HONDA CHOPPER MANUAL

DOZENS OF
HOW-TO-DO-IT PROJECTS

CONTENTS

The entire concept of a chopper is an expression of individual creation. It is one man's idea of what he thinks a bike, a custom chopper, is to look like. There isn't any pat recipe or procedure or any "right" way to make a chopper look. It can be a simple, lean "Frisco" styled chopper or a heavily chromed and loaded Eastern chopper. But it should be whatever the owner wants it to be and not just a blatant copy of somebody else's machine.

This manual is to assist the Honda chopper builder in the technical end of creating his personal machine. There is no real attempt to dictate guidelines or to lay down rules concerning what should be done and what the chopper should look like when the job is done. These things are for the owner to decide.

There are two ways to go about deciding how to make a choper. One is to sit down, take a long hard look at the bike and decide what changes need to be made to this machine for it to say something about himself. And it doesn't really matter if no one else understands the language of his creation. He knows what it says and that's all that's important.

But most will find this too difficult at first. They must build a chopper by assimilating ideas, by looking around at other people's machines and finding things that look good or feel right to them. He might look at the rear end treatment on a bike parked at the curb and feel that this is a good way to make his or that it's good but needs some more modifications along a certain line.

And then perhaps, a different machine will give him an idea for a gas tank or for a front end. A man who builds a machine in this way collects ideas from different sources for his machine while the first man pulls the ideas straight from his head. All of it is creating but the latter is a more pure form.

For years, the machine most popular for chopping was the Harley-Davidson FL series, the "hog." For the man who was down on money but had to have a bike, the cheapest ones around were the old Harleys, generally old police bikes. And so he bought what he could afford, even if it wasn't exactly a fun machine. The thing was usually loaded down with all kinds of garbage: windshield; moldy, stiff leather saddlebags with the dangly fringe around the bottom; big tank and an enormous seat. It weighed over a thousand pounds and rode like it too. Naturally, all that old crap had to come off in the effort to make the hog easier to ride. In those days, the slang to describe that operation was "to chop all that garbage off." Hence, the origin of the name "chopper."

Chopping went through the phases of lightening a Harley to making the Harley look better, to customizing any bike to make it look better. Recently, the most popular (and numerous) motorcycle in America has become the Honda. It was only a matter of time before it would also get the treatment. And since the big 750 Four hit the market, it has become the ultimate chopper to have. It's fast, light and sounds like no other motorcycle around.

This manual covers the four most popular models of Hondas: the 750, the 450, the 350 and the new 500. Raking and molding have been covered in some detail as they are considered the most important aspects of chopping a modern bike.

There has been an attempt to keep the level of operations down to that of the average home builder. There are many things that could have been covered and discussed but they would have involved special machinery, techniques and skills that the home builder just doesn't have. All of those dealt with here are possible to do in a garage. Some will involve renting or borrowing equipment, such as a spray painting rig, but it's all possible. Some of the operations in this manual are more difficult than others and will require a bit of skill on the part of the reader. Others are quite simple. The reader must decide for himself what he can do at this time.

The design of this manual is to assist the beginning to average home builder in creating his own customized Honda, his own expression of himself.

GEOMETRIC THEORY

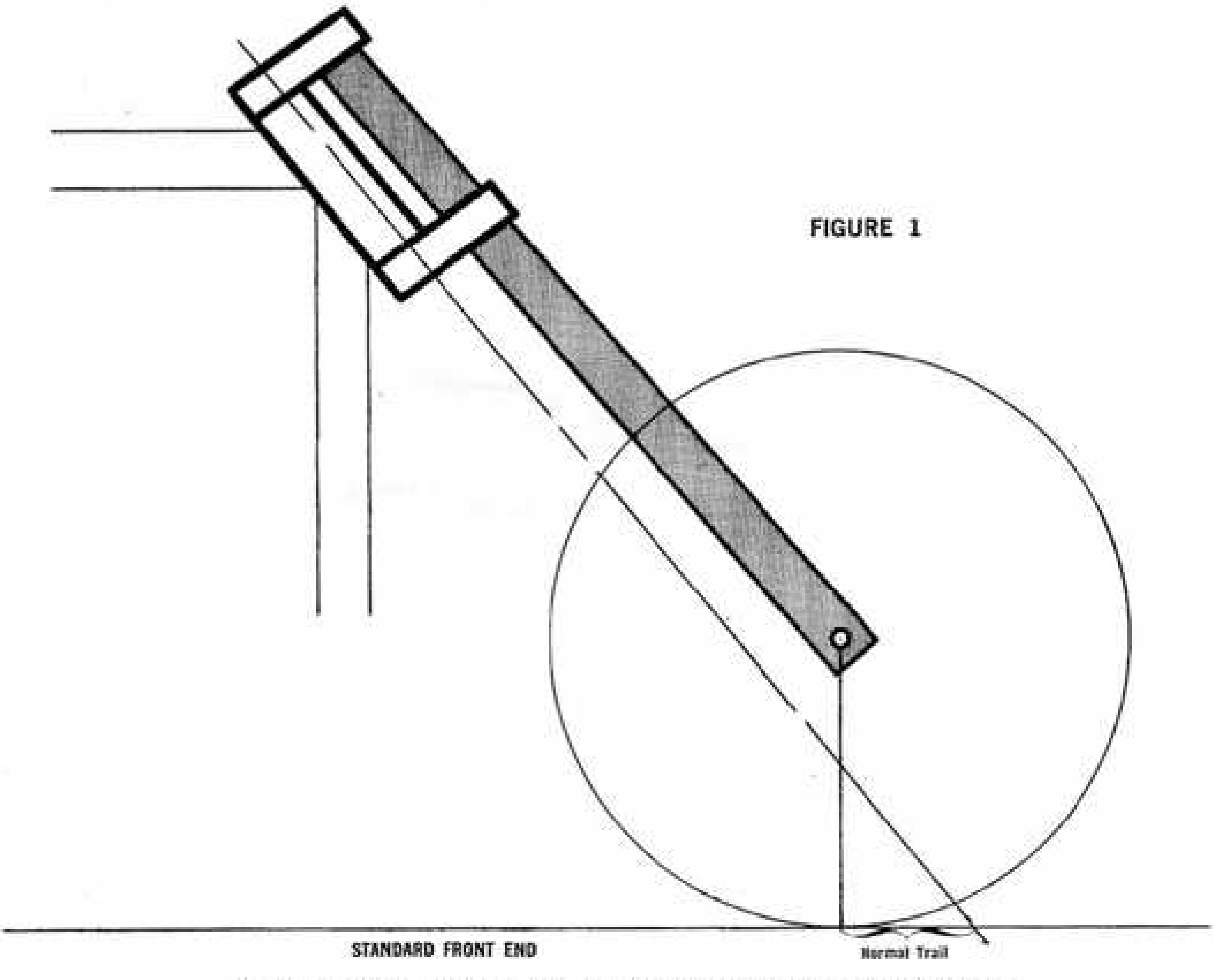
Before one should start cutting, hacking, and welding on a frame neck, steering theory and geometry must be clearly understood. Many will whack an inch from the frame top tube and extend the legs about 10 inches in a more or less blind fashion, without realizing how the handling will be affected. Unfortunately, what many don't see is the fine difference between a light, easy steering machine and a clumsy one. They both appear about the same to the untrained eye. The difference is very small in measurement but very large in effect.

Rake and trail are the two basic affectors of steering. Other things such as center of gravity, wheel size, amount of extension, handlebar size and shape, also affect the way a bike goes down the road, but they account for only about 20% of the total picture.

First an explanation of the difference between the two because there is some confusion concerning so-called "rake" plates. In some sections of the country, these altered triple trees are used as a cheap substitute for raked necks. The frame neck is left unaltered and the triple trees are cut and welded back together in such a way that the fork legs are kicked out at a greater angle. With this kind of a setup, the true rake is unchanged. What has been changed is the *trail* and the *wheelbase*. In extreme cases, the trail will be made negative and, if the legs aren't extended very much, the bike will be completely unridable. The front wheel will want to flop to the side and lock over against the stop. (See fig. 2.) It would take King Kong to hold the handlebars straight and even *he* would get tired on a long jam.

Extra-long fork legs and a heavy

FIGURE 1



A standard front end has a rake of about 30° and a trail of close to 5 inches front wheel will help to compensate for negative trail, but then the steering would be so heavy that it would just about take hydraulic cylinders to turn the forks. The heavy wheel would have a lot of gyroscopic action to hold the front end straight and the long forks would slow the steering down to where the rider might be able to quickly compensate for the squirrelyness and keep the scooter under control. But, even then, he couldn't steer it around a corner.

Normally, 30 degrees of rake and about five inches of trail are optimal. This varies a little because of center of gravity, total weight, percentage on each wheel and handling characteristics desired by the designer. A chopper can be raked up to about 45 degrees before things start to get unmanageable. Trail must be considered any time the rake is changed. There must be a small amount put into the front end: somewhere between 0 and 10 inches.

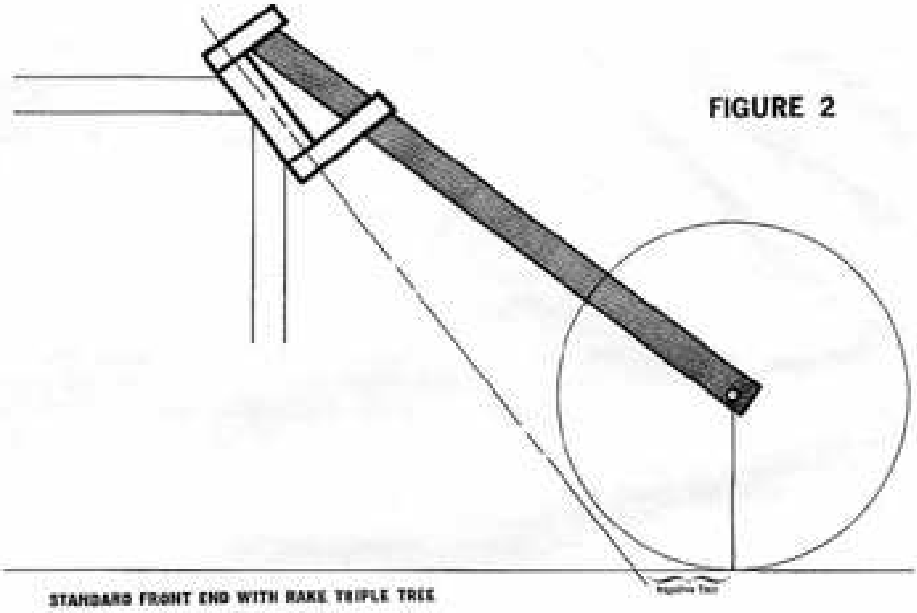
Fig. 3 shows what happens when a frame is raked and nothing is done about trail. A line drawn through the frame neck locates the steering pivot point. Trail is the distance from this point to the center of the tire patch. (If the tire is ahead of the pivot point, this is negative trail. Avoid this condition like the plague.)

When a frame is raked, and extended legs are put on, there will be too much trail. With a small amount of rake and extension, the steering will be heavy but manageable. On the open road, the bike will boogie along pretty much all by itself. Brave souls could take their hands off the bars, lean back on the sissy and relax. It would steer itself until curves came along. Then the rider would have to put some weight behind the bars to get it to follow the road.

Heavy rake and long extensions aren't much different from a standard machine out on the open road, but town riding is a first rate hassle. Lots of muscle power is necessary to hold the wheel upright at a stop and the bike will wander badly at speeds under 15 mph. The reason for this is that the steering line (the line passing through the frame neck) is getting close to parallel to the road, and if trail isn't compensated for, the tire patch will be far behind and below the steering line. It has about as much self steering effect as a swivel-jointed wheelbarrow. (See Fig. 4.)

By reducing trail, (moving the tire patch closer to the steering pivot point) the front wheel will lose the tendency to flop to the side. At zero trail, the front end will be light as a feather, even when the bike isn't moving. (See Fig. 5.) If negative trail is in effect, the front end will not want to turn at

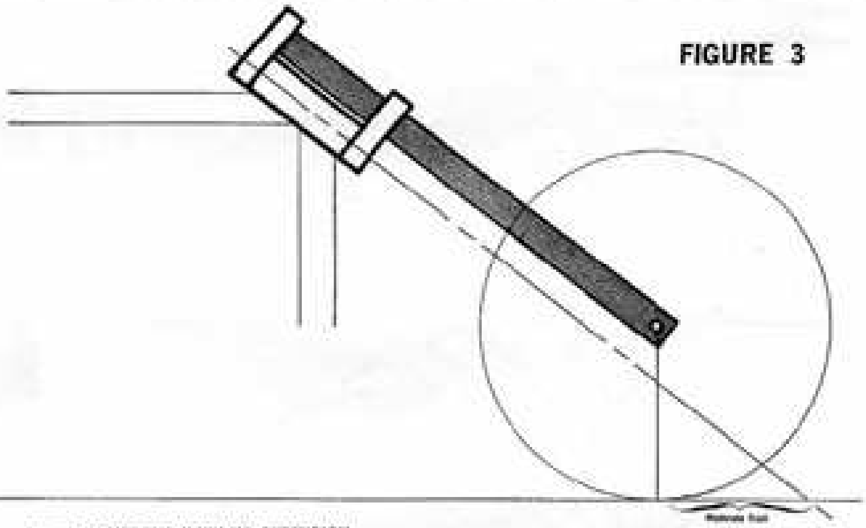
FIGURE 2



STANDARD FRONT END WITH RAKE TRIPLE TREE

Kicking the fork legs out with a raked triple tree can produce negative trail. Avoid this

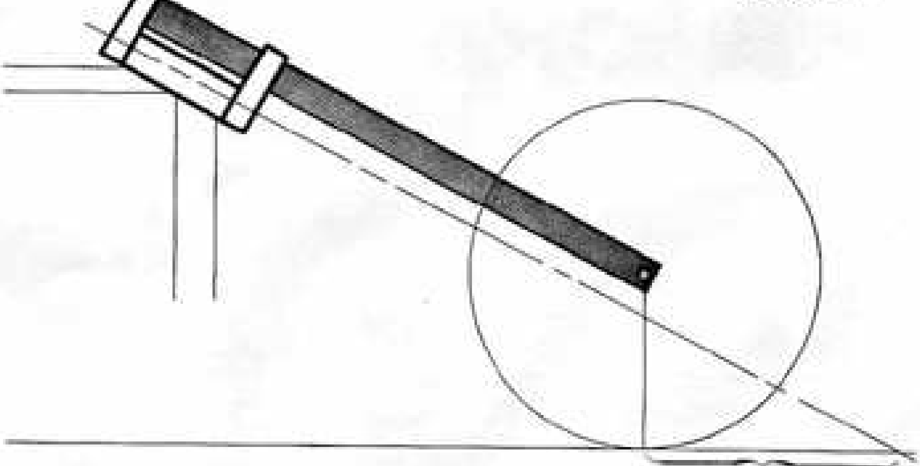
FIGURE 3



RAKED FRONT END WITH NO EXTENSION

Raking the frame steering head increases both steering rake and the amount of trail

FIGURE 4



RAKED FRONT END WITH EXTENDED LEGS

Raking frame and extending legs will greatly increase steering rake and trail causing very heavy handling all. Turning it to the side and releasing it, the front end will jump back to the straight-ahead position as if it had springs on it.

Ideally, the heavy raked, extra long front end should have just about zero trail. The rake will keep the bike in a straight line on the open road. Because extra long legs are on the heavy side, it's best to keep the steering feeling as light as possible.

How does one change trail? One way is to locate the wheel further forward on the fork sliders. Another is to alter the triple tree angle. The so-called "rake plate" has some use after all, if it doesn't have too much of an angle built into it. Be careful not to move the wheel ahead of the steering pivot point (negative trail). If one wanted to, he could take his upper triple clamp to a good welder and have about a quarter of an inch cut out but this has to be done by a good man. You don't want the weld breaking as you are jamming down the road. That would ruin the whole trip.

How much is cut out depends on how much rake and how much extension has been added to the front end. The figure will be somewhere between ¼ and ⅜ inch. It will then be necessary to bend the lower clamp to get the legs to line up with the altered upper clamp. Use some thought here because you may weaken the triple trees by doing all this cutting, welding and bending. It really isn't a good idea and a better one is to have new ones made up by a machine shop with the required angle built in. That's a bit expensive, but a hell of a lot safer.

If you are running a springer, the job can be a lot less complicated. Simply mount the axle further ahead in the rocker. This will decrease trail and it will also make the ride softer (and a little bouncier). If you're a heavy person, the springs may bottom on hard bumps. Should this happen, install heavier springs.

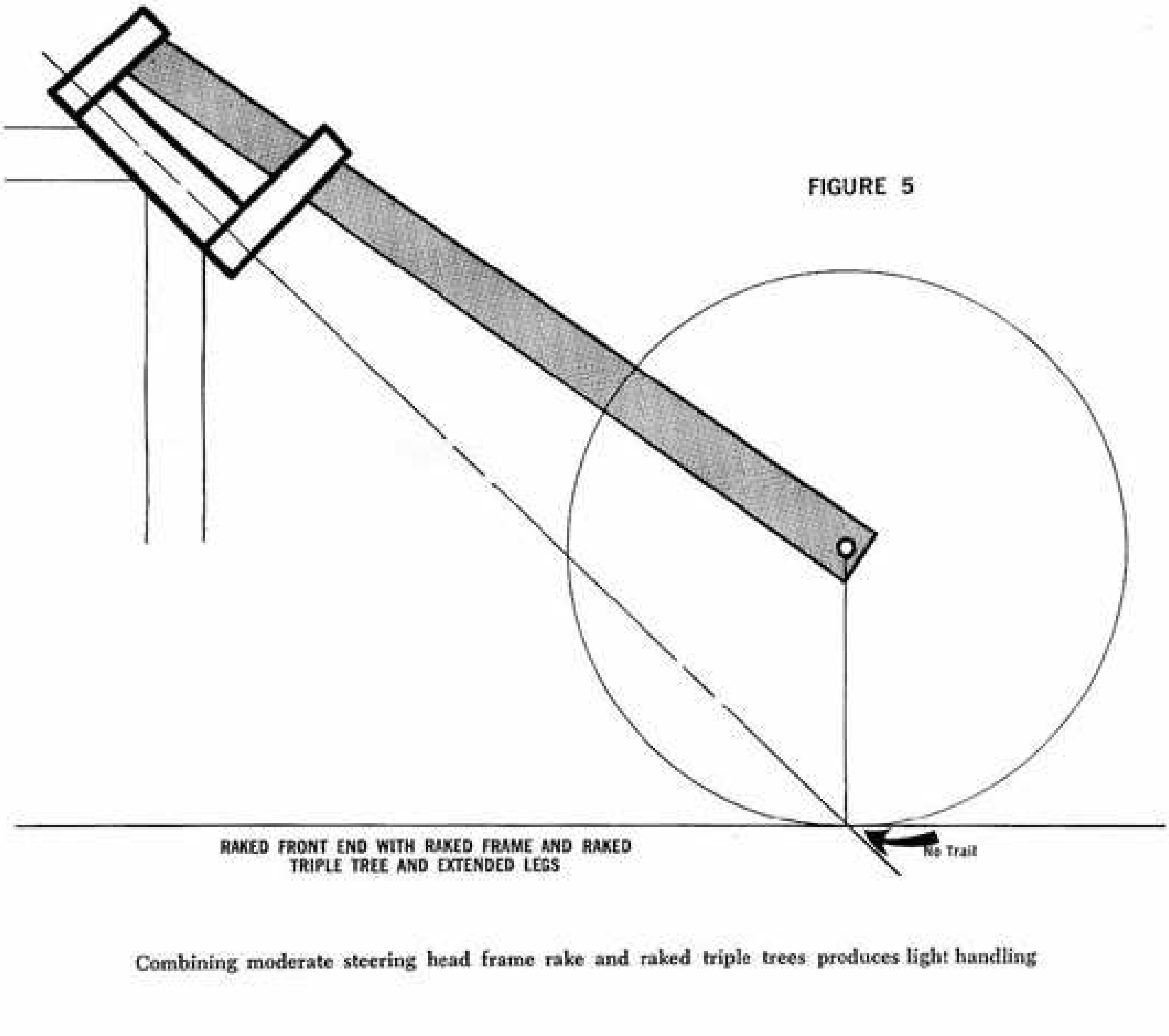
Sometimes the triple clamps on a springer can be altered to move the wheel closer to the steering pivot point but this usually involves some welding and that means a new chrome bill.

Girders, at first, look as though they would be easy to modify simply by shortening the upper links. But this will cause some problems in the way the forks work. All thin links should be of equal length so that they form a parallelogram. Making two unequal will put some Mickey Motion into the forks. A surer way would be to put a curved extension on the bottom of the legs, something like the rocker on a springer. This would move the tire patch forward and lessen the trail.

Another way would be to alter the triple tree pivot points that the links attach to. Move the top one to the rear to angle the legs forward and that will also lessen the trail for lighter steering.

Basically, keep the tire patch very close behind the steering pivot point if not right on top of it for light steering.

FIGURE 5



RAKED FRONT END WITH RAKED FRAME AND RAKED TRIPLE TREE AND EXTENDED LEGS

Combining moderate steering head frame rake and raked triple trees produces light handling

FRONT ENDS

The front end can be the biggest asset to the looks of your bike. It's the largest chrome piece and is the most visible from a distance. It's not our place to try to tell anyone the one best fork, because tastes are different, as are the applications that the particular front end must fulfill.

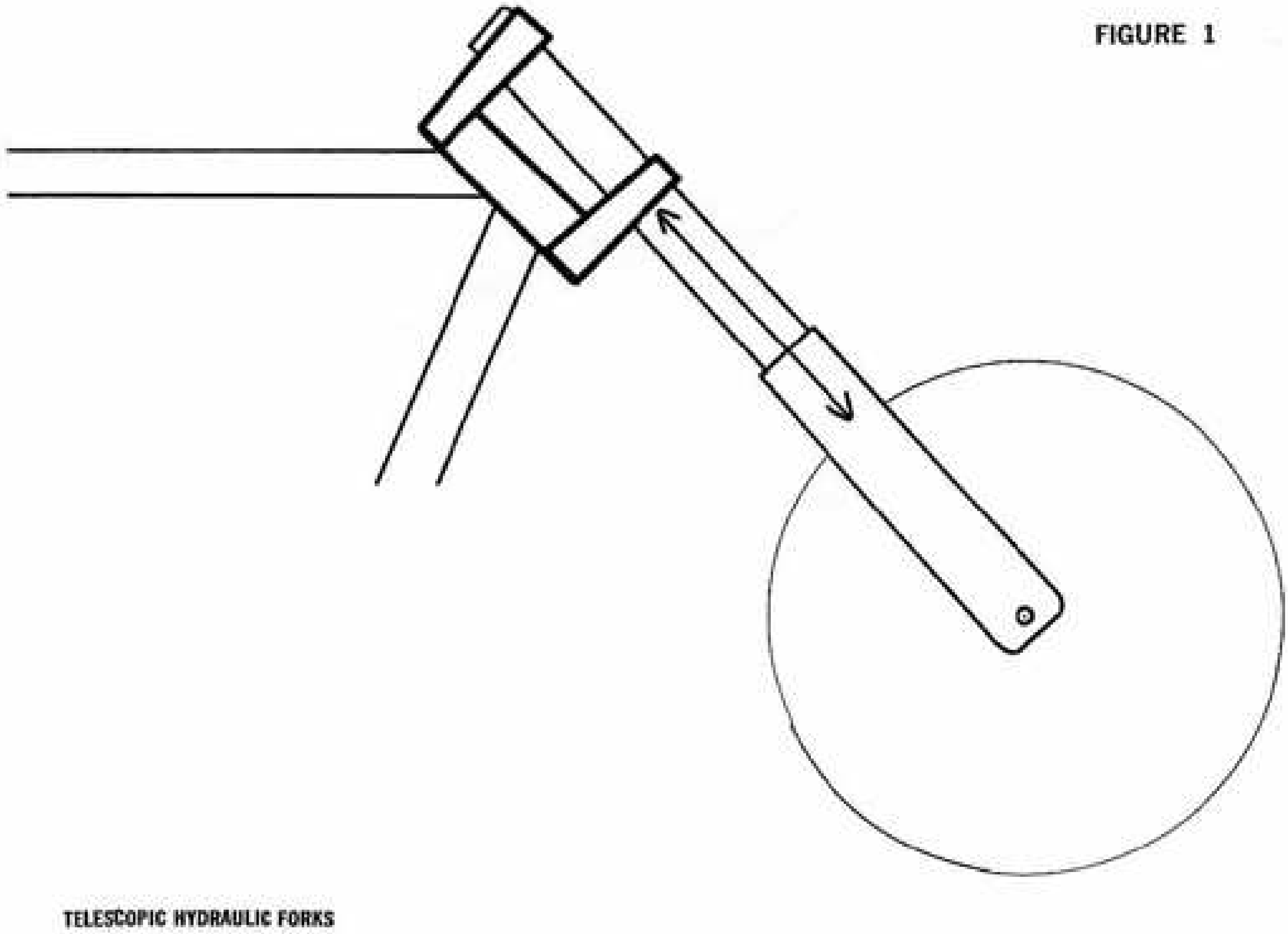
There are four basic types of front ends: telescopic hydraulic, springer, girder, and rigid, and all differ in their riding qualities.

STOCK FORKS

Nearly everyone is familiar with the telescopic forks. The operation is simple: A tube, to which the wheel is attached, slides up and down in another tube. A spring, either inside the second tube or externally above the first tube, supports the weight of the bike and absorbs the jolts and bumps transmitted through the wheel to the first tube.

However, if you tried to ride on a set of forks no more complicated than this, you would quickly discover that they don't stop bouncing after a bump in the road. What's needed is something to deaden the springing action. On well engineered telescopic forks, this is done through a hydraulic mechanism which works very much like a pump that moves oil back and forth to deaden the

FIGURE 1



TELESCOPIC HYDRAULIC FORKS

action. As the second tube works up and down, the pump absorbs the energy stored in the spring and dampens the action.

Each damping system must be matched to the characteristics of the forks and the weight of the bike. If the damping action is too strong, the bike will have a harsh, jolting ride as if the springs were too hard. And if the damping action is too weak, the rocking horse motion will prevail. The spring bounce must be cancelled out and no more.

SPRINGERS

Springer forks, standard on Harley-Davidsons for many years, are of the pivoting type. The front wheel is carried in an arm that is attached to the bottom of a long fork leg. As the wheel reacts to bumps in the road, the pivoting arm takes up the wheel motion to allow the bike to pass over them relatively smoothly.

A long leg parallels the fork leg, attaches to the pivoting arm at one end and to a spring on the other end. The pivoting arm pushes up against the springs through this long arm. Travel is usually limited to only a couple of inches, and damping is generally nonexistant, except for internal friction in the pivot points, which helps a little.

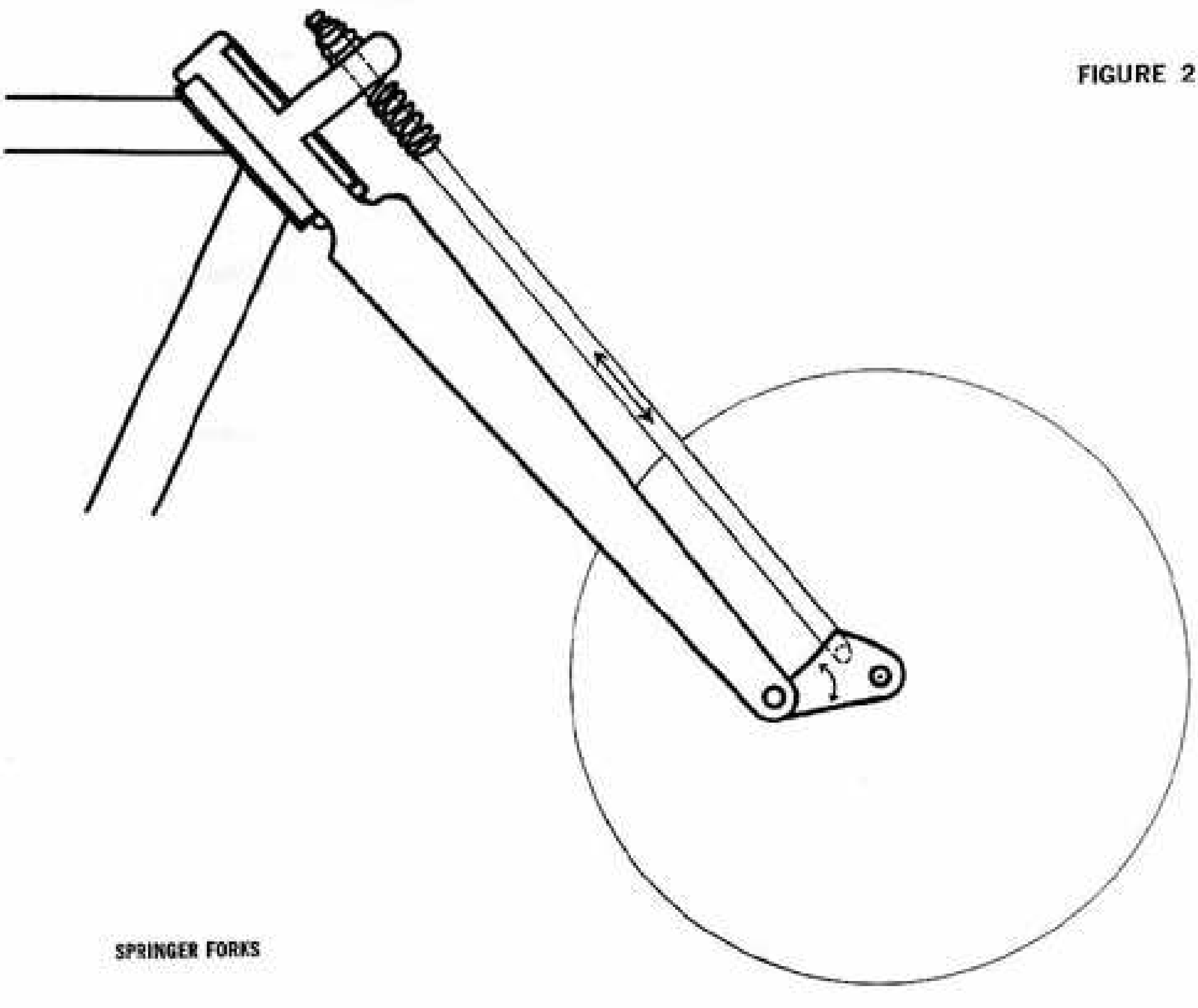
Advantages of the springer are that the extra-long forks will still work in situations where telescopic forks will not—that is, when custom raking makes the angle too great to get any action. As long as the lower pivoting arm is parallel to the ground, the springer will work. It must be remembered that the greater the fork angle, the stronger the springs must be. This is because of the mechanical disadvantage that the angle causes with the longer forks.

Problems with the springers are centered around flex inherent in the design. If the supporting leg is made big enough to do a good job of holding the rocker and wheel straight, then it's so big in diameter that it doesn't look very good. Not many people want a 1½ inch thick leg on their springers since the idea is to have a light looking front end.

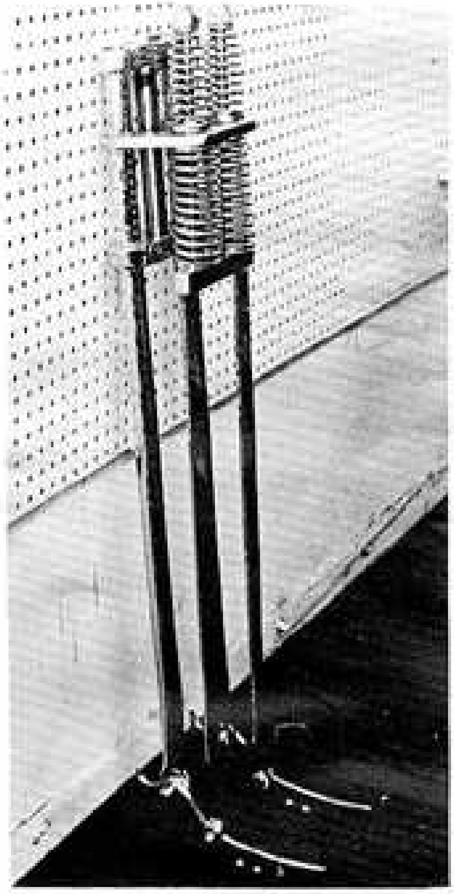
Even if the leg is made big, there's another hassle with the linkage in the pivot arm. Just a little play there is magnified greatly by the time it gets out to the wheel. Some manufacturers have gone to a needle roller bearing to help get rid of some of that slop but this type of a bearing isn't happy doing that job and they have a tendency to go belly-up sooner than they should. The problem is that needle bearings are intended to spin, not rock back and forth and their life is cut drastically in this rocking application. Most manufacturers use an Oilite bearing at the pivot points. It's not as tight fitting initially as the needle roller, but in the long run it stays tighter.

One appealing feature of the springer is the possibility of putting a longer pivot arm on without too much hassle. This would decrease the trail and help eliminate wheel flop on the super-long front ends. A handy side feature is the freedom to make that pivot arm into an ornamental shape to add to the looks of the bike if so desired. Shapes such as birds, swords, surf waves and curved designs have been used to make a bike distinctive and unique.

FIGURE 2

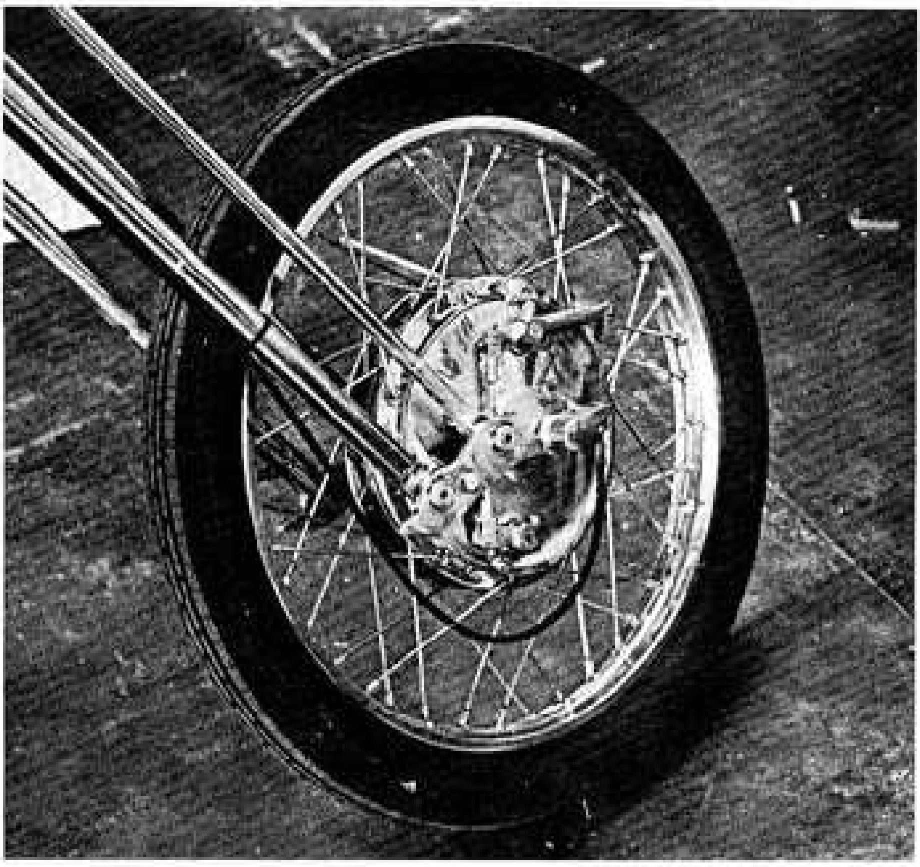


SPRINGER FORKS



Today's modern chopper springer fork is an adaption of . . .

. . . yesterday's Harley-Davidson FL springer.



Pivot arm on springer is located down low and connected by a long arm to springs near triple trees.

GIRDERS

Girder forks have been used by the Indian Motorcycle company and by many European factories up until the mid-1950s. Although they resemble the springer forks, they are different in operating principle. The front wheel is attached directly to a solid fork leg. Bumps and jolts are absorbed by a pivoting arm like the springer, but the girder has four arms instead of two (half on each side of the girder). On a springer, the wheel, pivot arm and spring leg move up and down to absorb bumps whereas, on the girder, the wheel, fork leg (also called a girder) and pivot arms move. A girder's pivot arms are located high, up near the steering head and the spring is located between these arms. Another difference is that the girder usually uses only one spring while a springer has four, two to control the bumps and two for rebound. The girder doesn't need any rebound control because a friction-type damper is often fitted. This device works very much like a steering head damper in that there are two friction plates pressed against each other. The pressure is adjustable by turning a knob or nut.

Girders look much cleaner and neater than springers. There is less clutter, fewer legs going down to the wheel and they are much easier to chrome plate and polish. Like springers, they work better than the telescopic forks when extended over 12 inches (as long as the pivot arms are kept parallel to the ground). Again, a stronger spring must be used to overcome the mechanical disadvantage of the extra-long front end.

Hassles are nearly the same: The front end flex is still a problem but not quite as much as with the springer. There are twice as many bearings (because there are twice as many pivot arms) to carry the load and they will last longer with some reasonable care and periodic greasing. The extra bearing surface helps to hold the girder better and the end result is a steadier bike going down the road.

So much for the principles, what else do you look for? What kind of steel is it made out of? There are some springers and girders on the market that are made out of ordinary mild steel. To compensate for the strength, solid bar stock is generally used for the legs and crowns. This makes for a front end that is decently strong but weighs close to 100 pounds. It not only hurts the ride but makes it difficult to steer.

Mild steel is easy to weld and the buyer can be reasonably sure that he won't have any trouble due to bad joints. It's also easy to chrome without hurting the strength characteristics because of hydrogenization and embrittlement, as is sometimes the case with exotic alloys. Also, if the bike should get into an accident where the forks are bent, it's fairly simple to straighten solid stock without distorting it as would be the problem with tubular fork legs.

While on the subject of welds, look at the joints. Are the beads consistent along the entire length? This is a sign that the welder is experienced. And do they form an even radius without looking either like a drop of water on a waxed surface or like a pit in the original surface? Either of these conditions would indicate that the welding was done improperly.

Also, avoid any welds that have been ground down smooth. All the bead is necessary for maximum strength. Besides, it may have been smoothed to hide a crummy welding job—one that will only break on you later out on the road.

Chrome is easy to inspect for quality. The most likely place for pits or holes in the plating is on the inside corner of a joint. This will be the first place that rust spots will occur on a second-rate job. Look around any holes (such as for pivot axles, headlight mount or wheel axle). If the chrome is very thin, the buffing process will have worn away the chrome on the edges of these holes to expose the metal underneath. It'll be a yellow color compared to the silver-white of the chrome and will show up later as rust.

A few other quality points to look for are the ends of the pivot axles. Have they been smoothed and polished to blend in well with the rest of the front end? Is the chrome mirror-smooth or does it have microscopic streak-like scratches in it? This would indicate whether the manufacturer went to the trouble to prepare the surfaces for a first-rate plating process. It's small things like this that mean a lot.

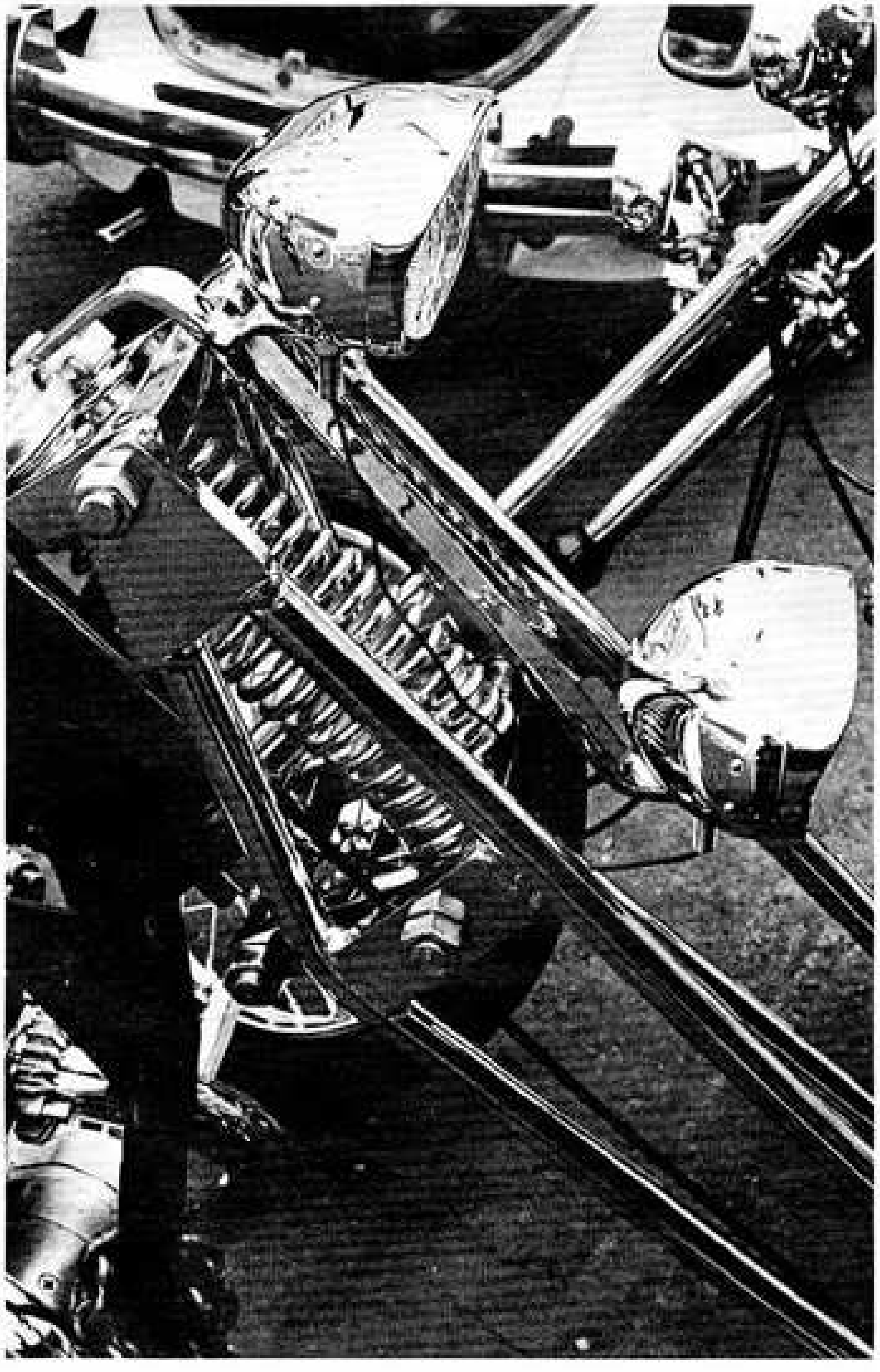
Tubular steel helps keep the weight of the front end down to a reasonable level but the length of most forks dictates a very strong steel. Most use chrome-moly 4130 for the most strength. The problem with this steel is the hassle in welding correctly. It not only has to be heli-arc'ed but also needs to be normalized to relieve internal stress built up by the heat of welding. In aerospace this is done by putting the welded piece into a jig to hold it straight and then into a heat-treating oven for a couple of days. Aerospace is government financed and they can afford to put out the heavy bread that this process entails but the fork makers can't do that. No one would be willing to pay $1000 just for forks. So they usually normalize their units by heating them with a torch until they just begin to glow cherry red for a few seconds. This isn't as good as oven normalizing but is better than doing nothing. An unnormalized piece is far too brittle and would break next to the weld on the first sharp jolt. Not exactly what the average rider would consider the hot set-up!

The problem with this is that normalization can't be inspected by eye. You don't know if it's been done right until after it's broken. About the only thing you can do is to find a company with a good reputation for strong forks. Ask other riders who have bought and used the forks that you are considering buying. They can tell you more than any dealer or brochure can (both good and bad points).

HYDRAULIC TELESCOPIC FORKS

Telescopics are simple enough. The only word of warning is to stay away from slugs. For those of you who don't know what they are, slugs are short pieces of steel that screw into the tops of the standard fork legs. The original idea was to cheaply lengthen the legs for the long look, but slugs have a couple of serious problems inherent in their design.

A front end with slugs is just barely



Girder pivot arms are located near steering head as is the spring. Note lack of rebound springs. . . .

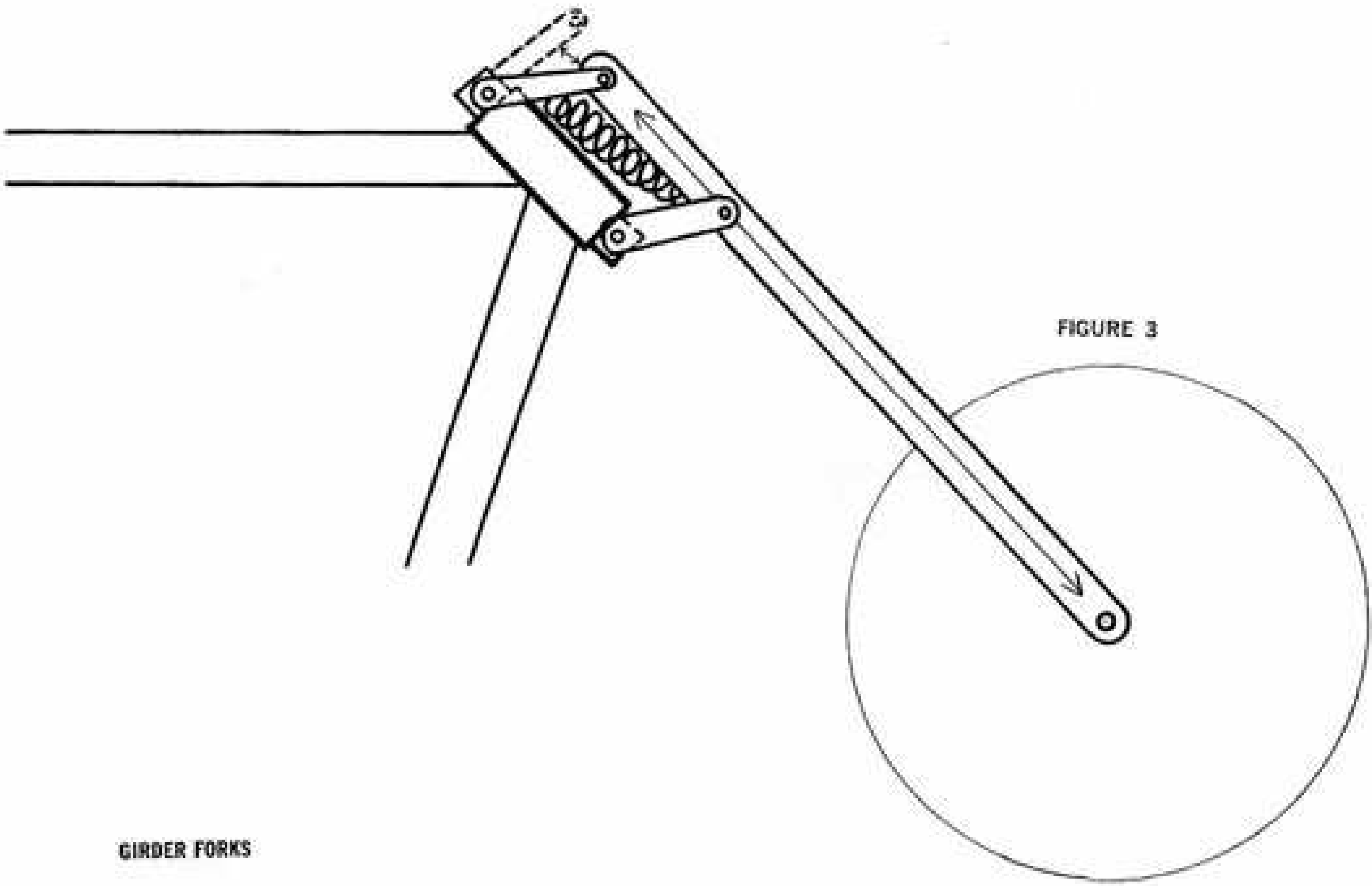


FIGURE 3

GIRDER FORKS

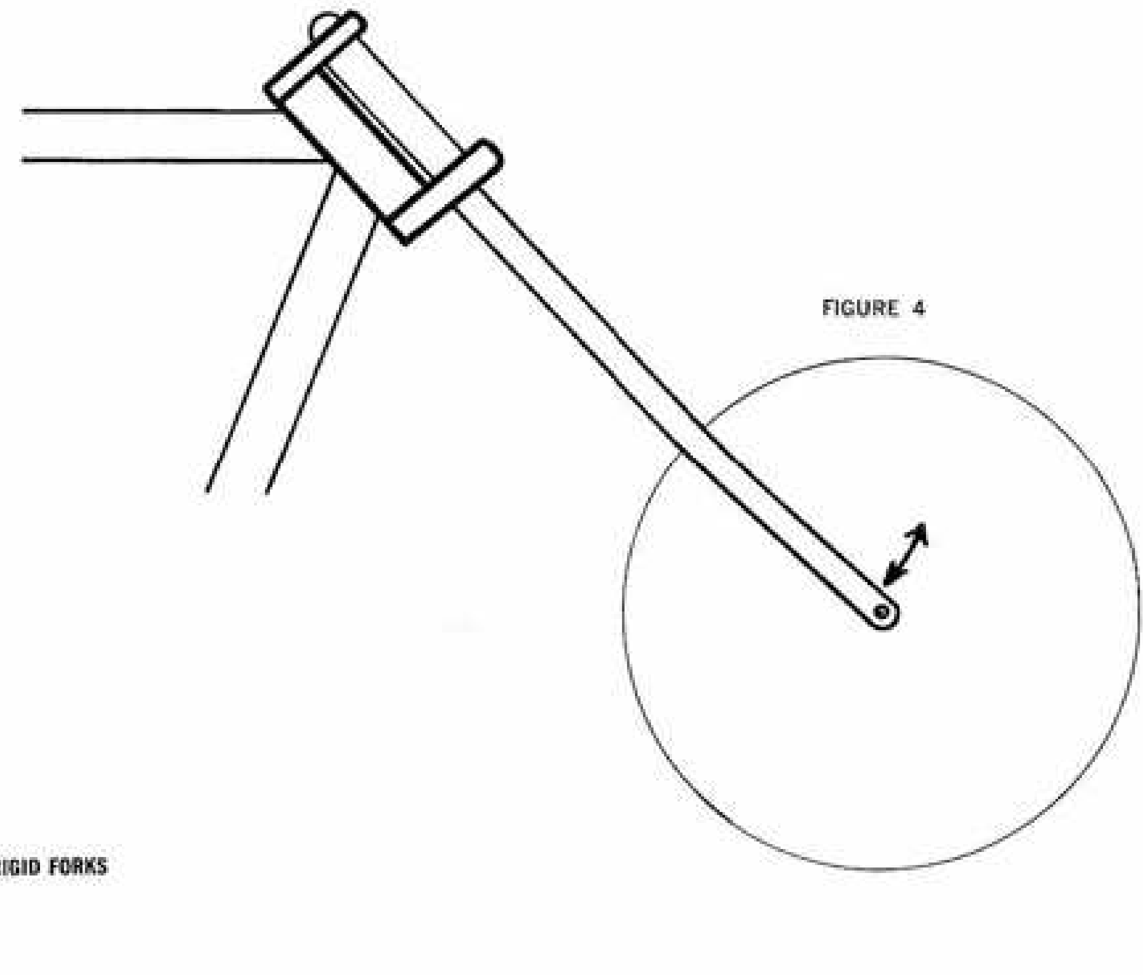


FIGURE 4

RIGID FORKS

strong enough to support the weight of the bike. Should the chopper hit a curb, chuck hole, or solid, immoveable object, the forks will break right where the slug screws into the legs. People have even tried brazing the slugs into place to add a little strength but it's not enough—they still break.

The second hassle is twist. When everything is down tight on a normal telescopic fork, the triple clamps help hold the legs straight and parallel. Each leg is held tightly in two places and any tendency to twist is counter-acted by the clamps. But if slugs are fitted, then the upper clamp holds the slug and the lower one is around the leg. If the forks try to twist, the slug will turn in the fork threads and the triple clamps won't be able to hold the legs parallel. Brazing will help eliminate this but it's still a much better idea to go to one-piece legs.

Most of these long legs are made of chrome-moly alloy for extra strength. Since there aren't any welds necessary in machining up legs, there isn't any problems using this tricky alloy. Plus, the extra strength is certainly welcome on those long forks.

Even with the one-piece legs, twist can still be a problem. Accessory legs are usually heavily chromed and this presents a slippery surface for the triple clamps to grip. They frequently have difficulty doing their job. It's a good idea to have a machine shop knurl a band around the forks where the clamps fit. This will get rid of most of the hassle. Many people fit a tweak bar to the fork legs to get rid of this twisting problem and it does a reasonable job. Sometimes the tweak bar serves as a stop for the springs when the bike hasn't been converted over to inside springs. However, the bike looks better usually without the outside springs or the tweak bar. Forks look a lot cleaner without all that foofaraw.

RIGID FORKS

For the ultimate in uncluttered front ends, the so-called rigid fork is without parallel. There isn't any sort of a mechanism to absorb wheel action other than the flex in the one-piece fork legs. The wheel is solidly mounted to the fork tubes and they, in turn are firmly attached to the triple clamps. Extremely long forks work best with this kind of an arrangement. The advantages are two fold: twist is held to a minimum and springing action is respectable.

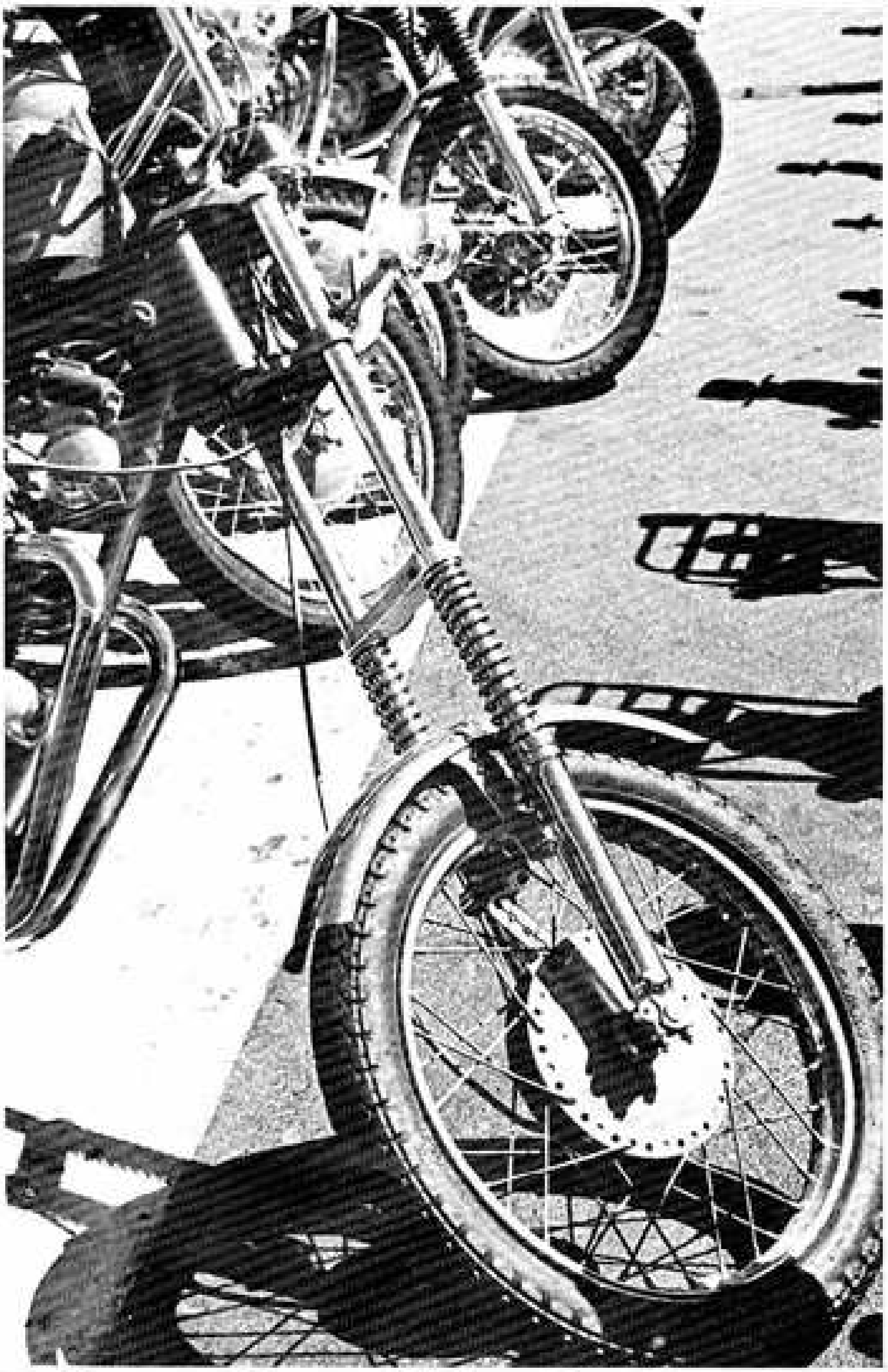
Drawbacks, however, include complete lack of any damping and a problem with the legs breaking right below the triple clamps. Nothing can be done about the damping but careful choice of a properly heat-treated steel for the legs and perhaps slipping another tube inside the legs to reinforce them at that weak point will eliminate the second hassle.

The best thing about this design is the very clean look. There aren't any extraneous tubes, struts or legs to mess it up. And chroming them is very simple, no problem getting a show-chrome job on them.

An enterprising soul on the East Coast recently made a unique front end out of leaf springs very much like those on a car. Three leaves were clamped into a specially made triple tree and these leaves curve gracefully down to the front wheel. As in an automobile spring, the ends of the leaves are staggered so that only the bottom one actually attaches to the wheel. A loop is bent in the end and the axle passes through this for the mounting point.

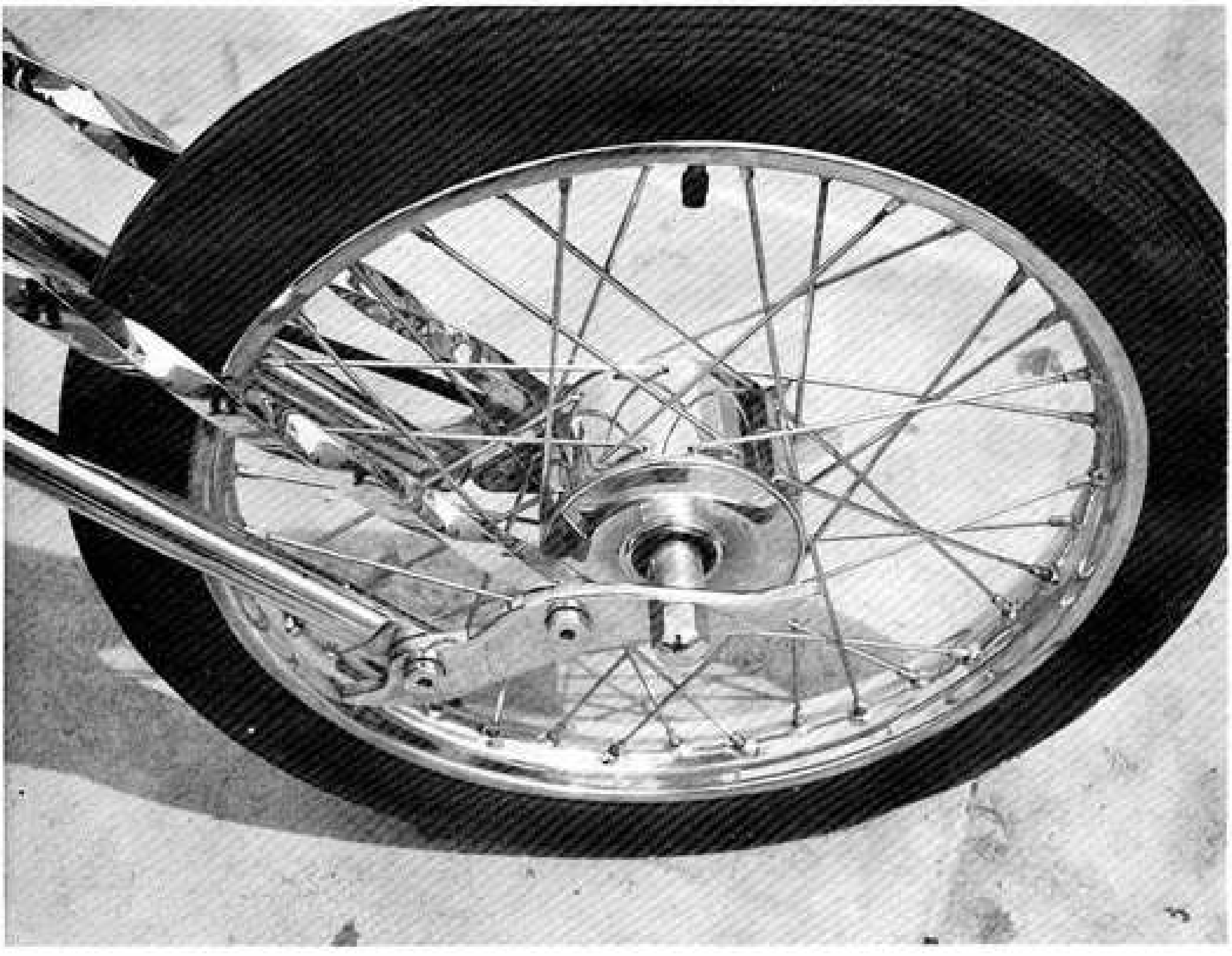
Damping is non-existant with this set-up. After a bump, it takes three or four seconds for the bike to stop bouncing but the spring action is tremendous. The bike feels like it glides over everything.

Once you know the principles behind each kind of a front end and its limitations, you will be able to pick the one that suits your needs best. Different strokes and all that.



Tweak bar serves double purpose: holds legs straight and also provides anchor for external springs.

WHEELS INTRODUCTION



Next to a quality front end, wheels are the most expensive parts to a good chop. They can run about $120 apiece, which is a lot of bread just to maintain the status of the scooter.

But wheels don't have to be super trick even if the rest of the bike is. Decent wheels will do just fine if the owner wants to save a few bucks. And it won't hurt the appearance as much as if the scrimping were done in other areas such as chrome or a front end.

Rear end treatment is simple. Lace in a chromed Harley rim and slip on a 5.00 x 16 tire. The fatter tire helps the looks of a chop by giving it a heavier rear end to contrast against a light front end.

Using the stock rear hub avoids a tremendous hassle in fitting up another one that wasn't designed for the Honda frame rear section. There would be a problem with spacers, axle size, sprocket location and rim off-set. Rim off-set must always be taken into consideration when the new Harley rim is laced in, but all the rest of that nonsense can be ignored if the standard hub is left in place.

On the front . . . anything! Anything that is legal (some states require a front brake) and anything that will fit the forks without falling off with the first wheely. Wheels ranging from a miniscule 3.00 x 8 wheelbarrow tire to a 4.00 x 19 to a 2.75 x 26 sulky wheel have been used with varying degrees of success. We say varying because, obviously, not all were intended for motorcycle use and it is possible to get into trouble by going too far out in the choice of a front skin.

Generally, the larger the diameter of the front wheel the better the bike will track down the road. The larger mass helps create a gyroscopic stabilizing force to keep the forks straight. For maximizing this effect, the 4.00 x 19 tire would be the best, but it is too fat and hurts the looks of the chop. Probably the best choice would be a 3.00 x 21 tire and wheel. It tracks very well and is large enough in diameter for the gyroscopic effect. The large diameter also helps smooth out the road. A little wheel will follow every small bump and tar strip while the big one will roll over most of them.

One point that has to be considered is what effect the wheel size will have on the steering geometry. Consider the two extremes: the 3.00 x 8 and the 2.75 x 26. On the same machine, these wheels will have a radically different effect. With the little one, the axle will be only seven inches off the ground, but nearly 16 inches with the sulky wheel in place. Ground clearance under the frame is affected, but the most important change is in the rake of the forks and the attendant trail. The 26 inch hoop will increase rake and trail to the point where the wheel will flop from side to side badly if there aren't any compensations for the increased trail. This effect would be in the acceptable range with less than six inches of extension but would get worse as the fork extension was increased. As was pointed out in the chapter on steering geometry, this can be corrected by decreasing trail, either through altering the triple trees or by moving the axle ahead in the springer rocker arm.

The small wheel has some natural advantages and disadvantages. A long front end combined with a small wheel help to cancel out the effects of each other with respect to the stock steering geometry. Combining the two usually results in geometry very similar to standard if the fork extension is no more than six inches. There won't be any wheel flop and the muscle required at the handlebars will be minimal. The bike will have the long fork look and the front wheel won't detract from the bike. It won't have the raked look but, at least, the scoot will be easy to live with around town.

Disadvantages are all inherent in the small wheel diameter. It doesn't have much gyroscopic effect. The front end will feel as though it's not very stable on the highway. And if you should run over a rock, a big stick or a little kid in the road, a fall is likely to result because the front end won't have any self-straightening tendencies. The gyroscopic forces aren't strong enough to overcome the deflection from the impact. The forks get turned and the rider gets the chance to inspect the road surface closely.

HUBS

Before deciding on which hub to run on the front of your scoot, check with The Man and find out if he has some laws that affect your choice. A number of states require a front brake and others allow you to run without a brake before a certain year models. It's also possible that some may have laws written into effect recently that restrict long front ends and chopping.

If your choice is open, then the best one as far as looks is concerned is the spool hub. It enhances the light look up front, especially when a 21 wheel is laced in.

But it is important that the disadvantages of this setup be recognized. Sixty percent of the braking effort is carried on the front wheel, and without it brake efficiency is cut down to less than half. The same is true even if a 5.00 x 16 is used on the rear. The reason for this is weight transfer. When the brakes are applied, the bike's weight is felt on the front more so than the rear. Heavy application of rear brake will only result in locking up the wheel and sliding because there isn't much weight pushing down on it for traction even with the 5.00 x 16.

With a front brake, this weight transfer is used to advantage. The extra pressure up front means that the tire has more traction to stop the bike. Without it, the rider must be extra careful and ride very defensively. He can't afford to get himself into a situation where he needs to brake hard.

Running with a spool hub helps the lines of the bike, not only by making the front end look light but also by eliminating the clutter of a brake cable and lever up on the handlebars. Going brakeless also eliminates the hassle involved with fork twist due to the brake arm being attached to one side of a sloppy front end. Some play is always present, even in a standard fork. But it's aggravated in the long springers and the brake pulling on one of the legs when applied can be a bit spooky. The bike wants to turn every time the rider slows down.

Another nice thing about spools—they can be laced radially. That is, the spooks don't criss-cross each other, they run straight out to the rim. It really makes a wheel look good, especially at night when lights reflect off the spinning wheel.

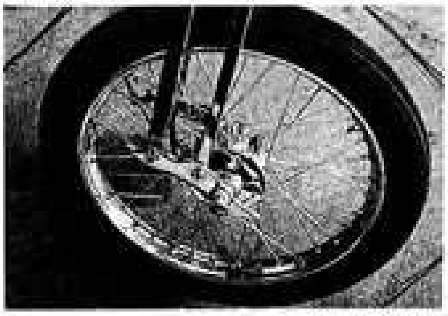
It isn't possible to lace a brake hub radially because this type of lacing has no torsional strength. The first time the brake was put on with any force, the spokes would twist right out of the rim. They must criss-cross to be able to transfer the braking action to the tire.

Spool hubs only have to hold the front half of the bike straight up in the air and the radial spokes will do this job just fine. Resistance to side flex is almost the same as with the normal criss-cross lacing method.

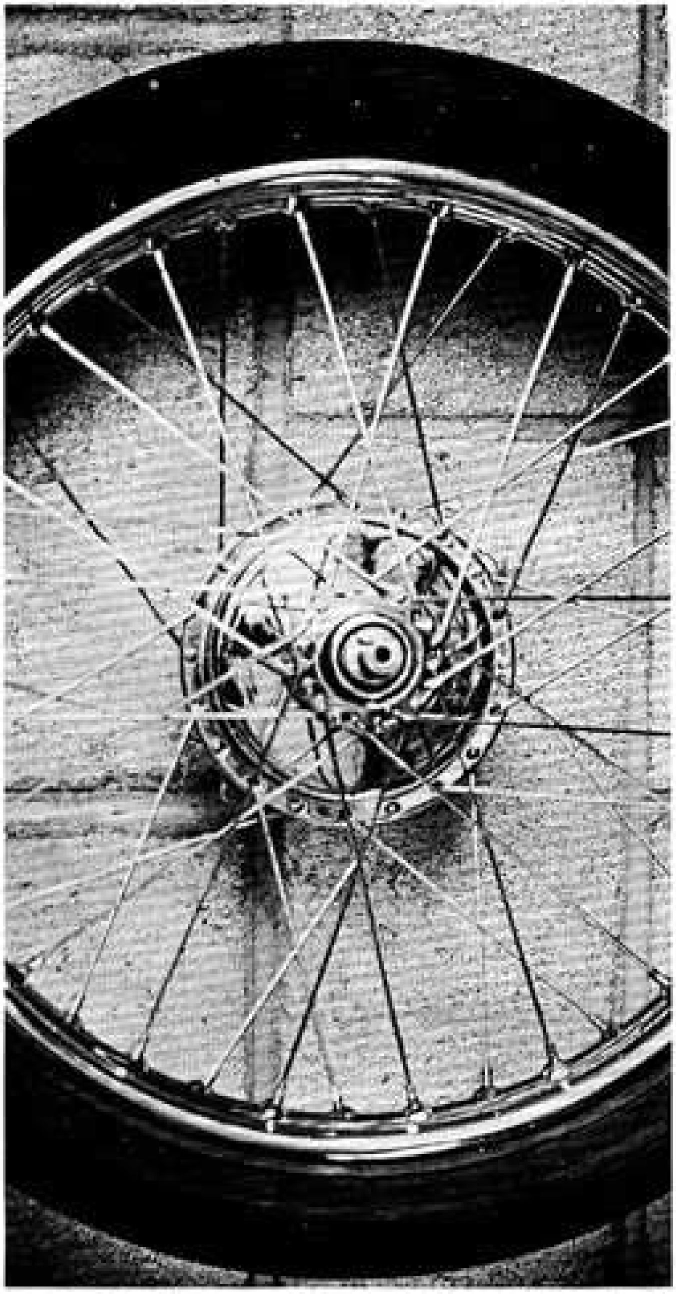
For those who like the looks of the spool but either want to run a brake or have to because The Man says so, there are a couple of alternatives open to him. There are some brake hubs on the market that are extremely small. These units will satisfy the law in most cases and usually don't hurt the looks of the bike. One unit in particular even looks like a spool hub. However, don't expect these little brakes to do the same job of braking as the standard Honda units. Size of the brake is what makes the difference and the little ones can't hope to perform like the others, especially like the hydraulic discs on late model Hondas.

Performance oriented chop builders should consider keeping a strong front brake. A rider who enjoys a high-speed jam needs good brakes to match that riding style. Things happen too fast at 70 mph. A rear brake alone won't pull the bike down fast enough if a little old lady pulls out of a side road right in front of him. Both brakes would slow him down enough so that the rider could possibly avoid the col-

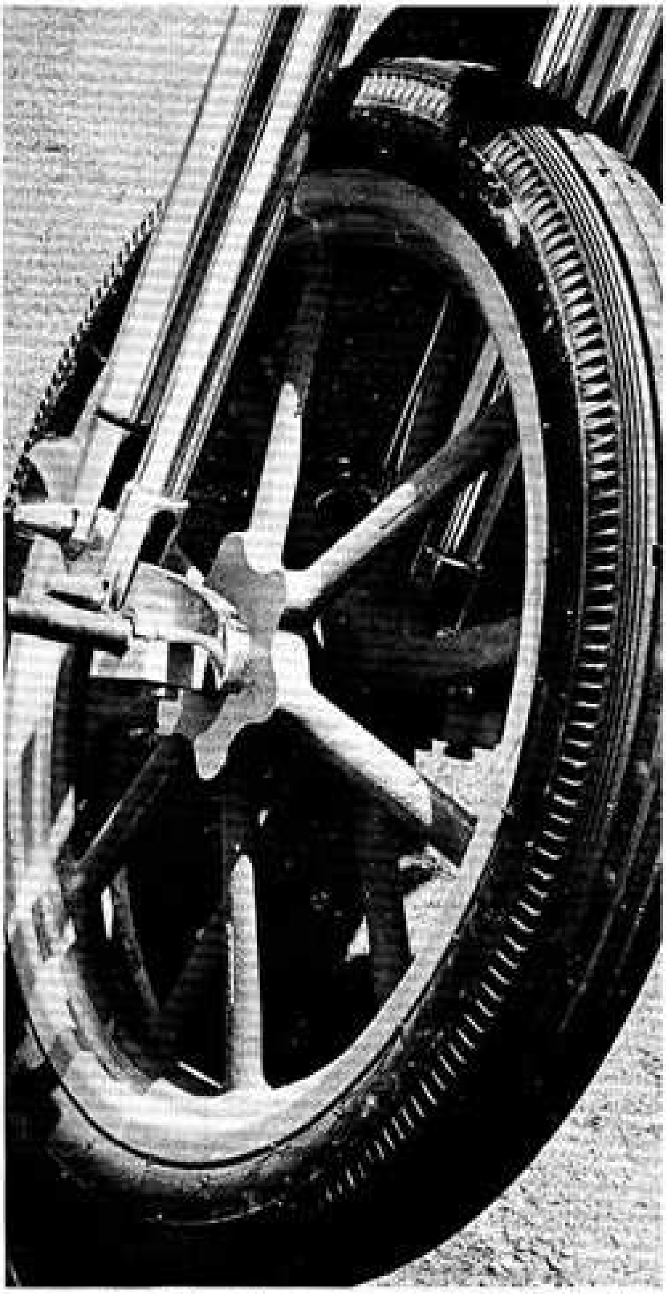
Spool hubs are probably best looking but some states have laws against them.



There are several accessory hubs available that look like spools and are legal.



Extra-long hydraulic lines can be a hassle finding. This bike has its master cylinder moved down and cable operated from the handlebar.



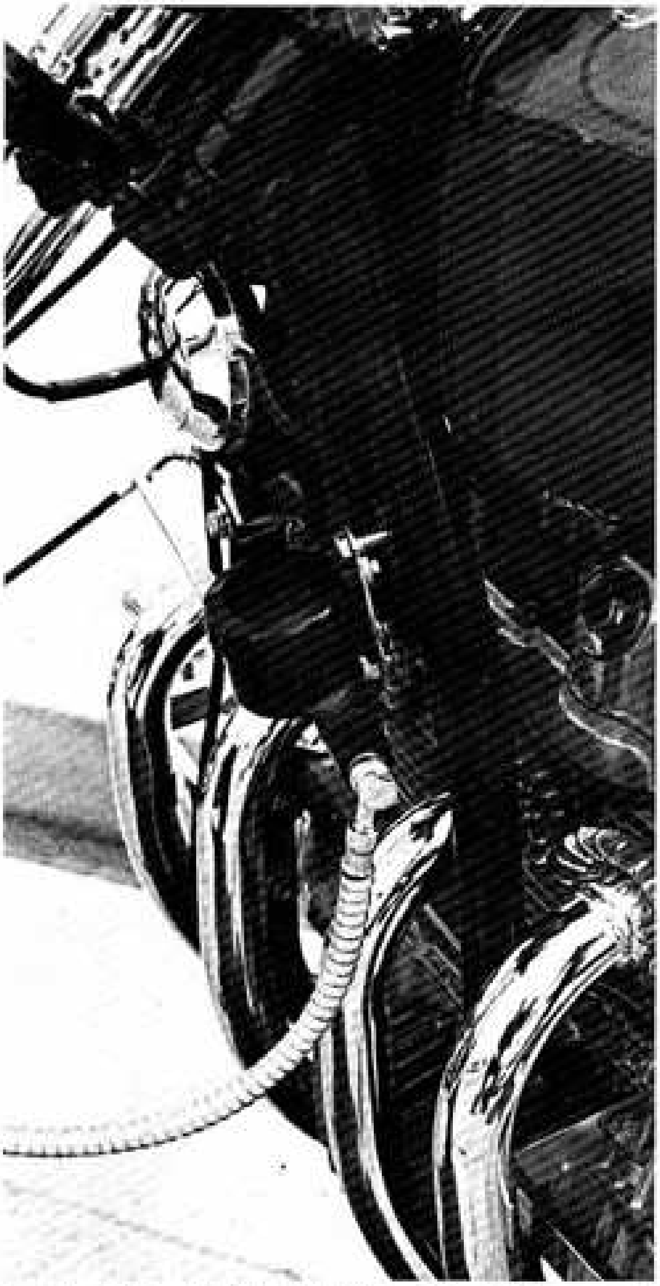
Small translucent Airheart lines can be adapted to the Honda cylinder and caliper fittings.

Standard Honda disc is based on a spool and looks good even in stock trim.

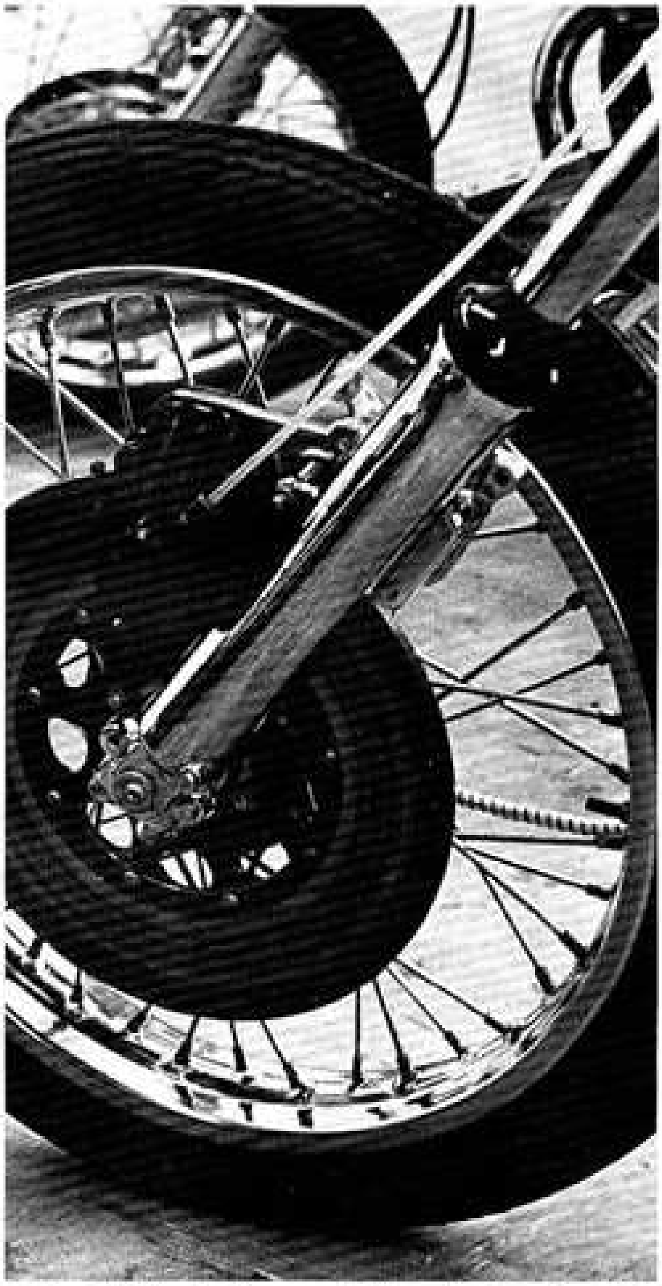
lision if not get stopped completely.

Honda makes some of the best brakes on the market. The disc arrangement is possibly the very best and a builder can't go far wrong in retaining his standard brake hubs. Like the rear hub, it greatly simplifies a number of hassles. Spacer, brake anchors, etc., are all ready made and in place. As was pointed out in the front end chapter, the man interested in jammin' is better off with an extended telescopic fork than a springer or girder, and his brake is already mounted for him on his standard fork.

Springer or girder adaptation can be something of a hassle mounting a drum, definitely a hassle mounting the disc. New lugs can't be welded on the forks without ruining the chrome, and most accessory forks don't have



A popular, but hard to find, hub is the steel model from an early Triumph Cub.



To be really different, fit any one of the various magnesium wheels to the chop.

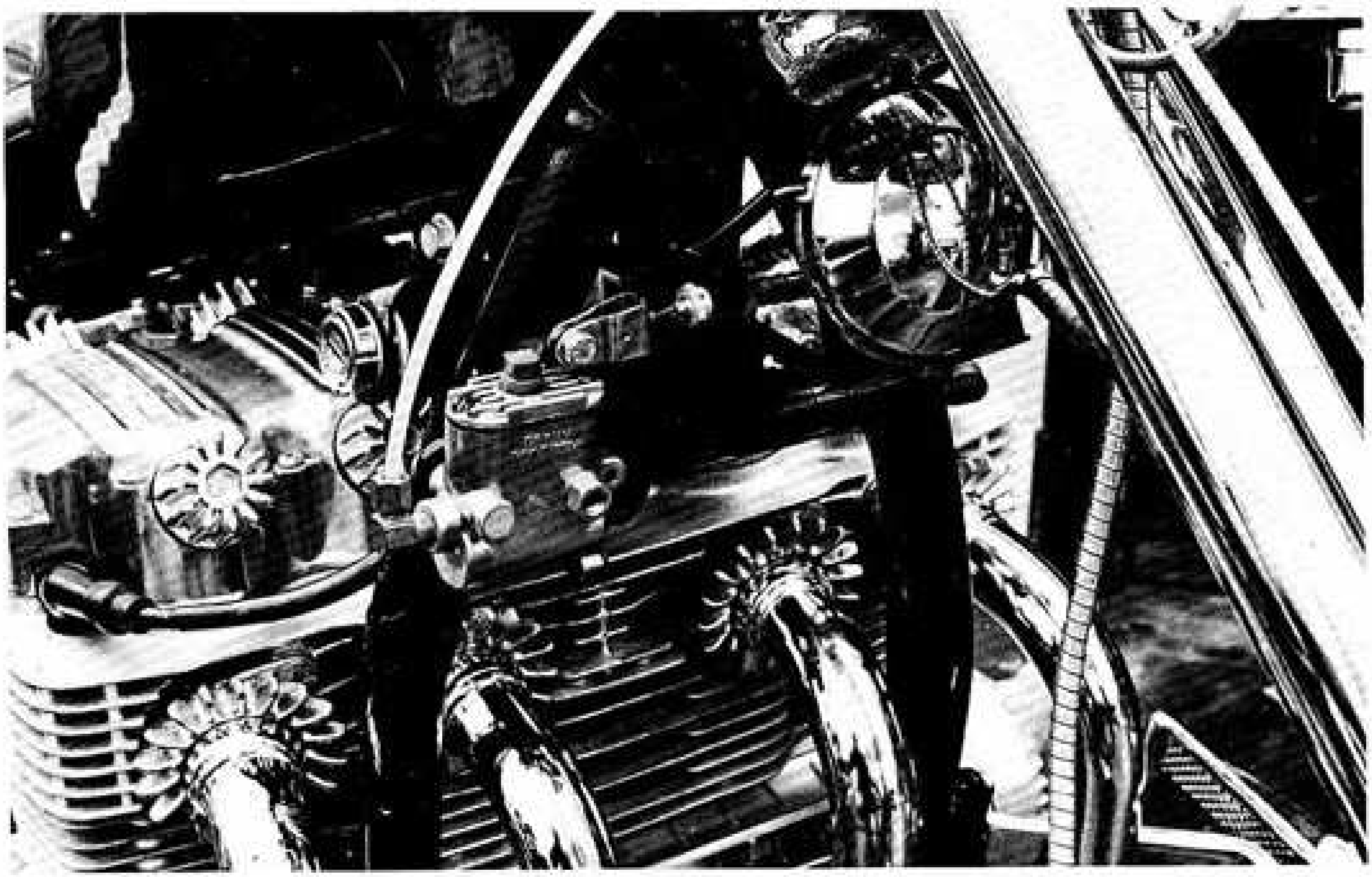
any provision for brake anchors, etc. This means that some kind of a clamp setup will have to be fabricated for the particular hub that is being used.

Another problem, one that has already been mentioned, is fork twist when the brake is pulled. This is caused by the brake anchor being attached to only one leg. The wheel pulls on this leg and causes the fork to flex around the other leg. The end result is a turning sensation on the entire bike each time the brake is used. How much depends on how much play there is in the forks and how much they've been extended.

One possible way around this is to use a double disc brake that is anchored on both sides so that each leg is pulled on an equal amount. Another, although very expensive, solution would be to use a four leading shoe roadracing

B

Drum brakes are best anchored to the rocker arm on springer front ends.



Another alternative is to use a cable operated Hurst Airheart master cylinder for a clean handlebar.

Standard drum looks good if heavily chromed up. Extra braking from big drum is a good safety factor.

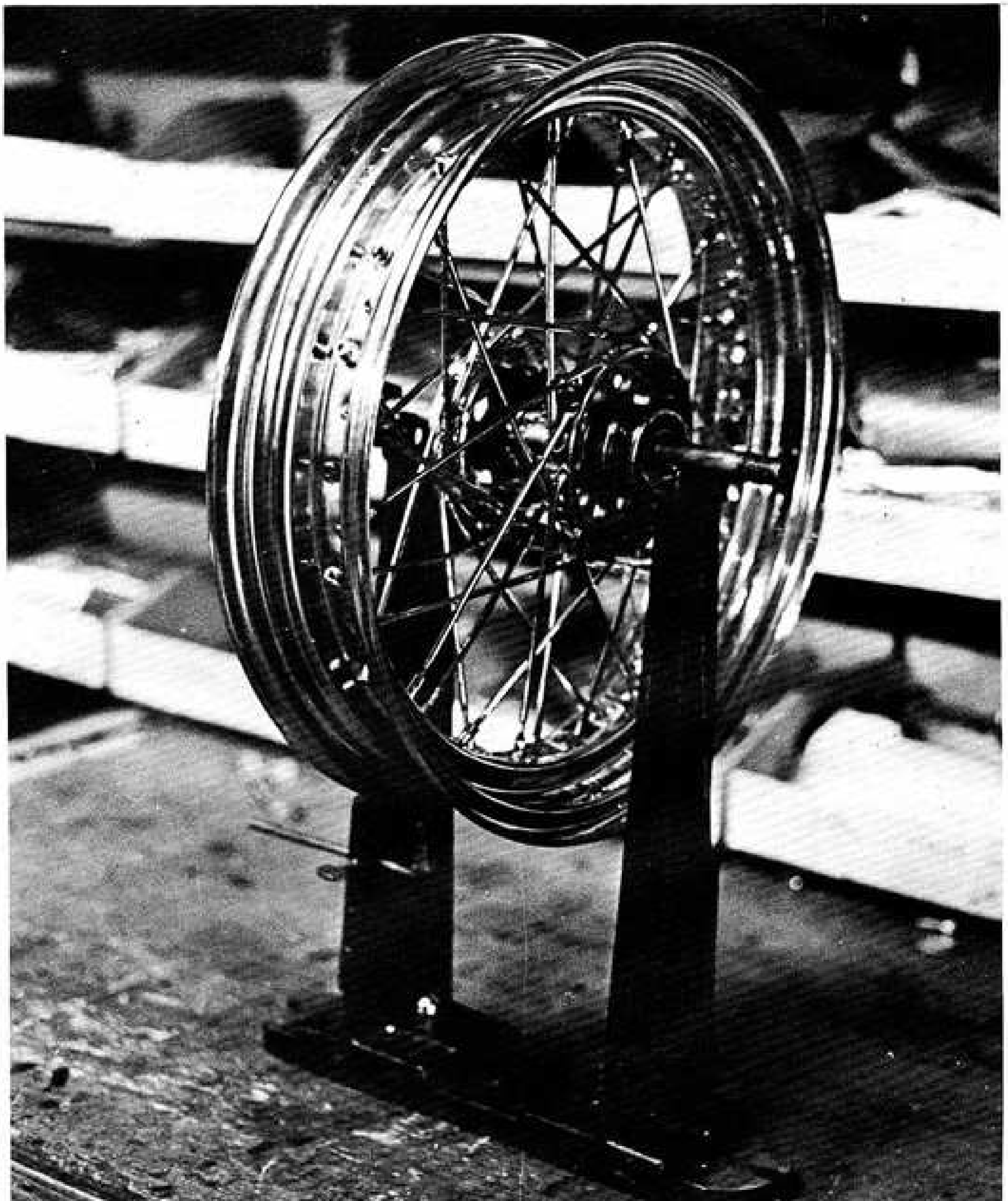
brake which also anchors to both fork legs. But, in addition to being very expensive, ($250) it's also very large and bulky.

Small brakes have been very popular on choppers, notably the Honda 90 front unit. It has proved to be a reasonably strong and troublefree unit. Larger ID wheel bearings have to be fitted for the standard axle, but that's a relatively minor hassle.

However, chroming any aluminum alloy hub is always a hassle. It must be done by an expert or it'll flake off and look cheap. Plating costs for aluminum done properly run just about double that of plating steel. It is for this reason that the old Triumph Cub front hub has proved popular. It's small, good looking and is easily chromed as it is made of steel.

On girder forks, anchor the drum brake directly to the leg. (This happens to look like a springer.)

WHEEL LACING



Wheel lacing is a job that you can do yourself and save about $15, which you can spend on the things that you can't do yourself, like chroming. But, it can be a hassle job, one that will make you bananas in short time if you don't know what you're doing. The principle is simple enough: just get all the spokes tightened down the same amount and end up with a rim that spins true. Both of these requirements are tricky.

Trick number one is to use the bike itself as a trueing stand. Prop it up on a sturdy box and you have saved another $25 on the ready-made stand.

Trick number two is to measure the amount of off-set in the rear wheel *before* you take the old rims off. If you should lace up the new 16 inch rim and get it too much off to one side, the bike will not want to ride straight.

Since you're using the bike as a trueing stand, measure from the center of the old rim over to some handy referance point, something like the brake arm or the mounting tab to the chain guard. Just something that you know isn't going to move. Now you can remove the old rim and spokes from the hub. The new rim will be centered in the same place.

Lay the hub down flat on the floor and put the rim down around it in the position in which it will be laced. The next step is to put the spokes in place loosely. You have two kinds of spokes: inside and outside (although some spoke suppliers have taken to selling just one type for both applications.) The difference is in the angle to which the head is bent. An inside spoke head isn't bent to a full 90 degrees like the outside spoke. Take a close look at yours and separate the two types. If you were sold just one type (they would be all inside types), don't worry about it too much; you can fix that later.

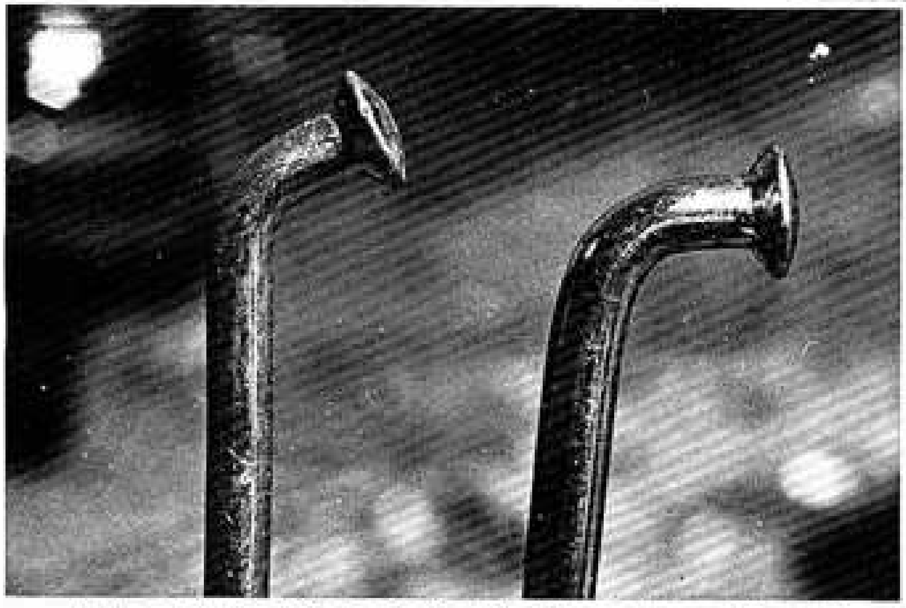
What is meant by inside or outside spokes is that the spoke lies on the inside or outside of the hub flange. An inside spoke would pass through the flange hole from the outside to the inside. The head of that spoke would be visible from a side view of the hub and the body would be on the inside of that flange as it passed out to the rim. An outside spoke is just the opposite. The body of the spoke would be on the outside of the flange and the head would not be visible.

Set the outside types (90° head bend) aside for the time being and put all the inside spokes into place. Ten spokes will go into each side of the wheel, in alternating hub holes. Later the outside ones will go through the empty holes. You should see all the spoke heads facing outwards in every other hole, ten on each side of the hub.

Now comes the trickiest part—getting the spokes going to the proper hole in the rim. Angle all the spokes off in the same direction. It can be either clockwise or counterclockwise, it doesn't matter. (If they pointed straight out from the hub, that would be radially spoked. That will be covered later.)

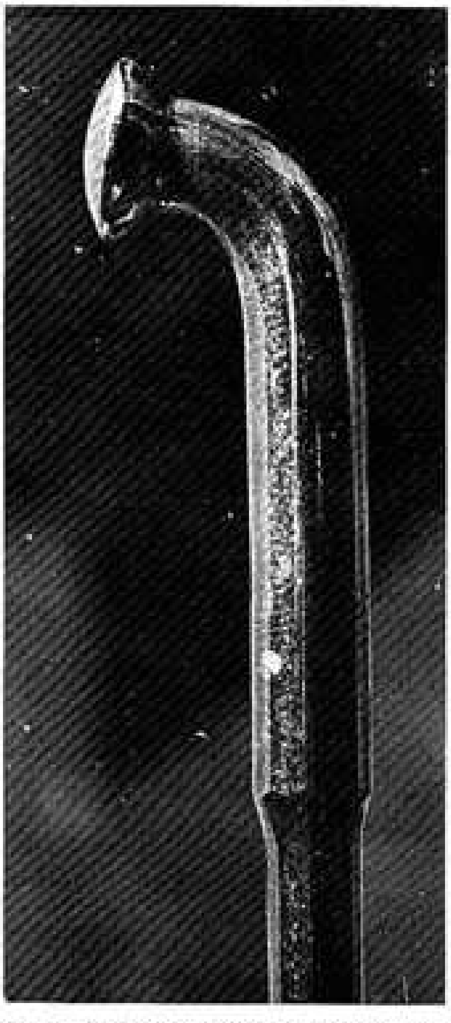
Pick one spoke on the upper hub flange and look straight across it to the spokes in the lower hub flange. You'll see that they don't line up, that they are all off-set from one flange to the other. If they weren't off-set, then two spokes would line up with the same hole in the rim and nobody has yet figured out how to screw two spokes into the same nipple.

Pick one spoke in the lower flange and find any one of the ten holes in the rim that will line up best with that spoke. Half of the rim holes point off in entirely the wrong angle for the inside spokes and half of those that



Inside spoke (on left) has head angle different from outside spoke.

Nipples (10, 9 and 8 on right) will require different rim holes.



Tapered spoke has 9 ga. head and tapers down to 10 ga.

remain point off to the wrong side of the hub. Put about four turns on the nipple to hold the spoke in place.

Pick up the next lower spoke and you will notice that it lines up perfectly with the rim hole that is four over from the first one that you did. It goes all the way around the rim that way. Every fourth rim hole lines up with one of the inside spokes on one flange.

Look again at the rim and you will see that the other inside spoke hole is right next to the set that you just did. It will be either ahead of or behind it, depending on how your eyeballs are looking at it and whether you angled the spokes clockwise or counter-clockwise. For the sake of directions, assume that the other inside rim hole is clockwise from the first. Look carefully across the hub flange and pick the spoke in the upper flange that is just a bit clockwise from the one below it. Run that spoke to the rim hole that is just behind the lower spoke. It should reach that hole perfectly but you may have to move the rim around a bit to get it to line up since all the spokes are still loose.

Again, each of the spokes in that upper flange will line up with every fourth rim hole. Put a nipple on each and turn it down about four turns.

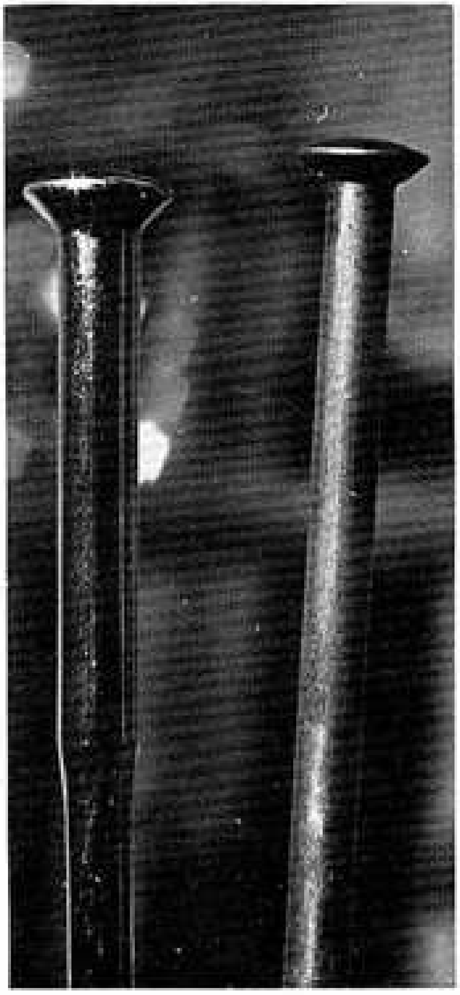
You're ready to put in the outside spokes now, but if you pick up the wheel to put them in, the whole thing will sag and get all out of shape. It won't cause any harm but it may be a little confusing to you to get it back to where you can see what you're doing. So, carefully slip one outside spoke into each flange without letting everything get out of shape. Take the spoke that you put through the upper flange and angle it off in the opposite direction as the inside spokes. (Remember, you want them to criss-cross.) It should line up fairly well with one of the rim holes and a nipple will hold that spoke in place well enough for you to turn the wheel over and do the same with the one spoke on the other flange.

It'll make matters a great deal simpler if these two outside spokes are put into holes that are nearly across from each other on the hub. This way you can check to see if you have them going to the right rim holes. They should match up with the rim holes in exactly the same manner as the inside spokes did. That is, the spokes will be off-set a little so that they will match the rim holes properly. You may have to play around a bit with them to get them to line up but it won't be any great hassle.

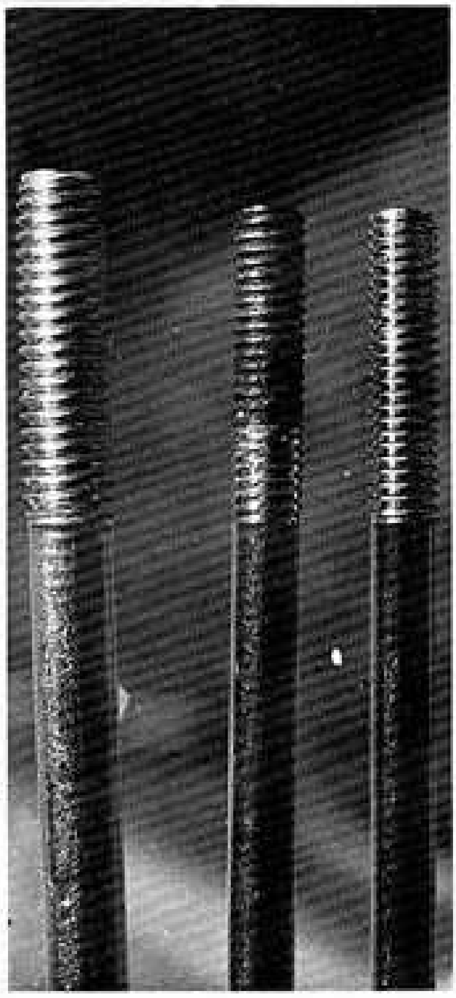
Those two spokes will keep the wheel together well enough for you to slip all the rest of the outside spokes into the hub and then to line them up with the proper rim hole.

What you have now is a loose wheel that looks like a spider web made by an anemic black widow. All the spokes are much too loose, but if you randomly start tightening them up, you will certainly end up with a wheel that belongs in a circus. They have to be tightened carefully and that's where trick number three comes in.

With the wheel back in the bike, rather than tightening all the spokes at once, work with just eight of them. It'll be necessary to mark them with tape or grease pencil so that you don't lose track of which ones you're using. Find them first by looking at the rim and locating two spokes that form a broad "V" at the rim. Directly opposite this "V" will be another "V" and two more will be found halfway around the rim. These four "V" intersections will be located 90 degrees apart, and the two spokes associated with each will make up the eight that will be used to true the wheel. The accompany-



Some hubs require a straight spoke. This is strongest type.



Spoke gauges run from 8 ga. on left to 9 and 10 ga. on right.

If rim holes are too big, a nipple washer can be used.

Lacing Honda hub to 16-inch rim is actually relatively simple because spokes are short.

ing photographs show only those eight spokes. Your wheel will have all 40 in place and may be confusing until you have studied it awhile.

The frustration step is next: the actual trueing of the wheel. Set the wheel into the frame and tighten the axle down. Spin it to see how far off it is from being true. Side-to-side wobble can be as much as 1/16 of an inch but the run-out (out-of-round wobble) shouldn't be more than 1/32 of an inch.

To help you see this wobble, clamp a piece of wire to the fork or swing-arm and bend it in such a way that the tip of the wire will be located close to the rim. This will give you a stationary reference point to measure the wobble.

Working with just those original eight spokes, get the wheel so that it is fairly close to being free of run-out. As you spin the wheel, you'll see that one side is "high". This spot acts like a bump on the rim as the wheel is spun. Tighten the spokes under this "bump" while loosening the spokes opposite the wheel. (If you don't loosen these spokes, the wheel will be squeezed in an egg-shape.) Don't worry too much about the side-to-side wobble at this point. As long as it's no more than a half-inch, you don't need to hassle it yet.

Work slowly, turning the nipples in or out just a little at a time. You must be careful that one of the spokes isn't turned too tight and distorts the rim. Check for this by gripping a spoke in the middle and wiggling it from side-to-side. The flex should be about a quarter of an inch either side from the center line. Also check the other spokes (the ones NOT being used to true the wheel) to be sure that they are completely loose. It's tricky enough to true the wheel with eight spokes, you don't need others entering into the game and throwing you a curve.

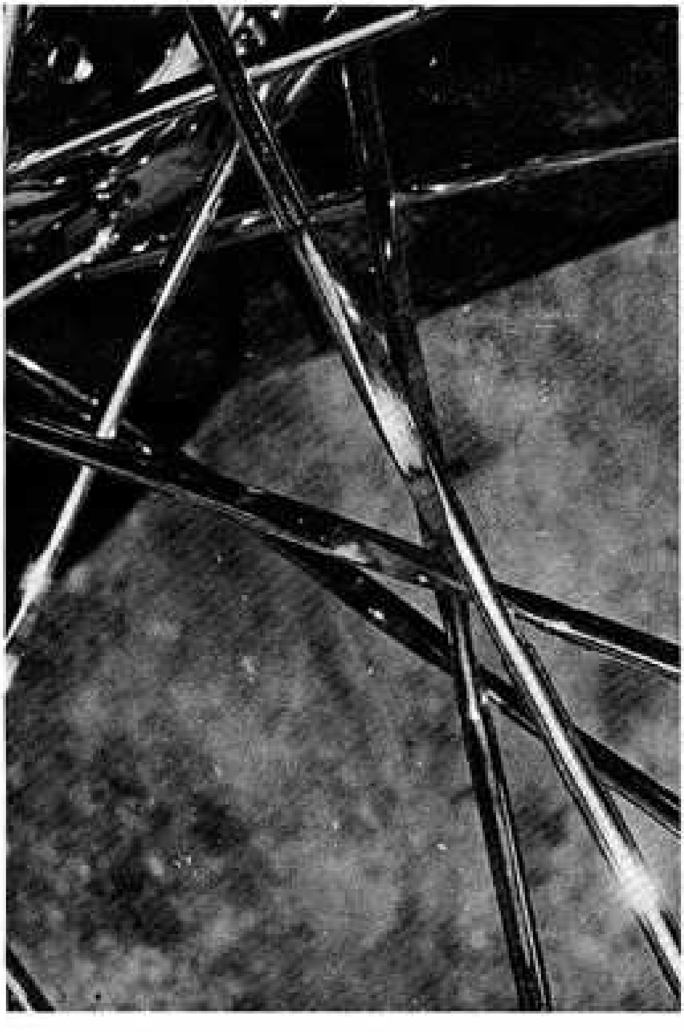
When run-out is down to about ⅛ inch, turn your attention to side-to-side wobble. Using the same reference point that you used to measure the off-set on the original wheel, locate the position for the new rim.

In order for the rim to move sideways, spokes on one side will have to be loosened while tightened on the other side. Again, work only with the original eight spokes and check to be sure that all the others are loose. Never, at any time in the trueing process, should any spoke be guitar-string tight. While working with the eight spokes, there should be a quarter inch side-to-side wiggle in the center of the spoke. Later, they will be screwed down a bit tighter along with all the rest of the spokes, but right now, during the preliminary trueing, none should be very tight or the rim will be distorted out of shape. Once you know just where the rim should be, you can relocate the wire pointer so that it will help indicate to you how far off the rim is.

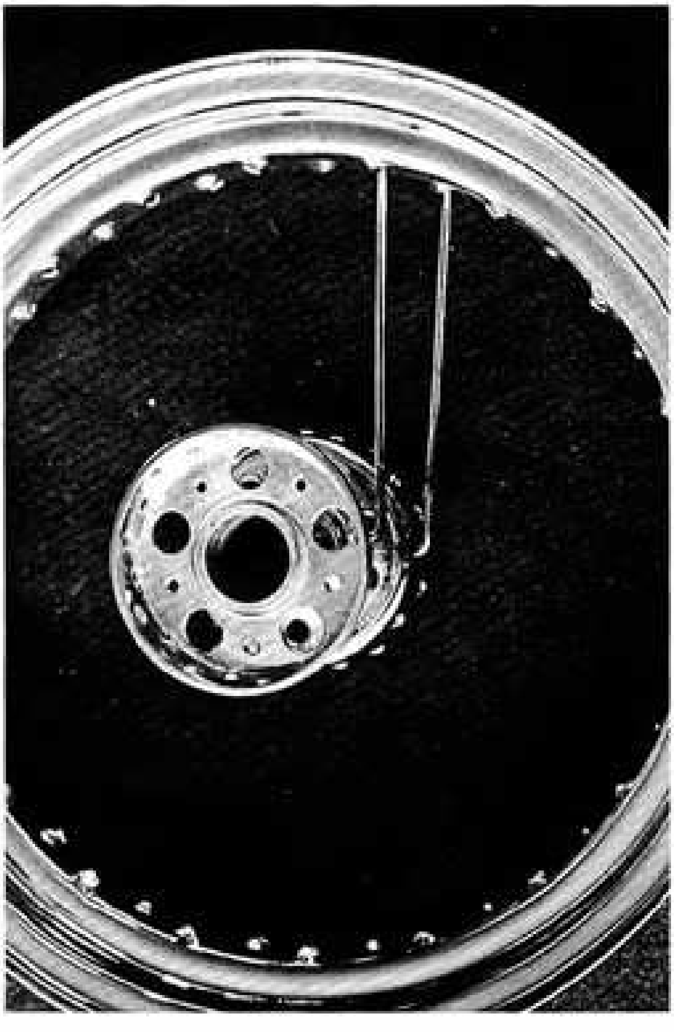
Slowly work the rim over to its proper off-set position until it's within an eighth of an inch of its position. Now double check the run-out. It will probably have moved away a little from where you had it before. (That's why it wasn't necessary to get it very close at first.) Slowly work it back again until you have it down to 1/32 of an inch. It's not necessary to get it any closer than this because the tires themselves aren't any more accurate in their roundness.

As you do this, also work the rim in closer on the side-to-side wobble. A sixteenth of an inch is close enough, again for the same reason as above.

If everything has gone well, you have a wheel that spins true, has eight spokes that are just a bit looser than they should be and 32 spokes that are completely loose. If you were sold all



Twisted spokes add a lot of sparkle to a wheel.



Start with inside spokes. Lower one is offset clockwise on this wheel.

inside spokes, now is the time to fix that. Tap on each of the outside spokes where they exit the flange to bend the head to 90 degrees and make it lay flat on the flange.

Tightening them all down evenly is the name of the game now. Using only finger pressure, get the 32 spokes down snug. They will still be very loose. After all of them are screwed down in this fashion, use a small wrench and tighten them down about ¼ turn (except the eight "true" spokes that were used first). Constantly spin the wheel to check the alignment. If the wheel starts to run crooked, loosen the last spokes tightened and then tighten them down carefully again. Continue working your way around the wheel. Tightening a quarter turn, spinning the wheel and checking the alignment. After a couple times around the wheel like this, the 32 spokes will be down to about the tightness of the original eight.

One of the tricks that some people use to test for tightness is to tap the spoke with a screwdriver and listen to the tone. Something like tuning a guitar. This may work with a *guitar* but it's not very accurate on a wheel. Some spokes may be touching each other to dampen the tone a bit or the nipple may be angled just a bit in the rim and that would cause a different tone. Spokes also aren't as accurately made as guitar strings. They aren't of consistant size, thickness or hardness and all of these things would affect the tone produced by different spokes.

The best way is to deflect the spoke from the center line. See how much it can be wiggled side-to-side. A properly adjusted spoke will deflect different amounts depending on how long it is. A spool hub laced up to a 21-inch rim will deflect about ⅜ of an inch whereas a 16-inch rim on a standard Honda 750 rear hub will have such short spokes that there won't be any deflection to speak of. It might just barely wiggle .015 inch and that's easy to misjudge. Luckily, the short spokes on a wide hub don't affect the alignment very much and some can be a little looser than others and not screw things up much.

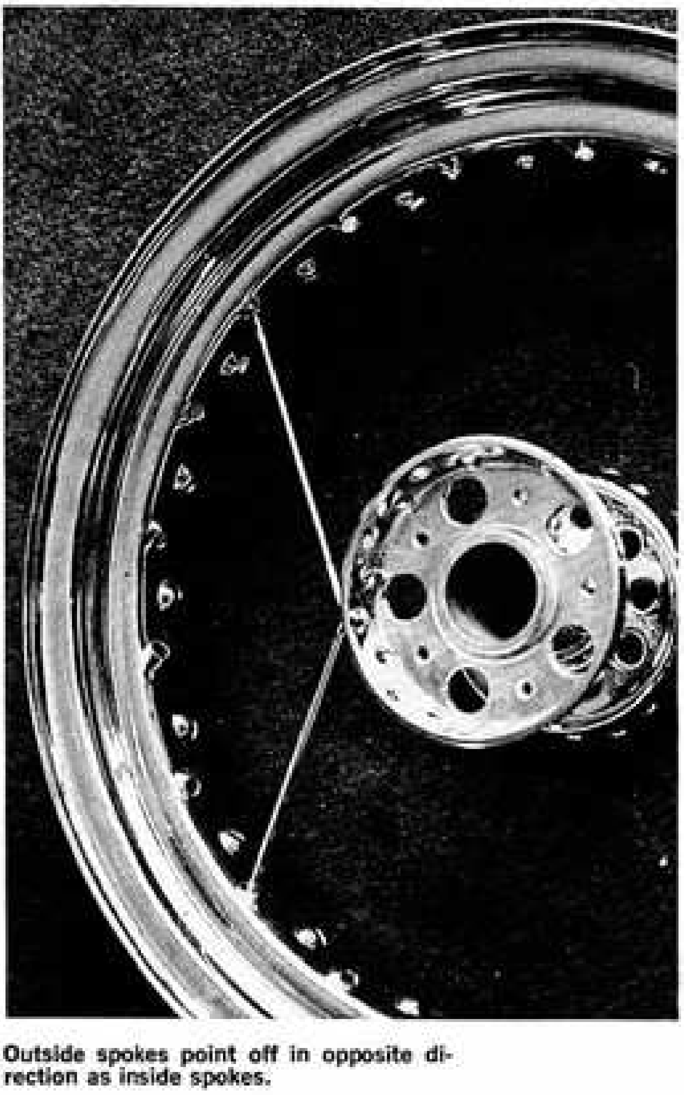
However, rapping the spokes with a screwdriver is a legitimate way to check for over-tightened ones. They will have a very high pitched tone that is quite distinctive. Get all the spokes as close as possible to the same tension. This will avoid any one spoke taking all the load because it happens to be tighter than the others. There's a good chance that an overtightened one will break on a sharp bump and this will lead to a weakened and loose wheel that may collapse if many more spokes break.

RADIAL LACING

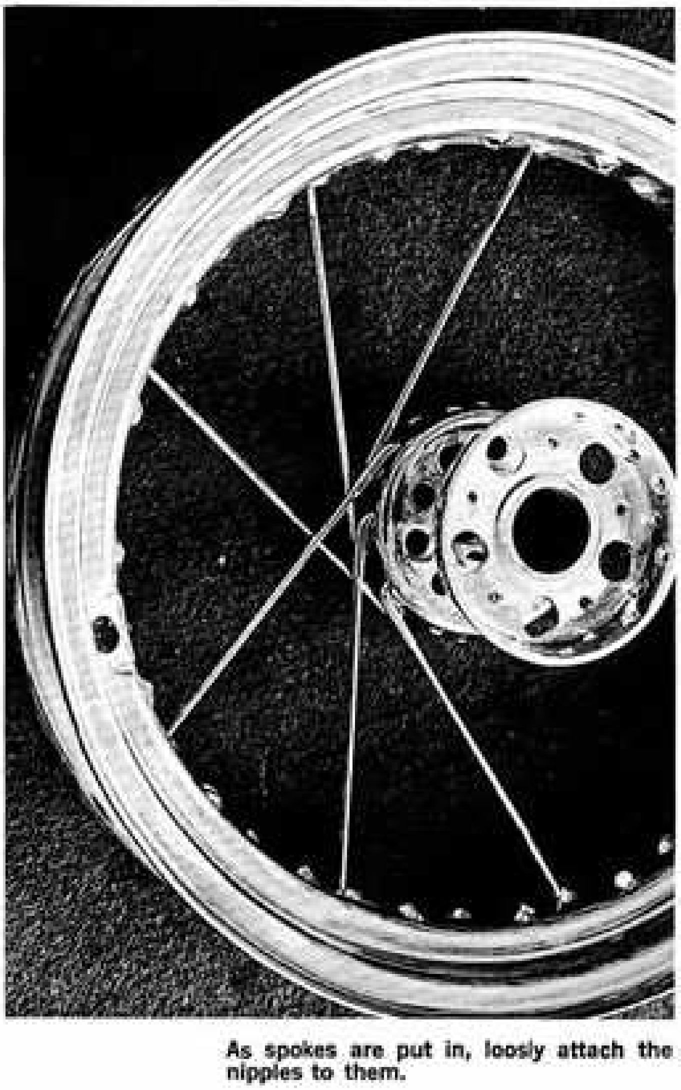
A front wheel that is running a spool hub can be laced radially. That is, the spokes don't criss-cross at all. They run out to the rim in a straight line from the hub. This type of lacing has no torsional strength to withstand rotational twist such as a brake would cause (or a drive force from the engine on a rear wheel).

With this arrangement, you want to show off the wheel and its spokes as much as possible. A 21-inch rim and chrome spokes have been the standard procedure because of the long spokes used with the larger wheel.

There is a small problem with this type though. The rim has to be drilled especially, which means it will be necessary to buy an undrilled rim and do it yourself. But the drilling isn't hard. Basically, the rim holes point straight toward the wheel axle. Every even hole must be angled towards one



Outside spokes point off in opposite direction as inside spokes.



As spokes are put in, loosly attach the nipples to them.

side of the hub and the odd holes to the other flange.

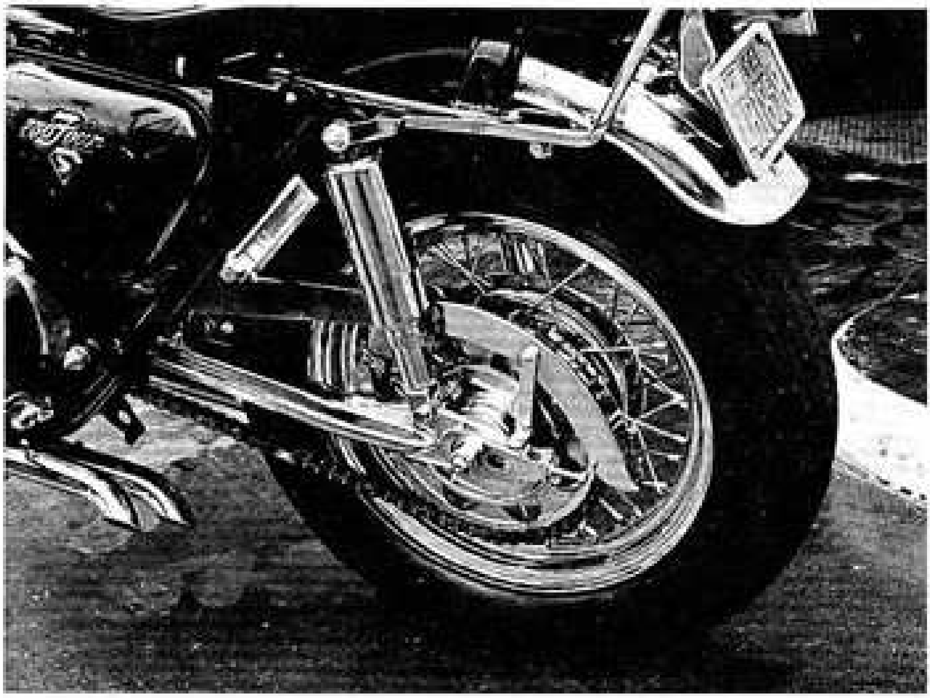
Spokes can go into the hub just about any way that you would like. The standard, half inside-half outside lacing pattern can be used or all the spokes can be outside or all can be inside types. Because they don't cross, the hub pattern isn't important.

At the rim, each spoke from one flange will go to every other nipple. The spokes from the other flange will fill in the rest of those holes. Naturally, you want the spokes to go to those holes that are angled slightly towards them.

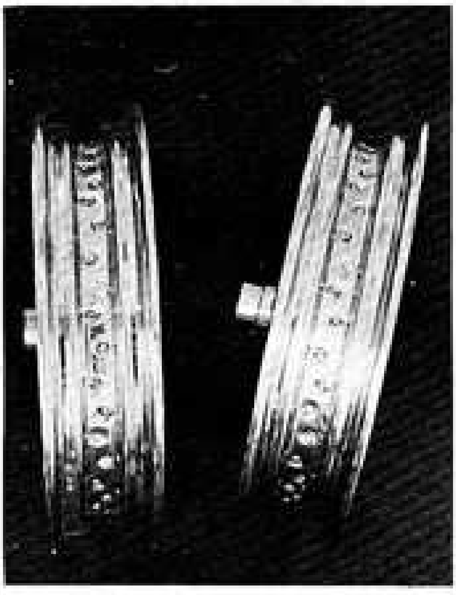
The trueing operation works by the same theory. Only eight spokes are used for the preliminary alignment and those spokes are approximately 90 degrees around from each other on the rim much as before.

Off-set alignment on the front wheel is very simple. The rim must be midway between the two fork legs, an even distance on both sides of the wheel measured out to the legs. Run-out and side-to-side wobble tolerances are the same as for the rear: 1/32 run-out and 1/16 wobble. When testing for spoke tightness by wiggling from side-to-side, the long spokes will flex about ¼ to 5/16 inch when they are of the proper tightness. It may be wise to pull the radial spokes down just a bit tighter than with the normal criss-cross method to add a little more rigidity, but don't overdo it.

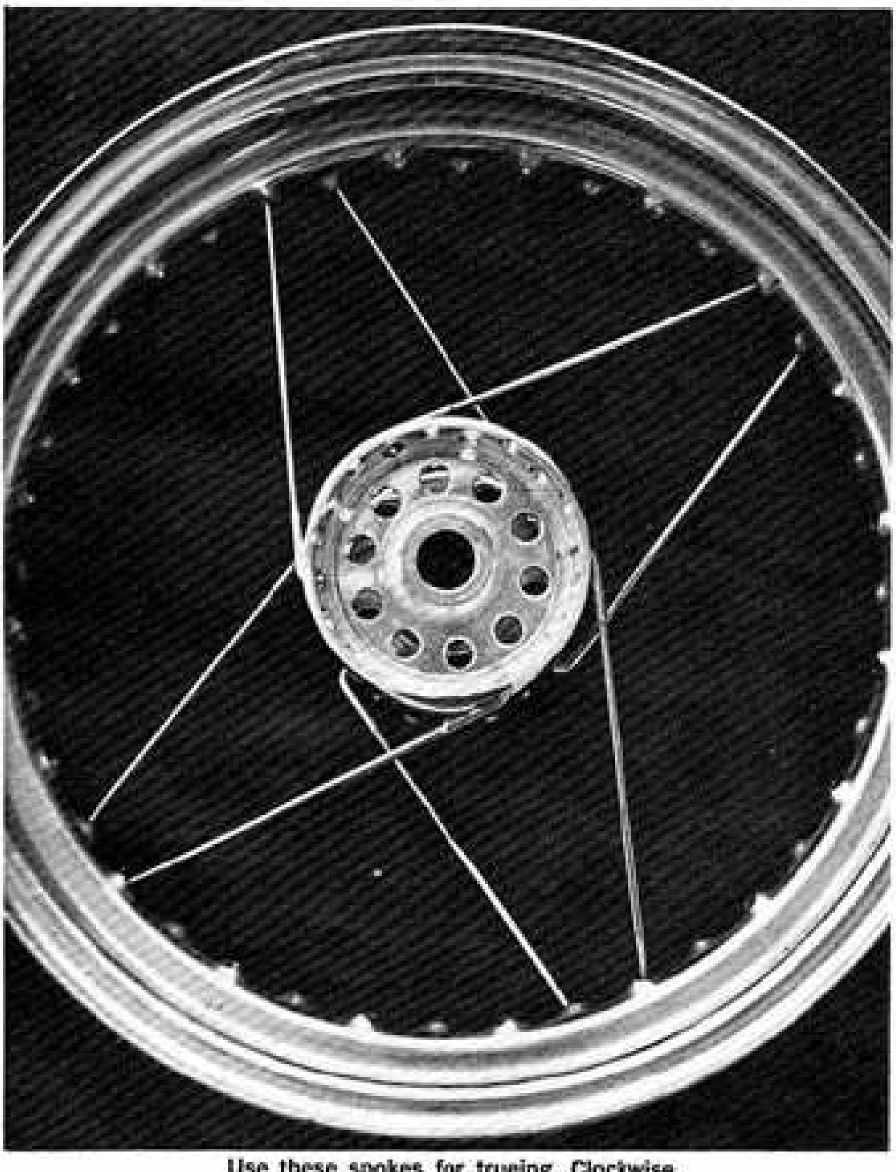
After about a thousand miles of riding on the new rims, check the spokes to see if any have loosened. Like anything else, they will "bed in" over a period of time, especially if they are used on rough roads.



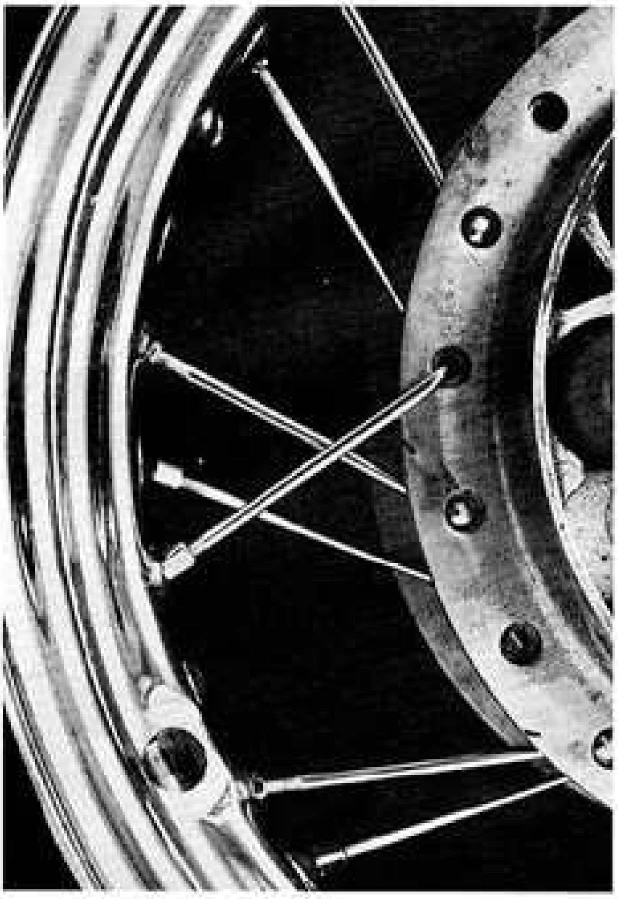
Choppers look much better with a fat 5.00x16 tire on the rear.



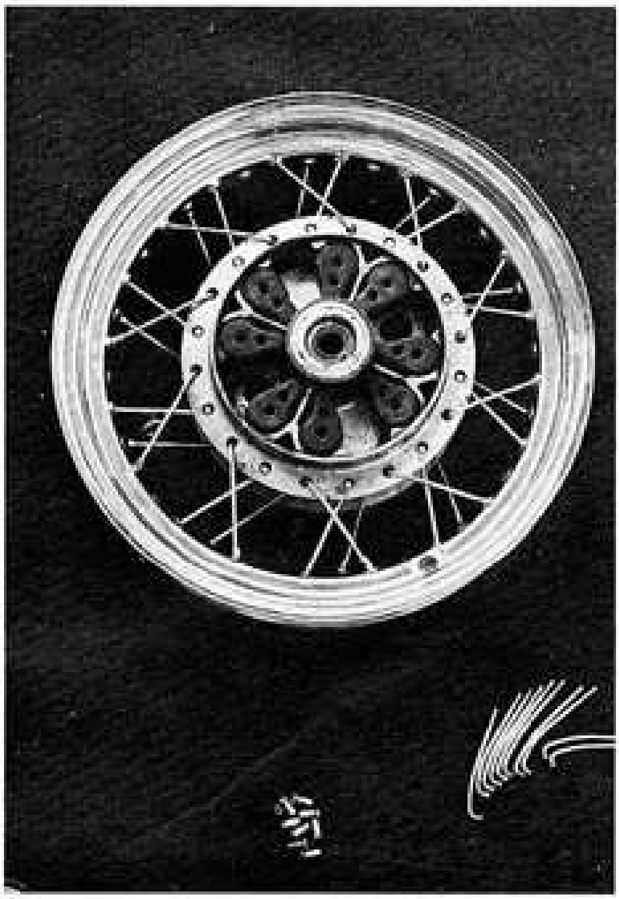
Wheel on right has more off-set than the other. Hub sticks out more.



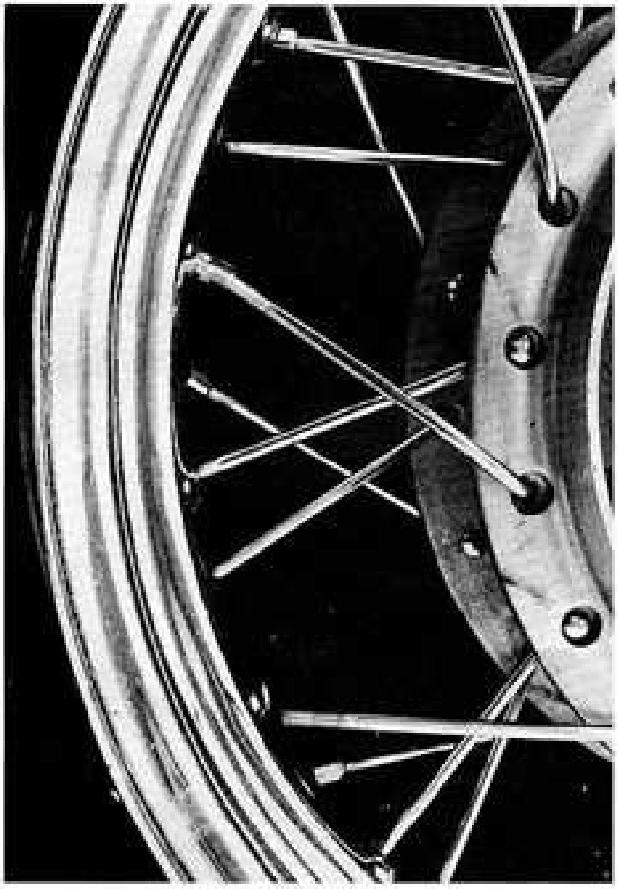
Use these spokes for trueing. Clockwise ones are in upper flange, lower ones are counter-clockwise.



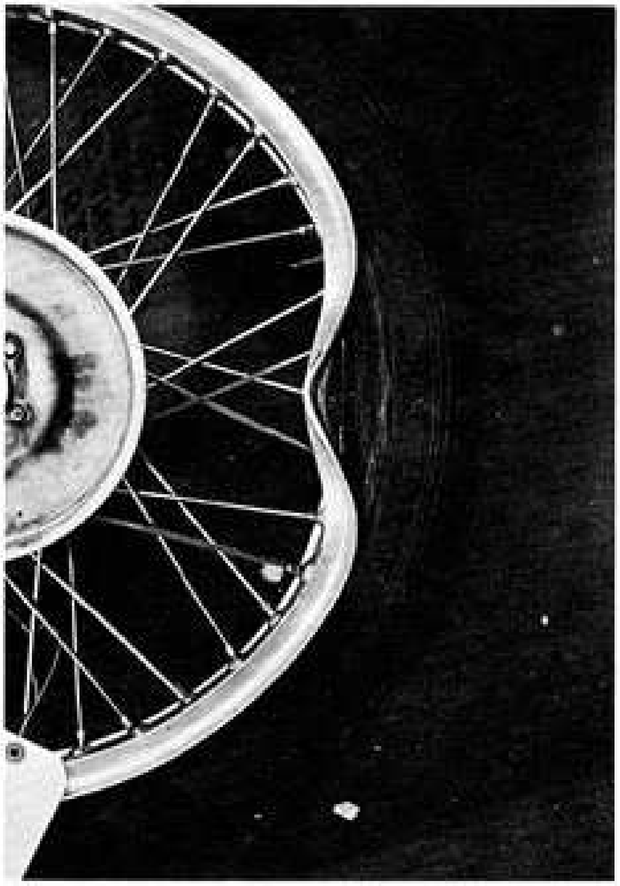
With this lacing method, outside spokes point off in counter direction.



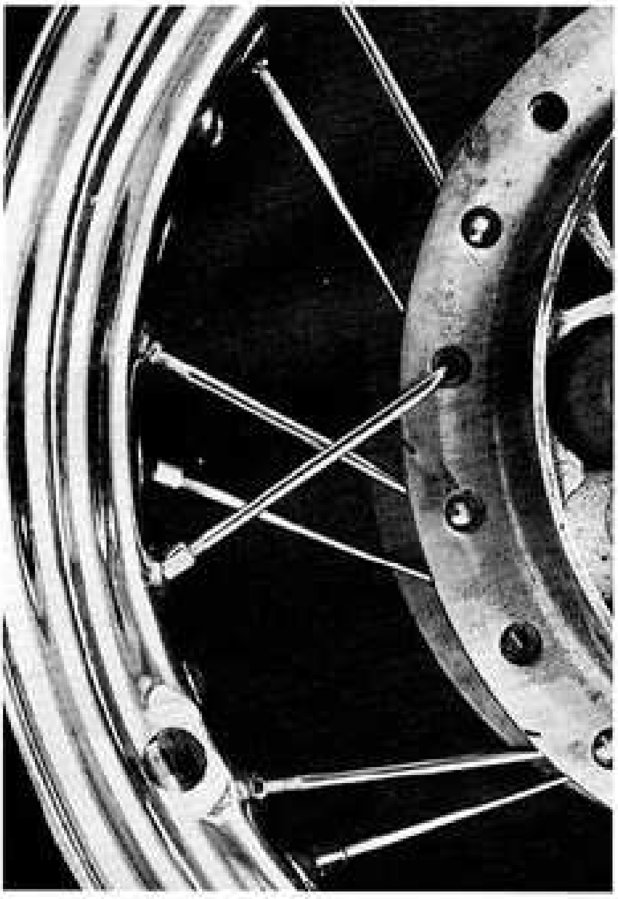
Wheel can now be turned over and the rest of the outside spokes can be put in.



After all the spokes are in, it may be necessary to firmly tap the outside spokes to make them lay flat.



It must be remembered that aluminum rims aren't as strong as steel.



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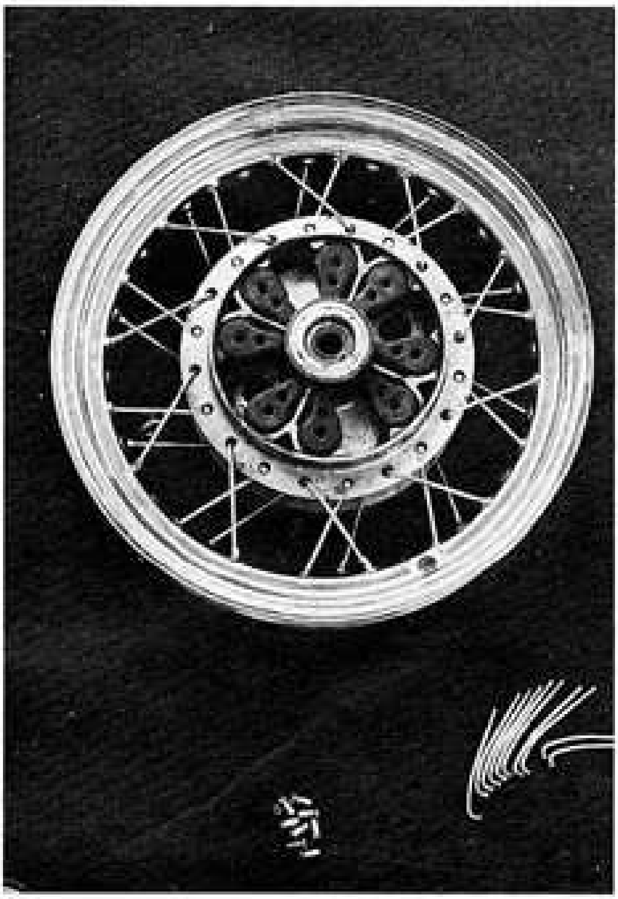

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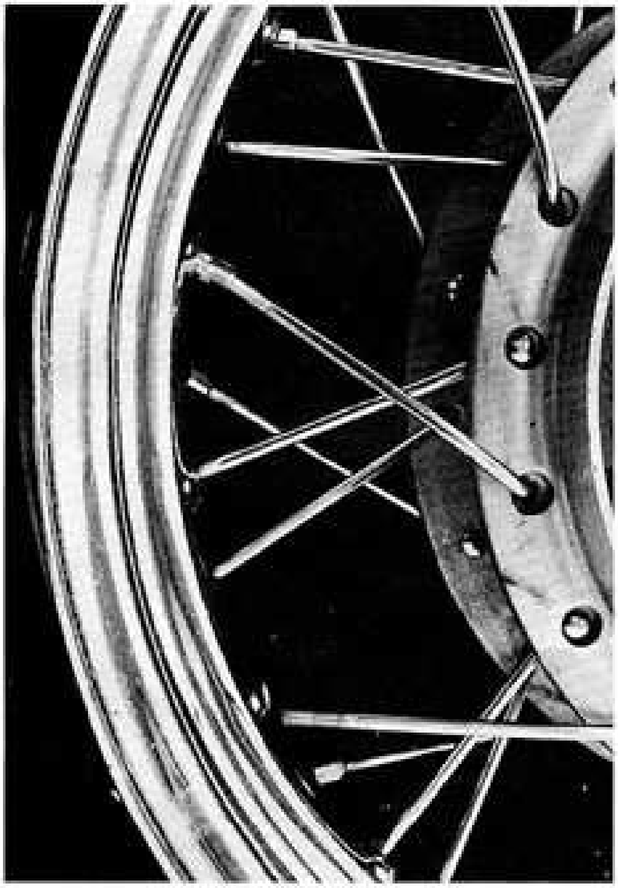

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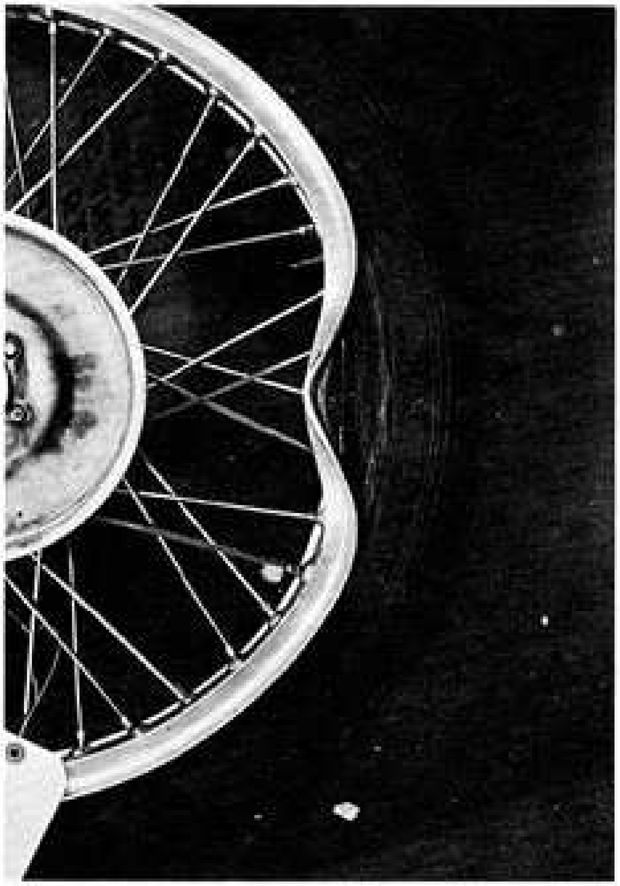

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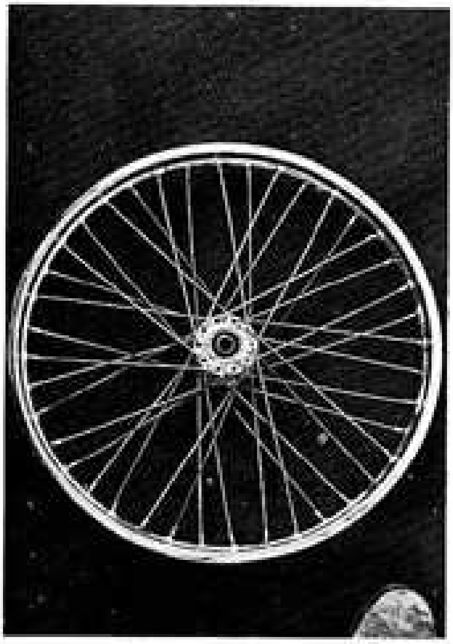
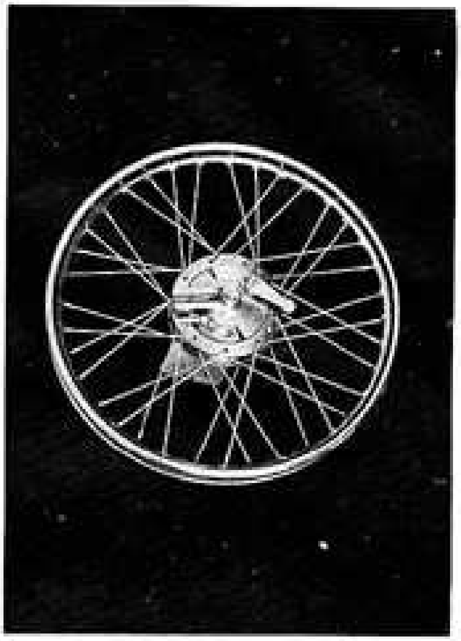


Spool hub and 21-inch rim laced together with cross-spoke style.

Spool and 21-inch rim shown with slightly weaker radial style.



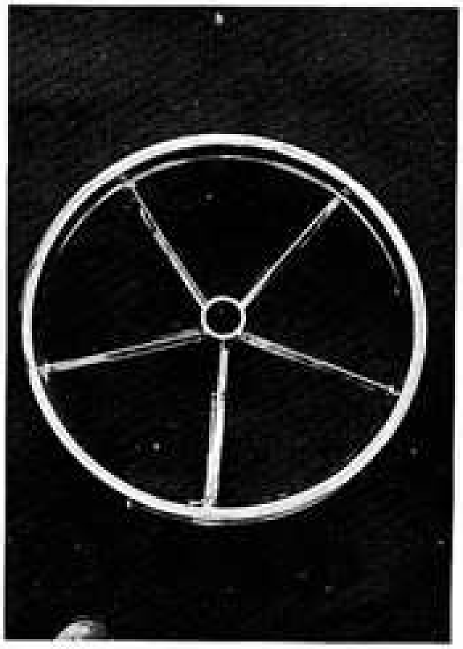
Any time a front brake is used, cross-spoke pattern is a must.

WHEEL LACING

Difference between 4.00x18 and 5.00x16 (on right) is obvious.

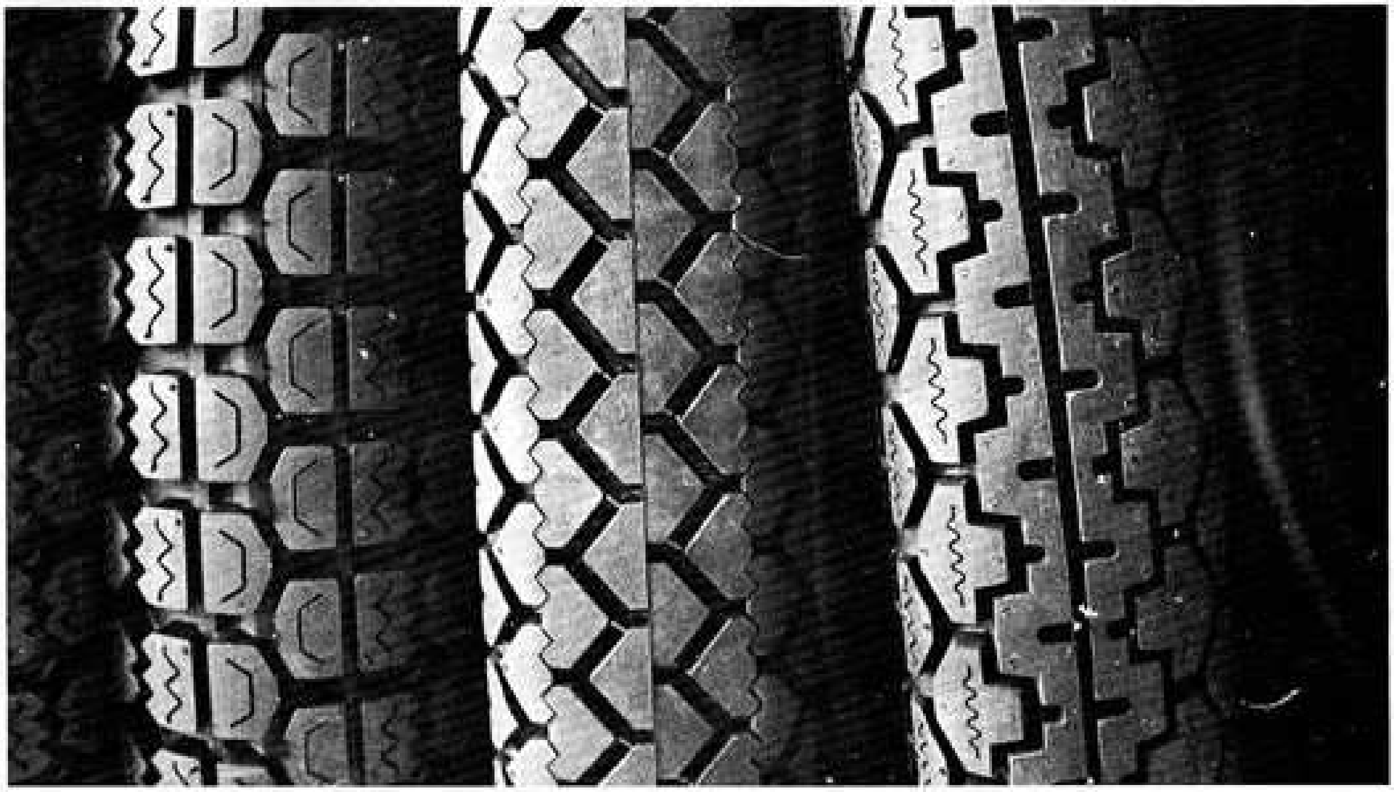
In addition to looking different, 21- and 16-inch rims also affect handling differently.

And for those who don't want to lace, there are solid wheels.

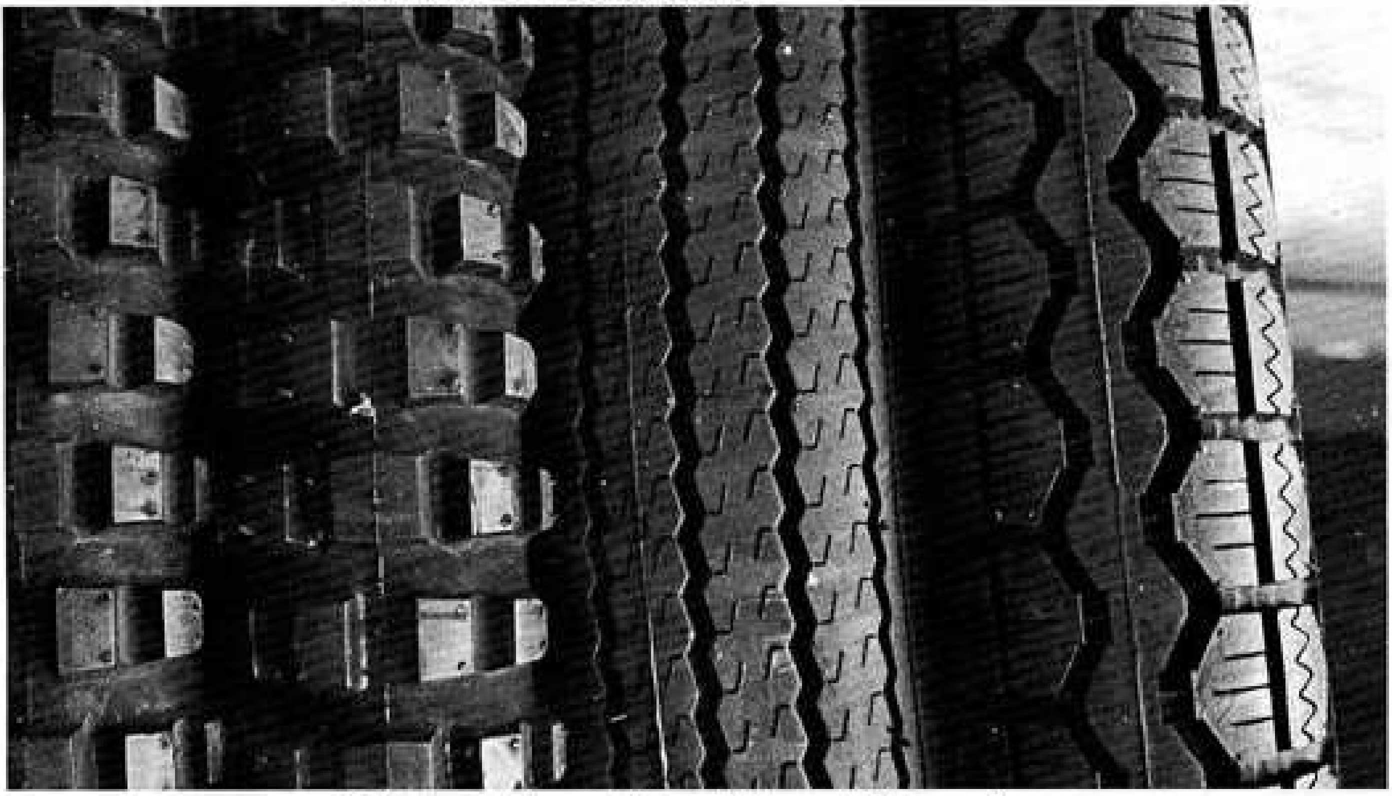


TIRES

Not many people pay much attention to the type of tire they run. Standard procedure is to tell the salesman you want a tire and ask him how much. But there are many different types and patterns of tires that will affect the way a bike operates. Also, some types are



Left to right: Carlysle, Avon, and Dunlop. Both grooves and sipes show clearly in these tread patterns.



Knobby tread pattern on left may look mean but they aren't any good on pavement. Stick to normal patterns on right.

poor on wet pavement and it's handy to know that before the bike is ridden in the rain.

For a while, some people considered the semi-knobby a "mean" looking tire for a chopper. The coarse tread pattern works fairly well on dry pavement but is in trouble if there's sand on the road and is absolutely horrible on wet roads. Fortunately, few think the semi-knobby is the way to go anymore.

Tread pattern is responsible for about 70% of a tire's handling characteristics. The rubber compound used in the tread accounts for the rest. There are two basic components in a tread design: the line grooves and the tiny slits in the rubber that are called sipes. The two work together and interrelated but, as a generalization, one can say that the grooves determine the tire's traction characteristics on dry roads and the sipes determine it in the wet. As was said before the rubber compound also has a hand in it. Usually, the softer the rubber, the better it works in the rain.

The shape of a motorcycle tire is different from that of an automobile. Bike tires will be leaned from side to side as the bike goes around corners. Cars don't usually do this and the engineers design the tires to work in the vertical position at all times. The tread is flatter and the side walls are stiffer to fight flex. A bike needs this flex and the tread must be rounded to maintain contact at all angles. Visualize a dragracing slick on the rear of a bike. This is the worst possible tire to run on a street bike. It not only has no tread pattern to work on sand covered pavement or in the wet but it also has a very flat tread. When the bike is leaned over in a corner, the tire tilts up on the sharp edge. Tire patch, the actual area of rubber touching the ground, is very tiny and the likelyhood of a skid is high. All it takes is a little sand or water and the bike is down. The same problem exists using an ordinary car tire on a bike although not as extreme.

There are two basic types of bike tires: front and rear. The front type, also called a rib tire, should only be used on the front wheel. It has excellent side to side traction and mediocre driving or braking traction. Because all the steering is done on the front, this tire was designed for steering forces.

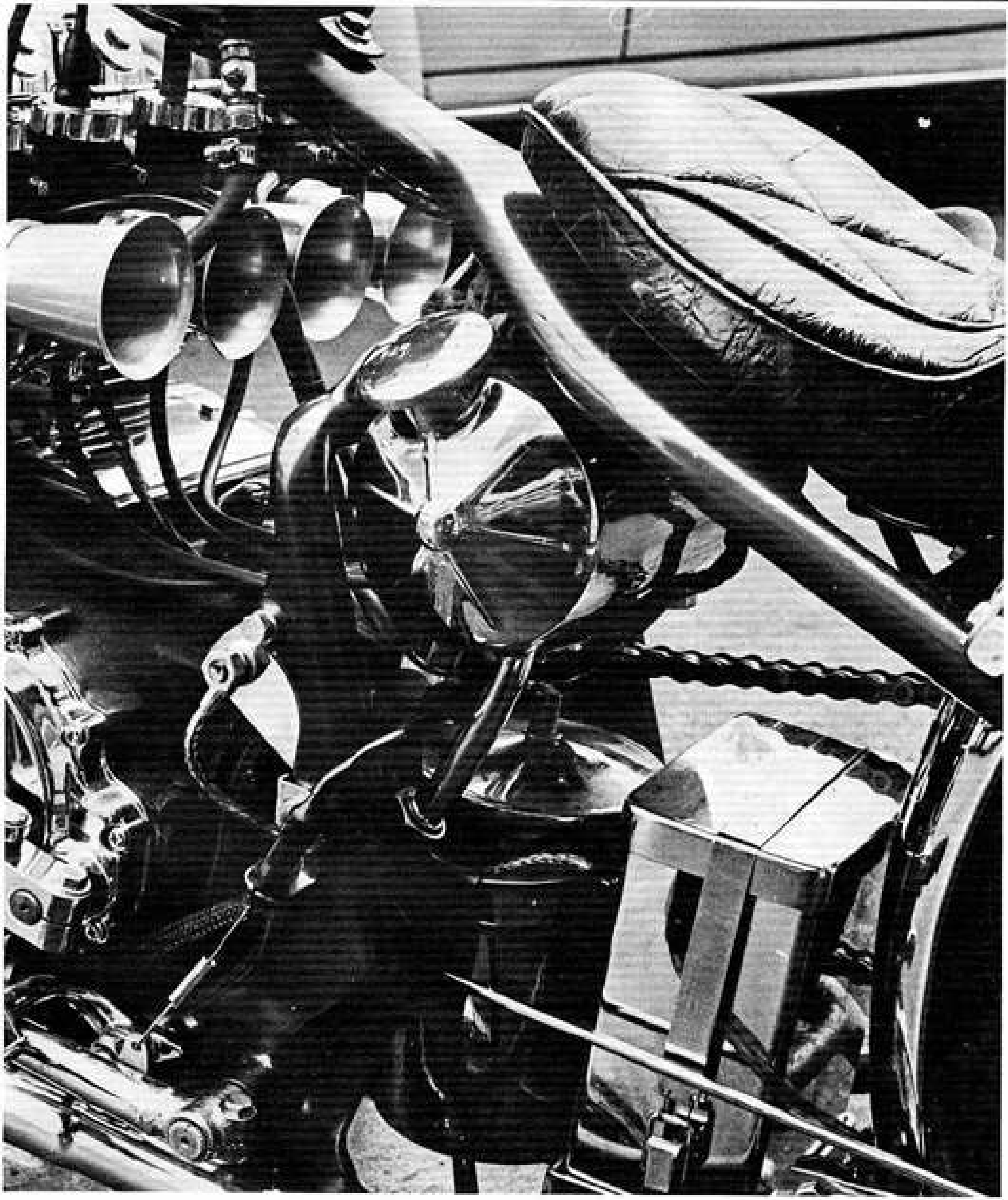
The rear type tire has a more conventional tread pattern. It works about as well driving or braking as it does with the side forces generated in a corner. This tire can be used either front or rear with no problems.

A rib type tire looks good and is ideal for a spool hub where it's only required to turn the bike around a corner, since there's no front brake. Most brands of rib tires work well in the wet.

Rib-type pattern works best on front tire. Has excellent side traction but mediocre fore-and-aft traction.

It's not a good idea to use an automotive tire on a bike. This Pirelli tire has a slightly rounded tread — works fair.

SPECIAL FRAMES

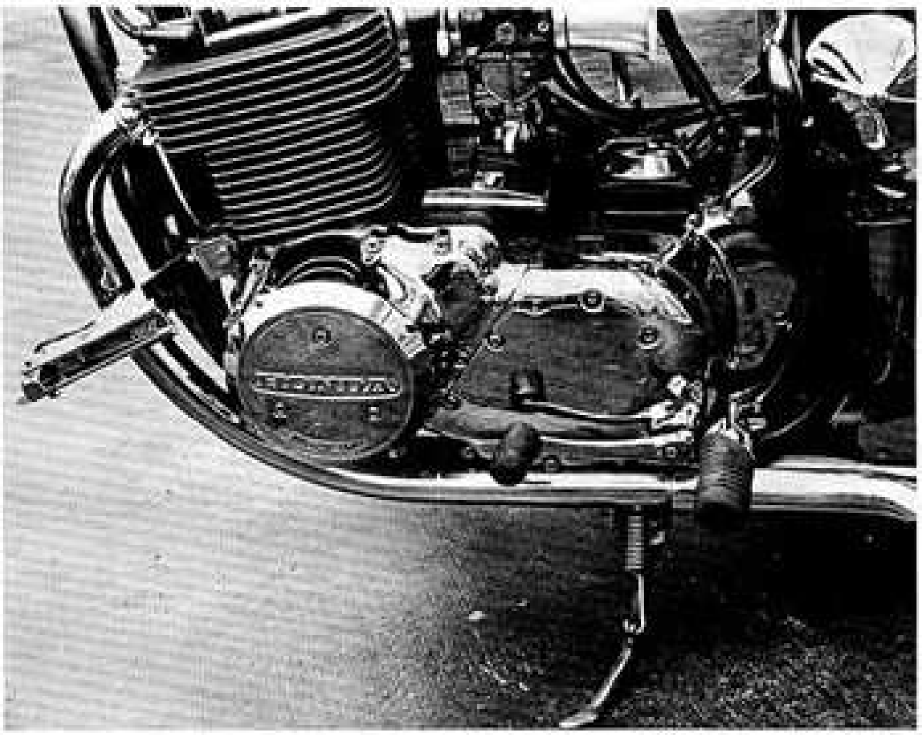


Rear section of Honda frame was cut off and then molded over for a smooth appearance.

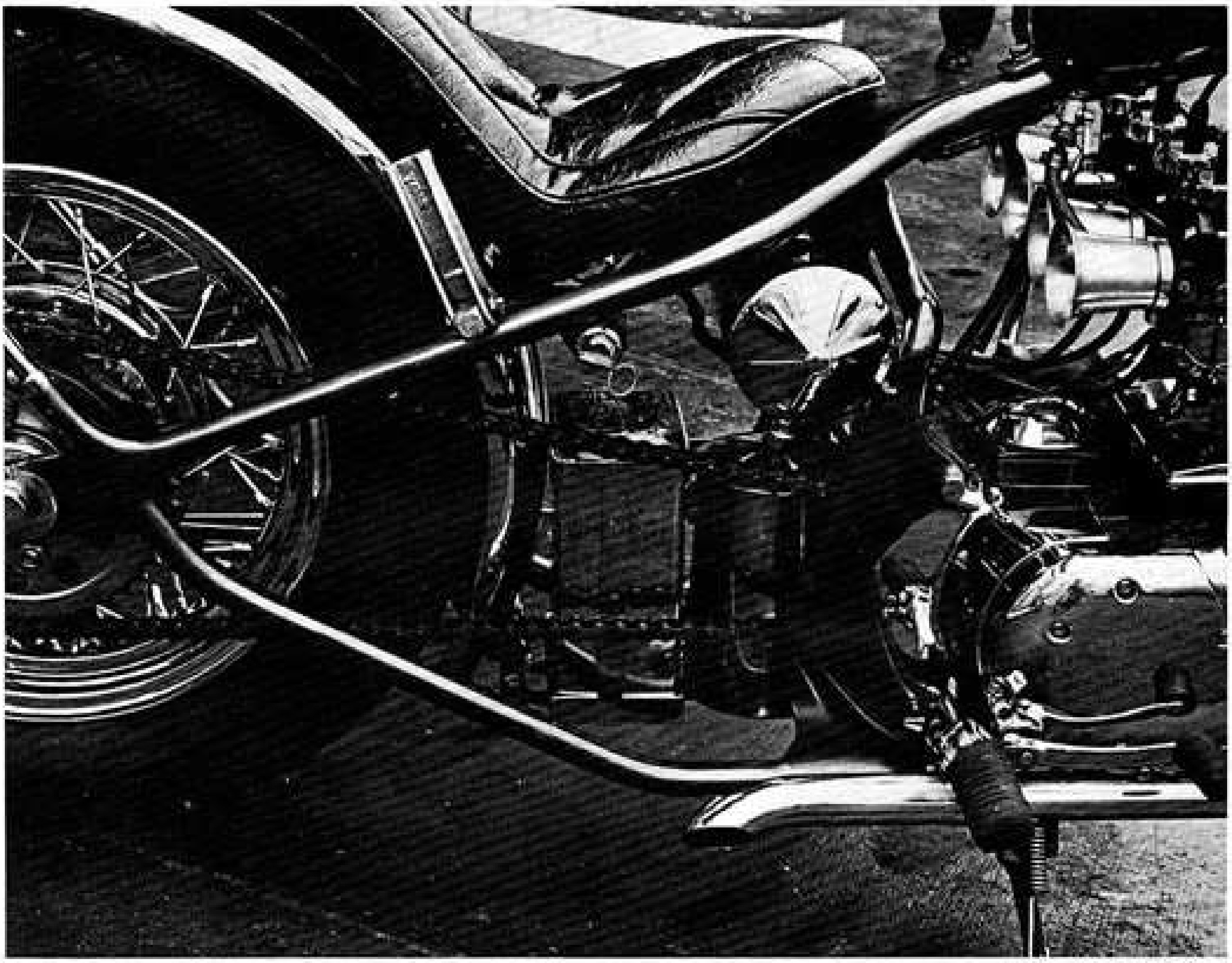
For the man who has some big bucks floating around loose and wants to end up with a first rate chopper, the special rigid frame is the way to go. A standard frame requires too many modifications, too much hassle to get it looking like the traditional chop. And even with all the modifying done, the frame still won't have the low profile or the raked neck of the specially made frames.

A few people have gained the "Harley" look by dropping the Honda engine into on old rigid FL frame. There are a number of these old frames floating around, especially in the mid-west and in the east, that can be picked up fairly cheaply. The only hassle then is to design new motor mounts and attach the extraneous parts: oil tank, electrics, etc. Even the little 350 engine doesn't look bad sitting in the big Harley frame if some care is taken in frame molding to hide the excess engine space.

Perhaps the biggest problem with using a non-Honda frame is getting the chain to line up with the rear wheel properly. Should the engine sprocket be offset to either side, the drive chain



Engine bay area of frame was left very much as stock except for some trick molding.



Detail of cover bike shows hand made rigid rear section that has been welded to a standard Honda frame.

may frequently jump off the rear sprocket; both sprockets will wear out very quickly and the chain will develop a lot of side play (which will further aggravate the chain-jumping problem)

If the Harley rear wheel is used complete with standard spacers, it's easy to figure out where to locate the engine so that the chain lines up. Near the engine sprocket on a stock Harley, measure the distance between the Harley chain and a frame member. When the Honda engine is in the frame, the distance should be the same between the frame and the Honda chain at the same point. Automatically, the sprockets and chain will line up (unless the Harley you measured first was screwed up!).

This will give you the side-to-side location of the engine. The front-to-rear location is pretty much open but it would be a help if the engine were just a little towards the rear so that the drive chain can be kept decently short. A long one will whip, which causes excess wear.

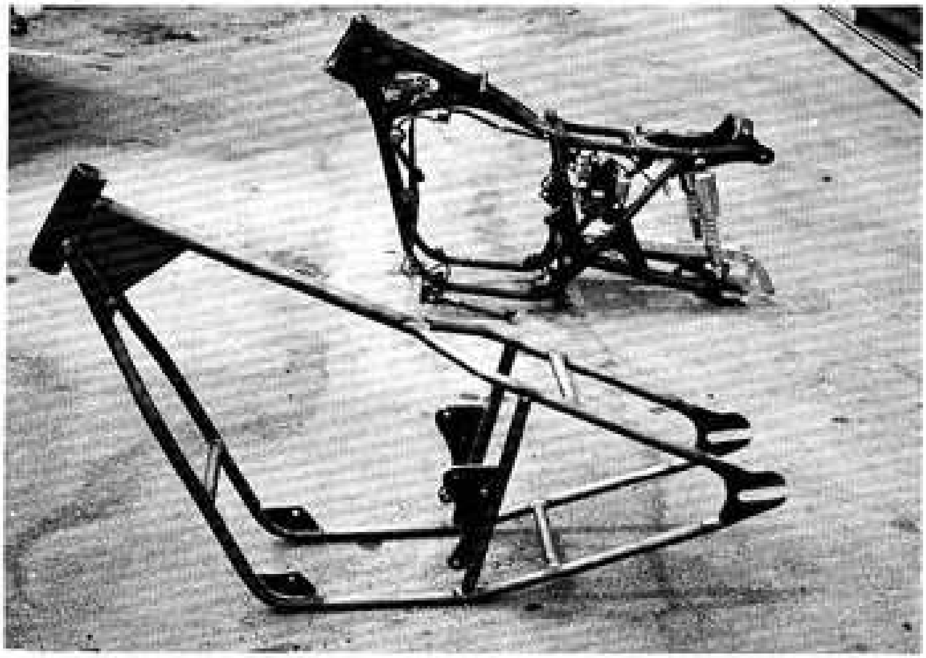
If a different rear wheel is used, some heavy-duty calculations are called for. An easy way to go about this is to mount the rear wheel so that its sprocket sits in the same spot as the standard one. Then locate the engine the same way as for the standard wheel.

Sometimes it is not possible to locate the new sprocket in the same spot because of spacer hassles or brake linkages. In this case, determine how far off the new sprocket is laterally from where the Harley model was and compensate for the difference by moving the engine to one side or the other. Again, the sprockets should line up automatically.

You can eye-ball the rear end of the bike when the chain is in place to double-check your job. From the rear, look directly down the chain as it runs between the sprockets. Compare the line of chain between the sprockets to the line made by the chain that is touching the rear sprocket. These two lines of chain will be perfectly straight and continuous if the sprockets line up. It will help to slowly move your head from side to side as you look down the line. When they don't line up, there will be a distinct bend in the chain when it comes off the rear sprocket.

When you are checking by this method, be sure that the rear wheel is properly aligned in the frame. It's not wise to try to compensate for sprocket off-set by intentionally cocking the rear wheel in the frame. That won't fully correct the offset. In addition, it will cause excessive tire wear, will require an uncomfortable riding position, and hard acceleration will make the bike pull to one side.

Honda 450 engine in special rigid chopper frame with springer front end.



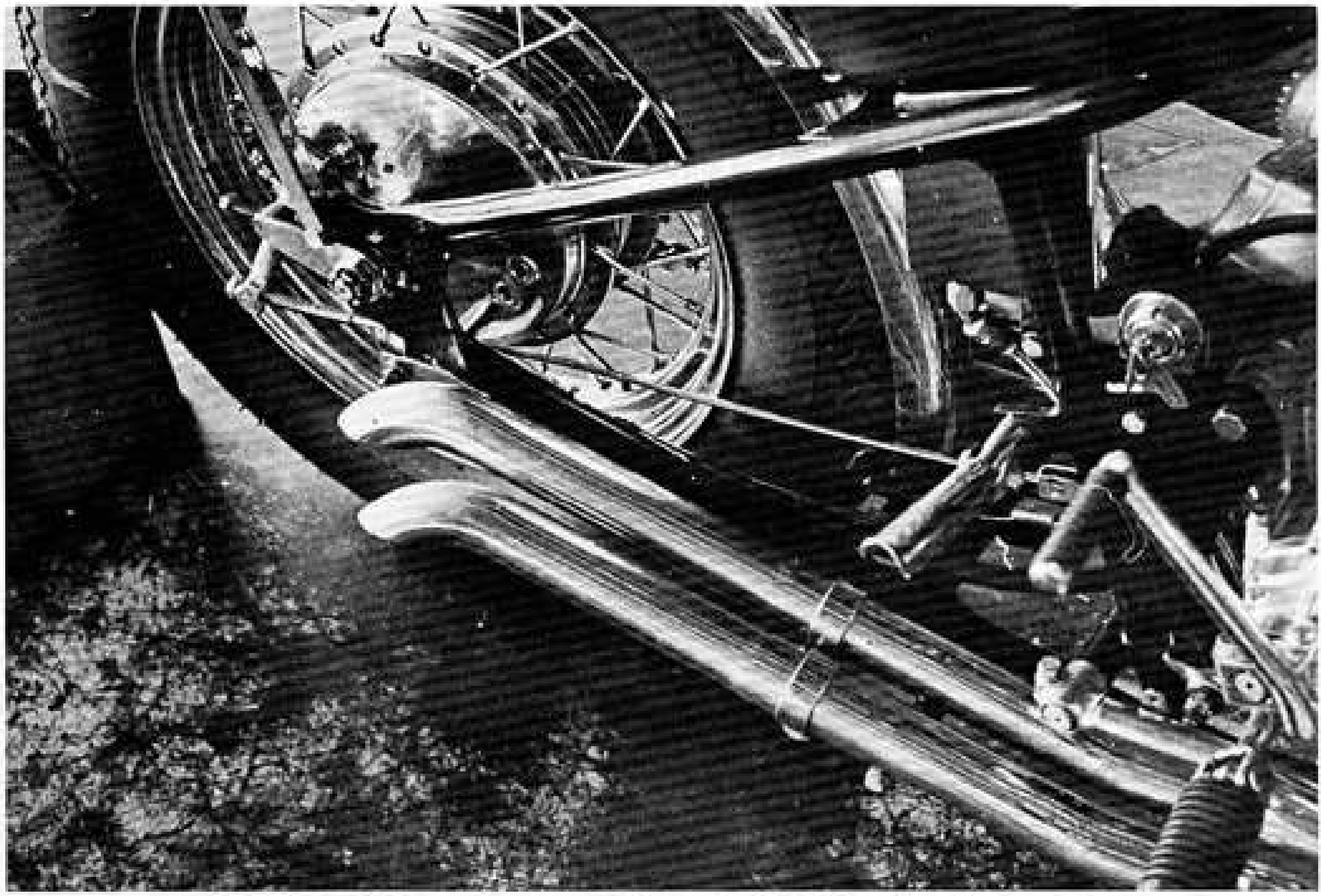
Compare super-light special frame with stock Honda 500 frame in background.

Another alternative is a ready-made custom frame for the Honda engines. These frames are intended to replace the standard frame and accept the engine, wheels, etc. It requires more money, but the savings in sweat, time and frustration usually compensate the neophyte builder who lacks not only experience, but also the necessary equipment to handle the machine work involved in engine swaps.

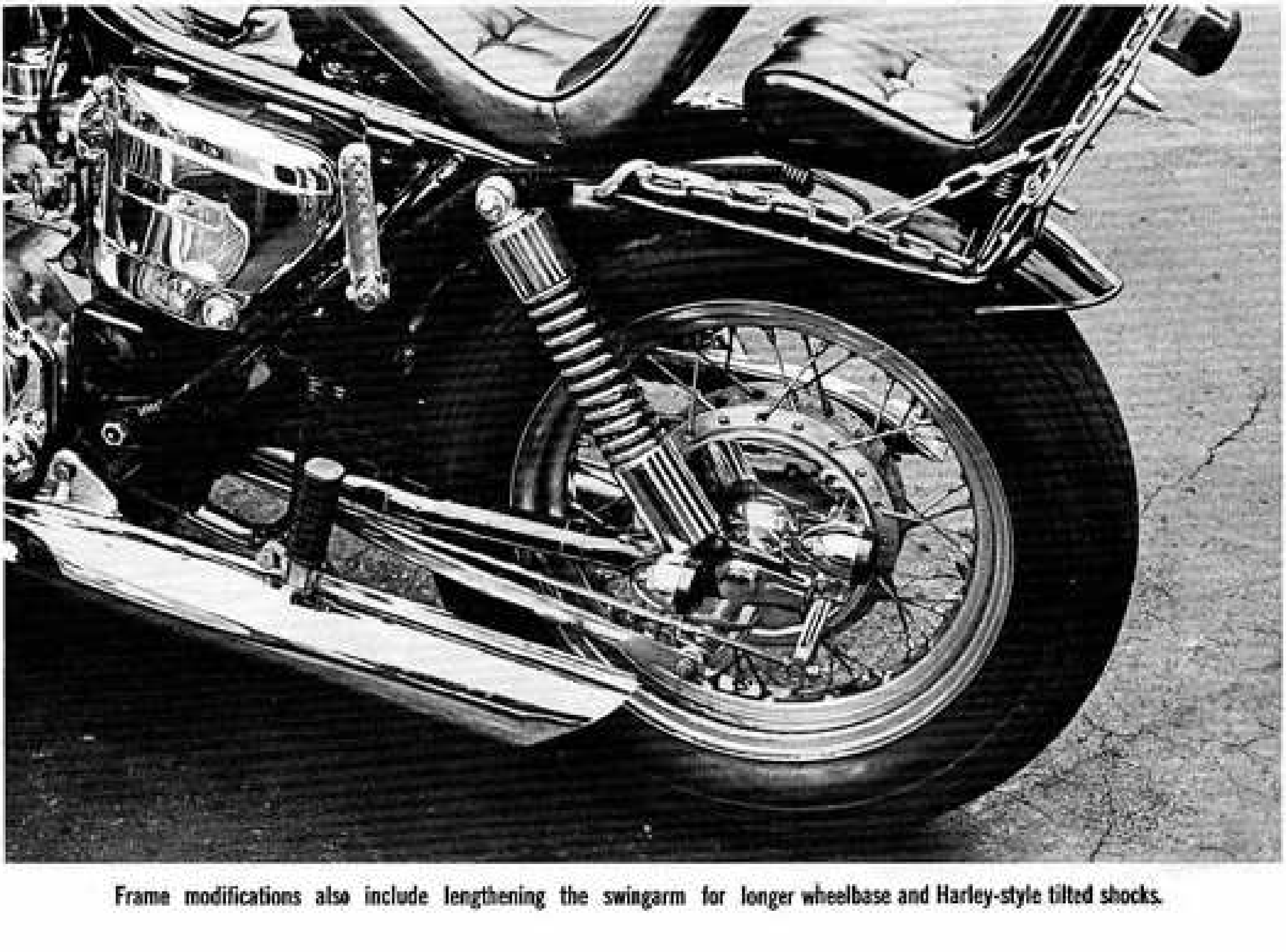
Molding is also very much simpler on special frames, as there is no complicated tangle of frame tubes coming together at the joints. The frame is cleaner and neater looking than standard models.

Seat position is much lower because of the rigid rear section. Humped chopper seats are actually intended for the rigid models and look "right" mounted low on the frame. This is only possible on a rigid frame.

The real difference between a "custom bike" and a real chopper is in the frame. No matter how much time or money is spent on a bike, if the frame, front end, etc. are standard it can't truly be called a chopper.



Detail of special frame shows compact placement of oil tank and mounting for switches.



Frame modifications also include lengthening the swingarm for longer wheelbase and Harley-style tilted shocks.

RAKING

Raking a bike is the difference between an ordinary chop and a first rate chop. Until the forks are kicked out at least a few inches, the bike can only be considered a custom machine. There are other attributes that help to classify it in the true chopper category, such as a rigid frame, but the most important is the long, raked front end.

But before you rush out to the garage with a hacksaw in hand, it would be best if you understood just what is involved in raking a frame, what it does pro and con and what precautions are important.

Basically, raking is simply increasing the angle of the steering head so that the forks are at a lesser angle to the ground. (plus or minus a little consideration for trail). This can be done in three ways. First is to lengthen the forks so that the unmodified frame is lifted higher off the ground. As the front of the frame rises, the steering head is effectively pivoted around the rear wheel. The frame rotates backwards and the head angle moves toward the horizontal. As a close approximation, one can figure that each inch of fork extension will add one degree of steering head rake up to a limit of about 15 inches of extension.

Rake is also increased by lowering the rear end, either by using struts or by making up a rigid rear section that places the axle in a position higher than the original swingarm position. The difference in effect between this operation and extending the legs is that lowering the rear results in an overall lowering of the bike. Approximately two degrees of rake change results from each inch the rear is lowered, but the fork length accounts for considerable variance in this estimate. Lowering the rear of a bike that has extended forks will gain more rake than the same operation on a stock bike.

The final way is the most involved, most expensive, most potentially dangerous (as far as workmanship is concerned), but also the most effective. That is cutting and welding the frame itself and modifying the steering head geometry directly. Usually, a small piece of metal is cut out of the horizontal tube directly behind the steering head, and the head is bent backwards to fill in the gap left by the missing piece. The frame is then welded up, painted and reassembled.

White tape shows where to make the cuts for raking the Honda 750 Four.

After hacksawing the gap in the top tube, the rest of the cuts can be made by torch.

With some bikes, notably the Honda 750, the frame is a bit complicated. There are many frame tubes that come together at the steering head and it isn't a simple matter cutting and welding without hurting the strength of the entire package. Other bikes, like the Honda 350, are easy to do because the frame is straighforward and simple.

Raking a bike has a tremendous effect on the way it handles On any motorcycle, the more vertical the forks are, the more agile and quick handling the machine is. As the forks are raked out, the bike becomes slower handling, sluggish and resists turning a corner. It tends to go in a straight line. This make it an ideal highway cruiser as long as the road isn't too curvy. The rider can pretty much lean back and take it easy, as the bike will make it's own way down the Interstate.

Because the forks are at a greater angle, there is additional strain on the entire front end. The fork legs must hold up under a bending load. On a raked bike, the weight of the machine tends to bend them while a standard bike tends to compress them. There is very little danger of the legs breaking as long as slugs are not used and any welding is done by an expert. However, it is necessary to keep a close eye on the steering head bearings. They will be taking more punishment than usual and the races may get chewed up as a result. Keep them at the proper tension and well greased. Also watch for cracks in the frame tubes immediately behind the steering head, as this portion of the frame now has increased stress. It is also the point where the cut and weld have been done.

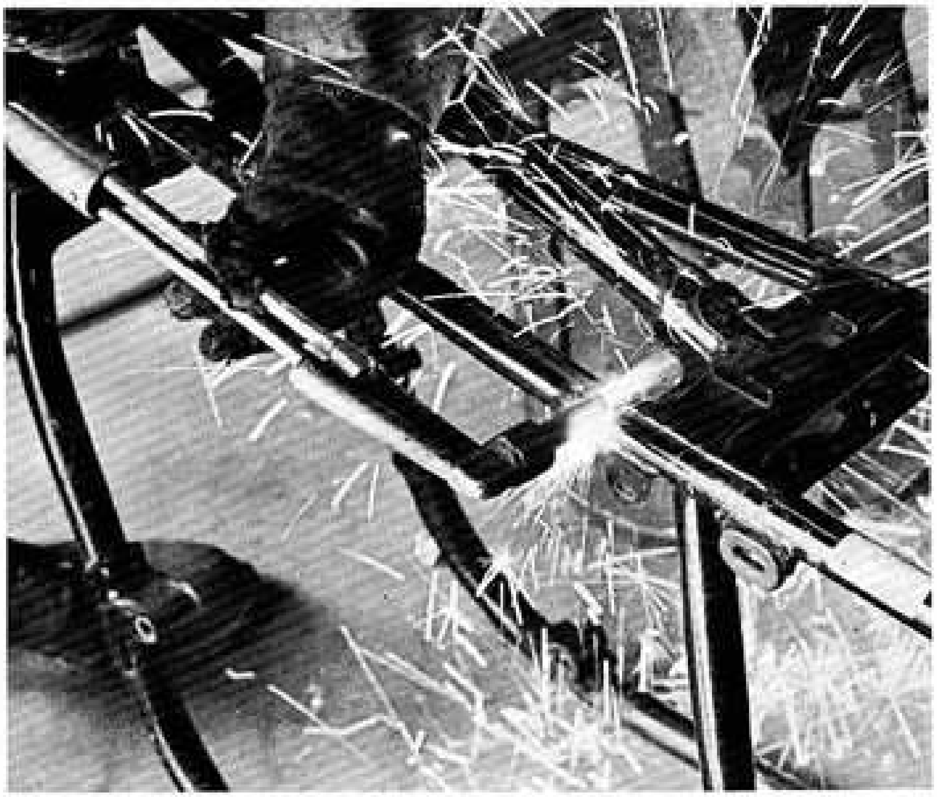
RAKING THE 750

Of the Hondas, the 750 is the most difficult to rake, as there are five tubes joining at the steering head. A simple way around this is to remove two of them completely. This weakens the frame a bit but not enough to make it dangerous (unless the bike is constantly ridden on rough roads at high speeds). If so desired, a frame section can be made up that will restore almost all of the original strength.

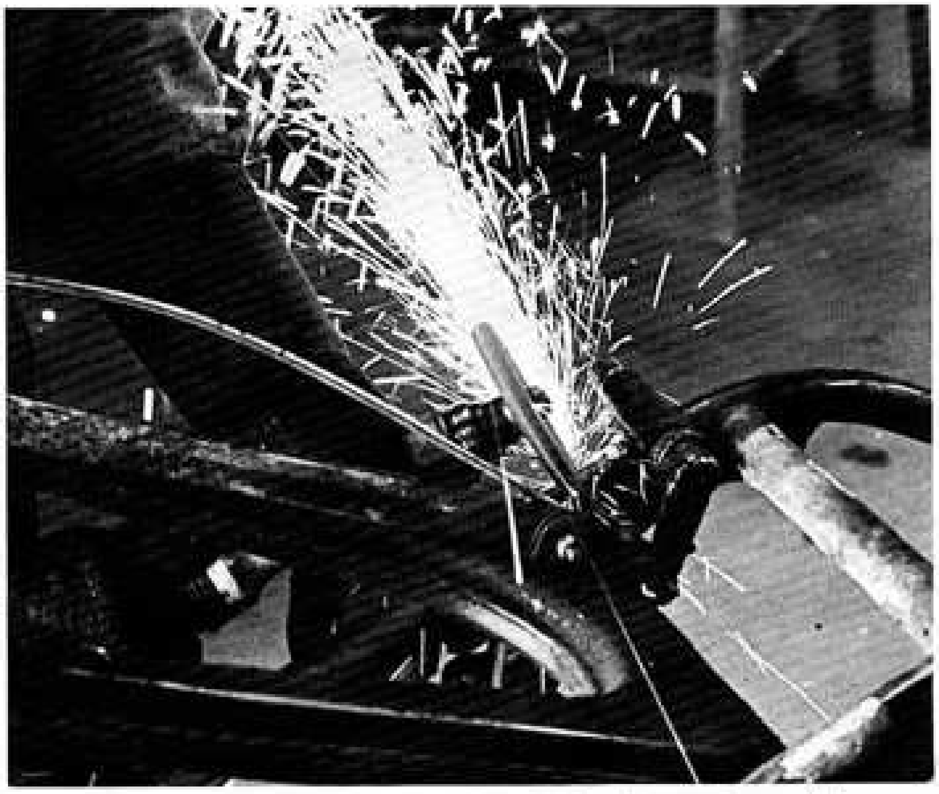
Cut the two tubes that pass beneath the tank and take them completely out. One cut will be just under the leading edge of the seat and the other will be near the steering head where the two down tubes join the head itself. It will also be necessary to cut away the support gusset that joins these two bottom tubes to the single top tube.

Once they are out of the way, raking is fairly simple. About five inches behind the head on the single top tube, cut out a piece of the top tube. This can be as little or as much as you like, within reason. Between ½ and ¾-inch is a good idea. More than that would be excessive. In addition to steering problems, there would be difficulty in getting the engine back into the frame.

Heat the steering head and pull it back until the gap is closed. Weld it solid. If desired, cut a 1¼-inch diameter mild steel tube to fit beneath the single top tube for reinforcement. Weld one end to the lower part of the steering head and the other end to the frame area under the seat. This will help add support to make up for the two tubes that were removed. An advantage to removing those two tubes is a cleaner appearance under a custom tank. It also enables you to mount a custom tank without having frame members in the way. Adding the one tube for rein-



Remove the upper side rail by cutting at the steering head gusset and near the rear seat gusset.



Grind torch cuts smooth and remove any lugs or fittings that are no longer needed.

forcement will not add much to the clutter.

If a large piece is cut out of the top tube, the mounting holes for the front of the engine may be off quite a bit. This can be avoided if the two downtubes that pass between the steering head and the motor mounts are bent slightly. This will allow the mount holes to remain in approximately the correct position.

As an alternative, the two lower tubes can be left in. A gap must be cut into them also but not as large as the gap in the single top tube. Make it about one fourth the size of the single tube gap. Force the steering head back so that all three gaps meet, then weld. It will take more muscle power to do it this way but the frame will be as strong as original (although it will also be as cluttered in appearance).

RAKING THE 350 AND THE 500

Simplest of all Honda frames to rake are the 350 and the new 500 machines. Steering neck areas are very straight-forward with no complications. Lately, Honda has made extensive use of pressed steel panels in forming all the tube joints. This makes for clean and simple frame junctions that are easy to alter by the cut-and-weld method.

There are two ways this can be done: a pie shaped section can be removed from the top of the steering head area or a pie shaped section can be added to the bottom of the steering head. From an aesthetic point of view, the bike looks better with the pie section added in. This makes the neck look longer and allows more room for molding. Since the frame sticks out a little more with the section added, it will have more of the "gooseneck" look.

About one inch behind the steering neck, start sawing from the bottom of the pressed steel panel. Parallel the steering neck until the hacksaw blade is about ⅜-inch short of completely cutting the neck from the rest of the frame.

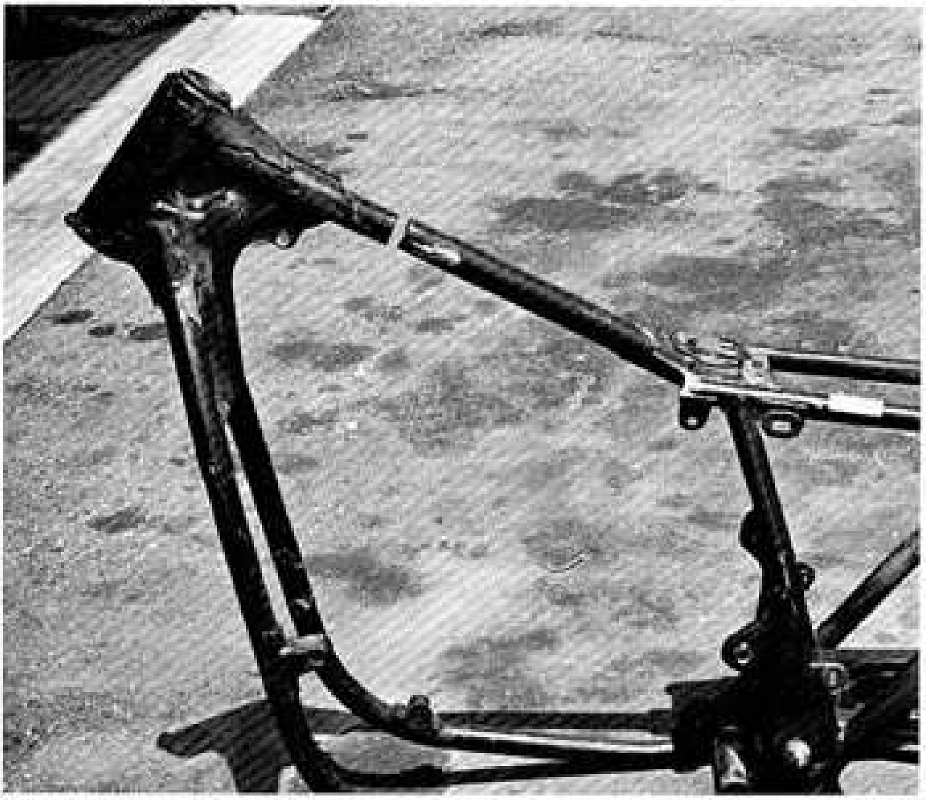
Carefully bend the steering neck away from the frame. Open the gap up between ¼ and ⅜-inch. Take care that you don't bend the neck off to one side.

Cut two pie shaped wedges in the shape and size of the gap, using ⅛-inch mild steel. Fit one on each side of the gap and weld them in place. Cut a smaller one to fit into the open space left on the bottom of the gap. This will close it up completely to finish off the rake job.

If you're tricky, you can make a bent plate that will wrap around the gap in one piece for a neat appearance. But, since most people will be molding their frames if they've gone this deep into a chop, the appearance doesn't matter. It will all be covered up with Bondo later.

Removing the pie shape section from the top isn't any more difficult other than making the gap fairly even on both sides of the frame. Two saw cuts are necessary and they must meet about ¼-inch from the bottom of the pressed steel panel. Cut the gap as wide as you want the rake to be.

Two handy features of doing it this way are the fact that you don't need to make up the wedge plates and it's easier to keep the front end straight as you bend the neck back. The edges of the gap will meet to assure proper alignment. However, the neck won't



If more than ½-inch is removed from top tube, it may be necessary to heat front down tubes and bend them.

Close gap with large clamp and have frame heli-arced by an expert welder.

stick out as far and your bike won't have the "gooseneck" look.

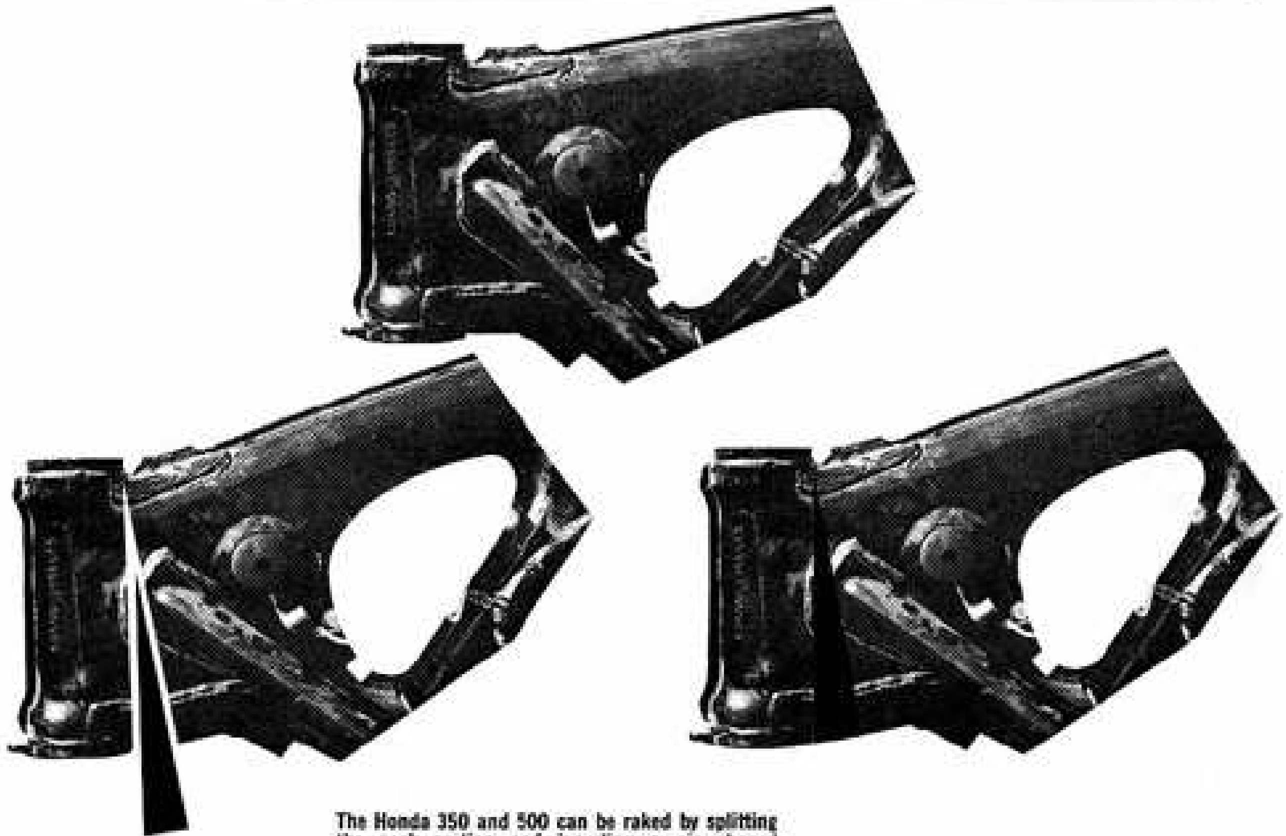
RAKING THE 450

Honda's 450 model has a frame along traditional lines. It very much resembles a Triumph frame in that the steering head has an upper and a lower tube leading forward from the seat and under the tank. The lower tube actually intersects with the single down tube that runs from the engine up to the steering head. Raking this frame involves cutting a section out of the upper tube and heating the frame to bend the neck back.

This is a risky practice for two reasons: to apply a lot of heat to a frame may weaken it; and it is easy to unwittingly misalign the frame—even if the cut gap is closed up evenly. There isn't much that can be done about it other than being extra careful on the 450.

What things should one be careful of when raking a frame?

1. Always have the welding done by an EXPERT. That area of the frame is under extreme stress and the welds must be perfect.
2. It would be wise to have the frame heli-arced. There is less heat build-up.
3. Avoid excessive heat when using a torch to bend the frame neck.
4. Keep the steering neck in line when raking the frame. The handling will be affected adversely if it's crooked.
5. When making up wedges or gussets, use mild steel. Don't use something exotic like chrome-moly alloy. It's too dissimilar to the steel in the frame and welding them together can create problems.
6. Save yourself some money and weight—don't make the gussets and plates out of ¼-inch plate. ⅛-inch is enough.
7. Don't rush the job. Take your time and do it right, this is very important both to looks and handling.



The Honda 350 and 500 can be raked by splitting the neck section and inserting a pie shaped wedge. This had the advantage of making the neck longer for a "gooseneck" look.

An alternative way to cut from the top of the neck section and remove a wedge. Weld the split up to finish it. It is easier to keep the steering head in line with this method.

STRUTS

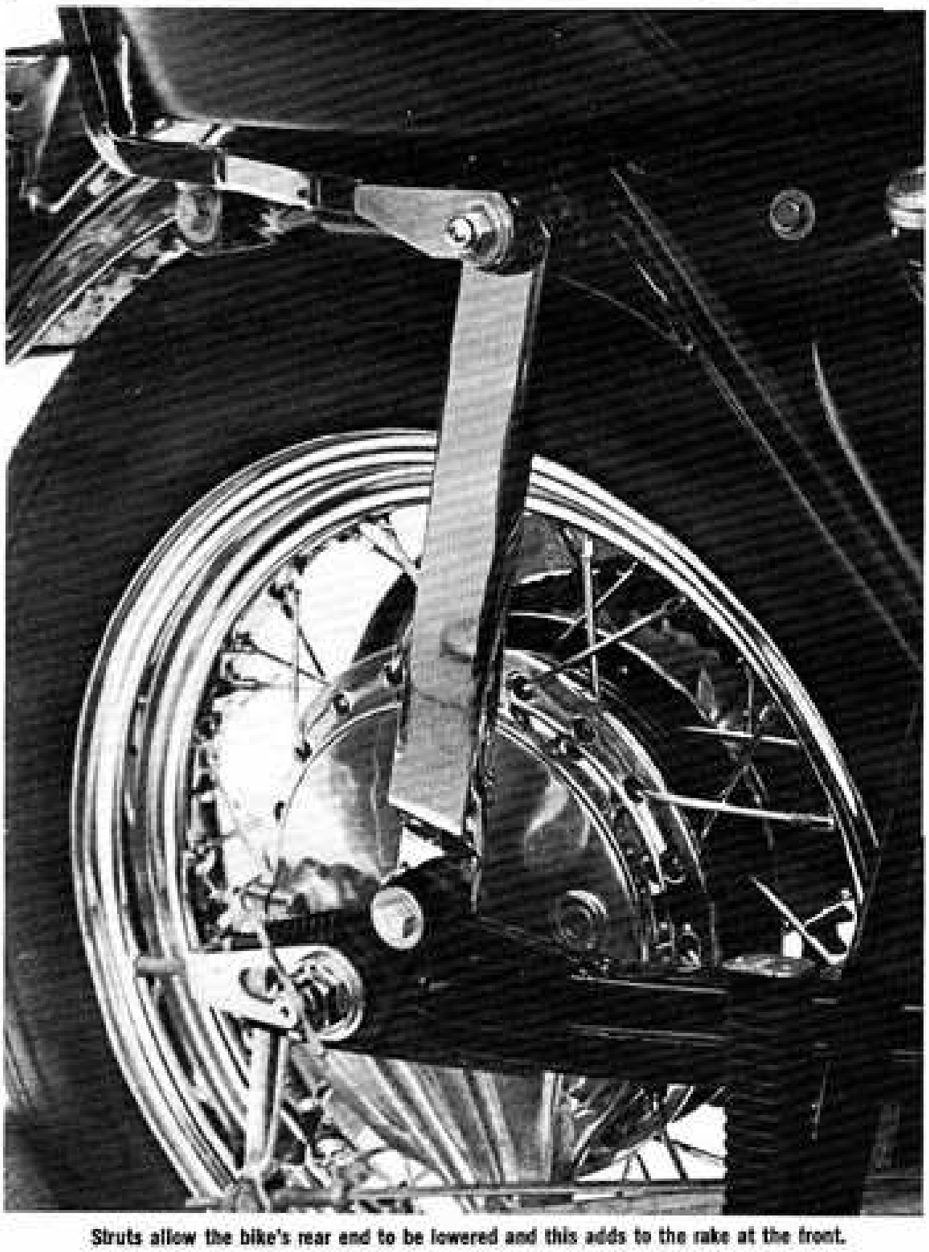
As is mentioned in the chapter on raking, it is sometimes better not to cut the frame if it is completely in design. A safe way to gain a few degrees of rake without a major operation is to lower the rear end of the bike. Just as raising the front end adds to the rake, so does dropping the rear end.

This can be done by lowering the rear suspension to its maximum travel point. Since there is no more room for the wheel to bounce up in absorbing bumps, that means the rear will have to be made rigid. This is best done by replacing the shock absorber/spring units with a solid bar (strut.)

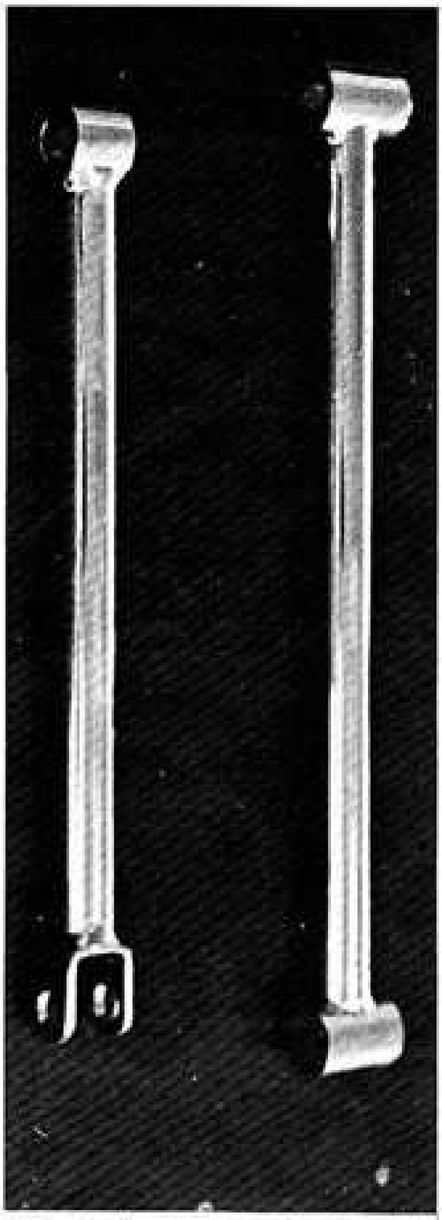
Without the shocks, the ride will be harsher but this can be alleviated somewhat by mounting a fat, soft 5.00x16 wheel and running it with about 10 to 14 pounds pressure in it.

Struts can be made of just about anything strong enough not to break on hard jolts and bumps. Solid bar stock, stainless steel, aluminum, hardwood and tubular steel have all been used. One enterprising soul even used his old shock absorber units after removing the springs. They are the perfect length and already have mounting eyes.

Usually, it's a good idea to take strut measurements with the wheel and



Struts allow the bike's rear end to be lowered and this adds to the rake at the front.



Simple strut bars can be made up from tubing with home-made shock mount fittings on the ends.

fender mounted. It's a simple matter to remove the old shocks and let the frame down until the fender touches the tire. Measure the distance between the shock mounts and add an inch or so for tire clearance. That will be the distance between the mounting holes in the struts.

There are endless choices of materials. Most go to some type of a solid steel bar stock, which is easily chromed. It is also easy to weld mounting eyes to this material and the stuff is available in round, square, hex and octagon-

This is your chance to get tricky and use twisted square stock to add unusual glitter to the bike.

al forms. Should you be concerned with weight, tubular steel or aluminum bar stock would be a more attractive choice.

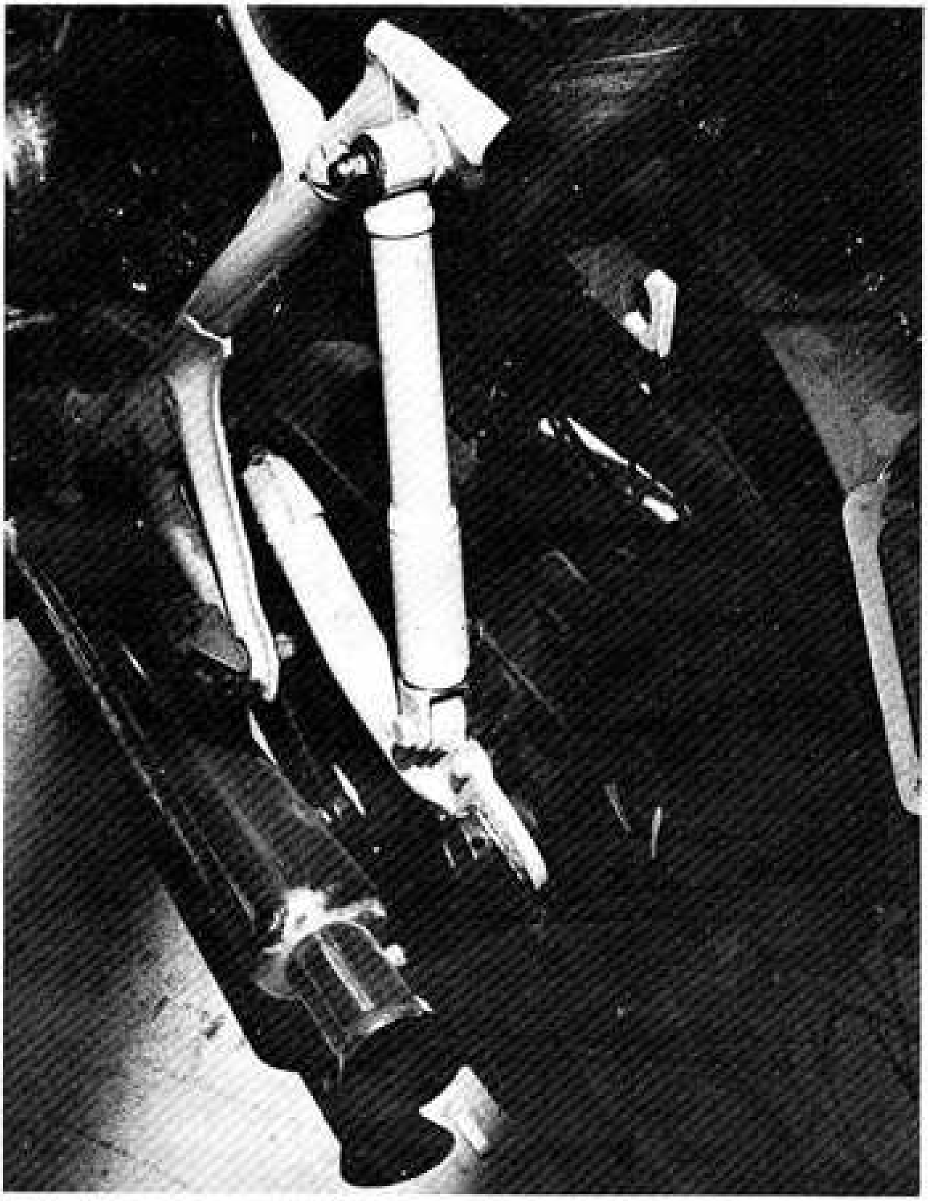
Solid steel bar can be heated and twisted into a spiral design that looks "bitchin'." Doing the job can be a little tricky because it takes some heavy duty equipment and a good eye. A big vise, an oxy-acytelene torch, and a muscular helper are what it takes to twist the stuff yourself.

The general idea is to hold the bar in the vise, heat it and turn on the end of it to get the twist effect. The expertise comes in not heating it so much that the steel "burns" and flakes off: this would leave it pitted, and it would never look quite right after chroming. Keeping the bar reasonably straight can be a problem, too, if the person twisting it can't put an even rotating force on the end of the bar.

An easy way to solve this is to temporarily weld a "T" handle to the end of the bar. By contrast, if an ordinary wrench is put on the end of the bar for twisting purposes, you'll end up with a snakey strut (which may not be all that bad if you dig it).

Start heating the bar at the end near the vise. Work the torch back and forth on a spot about two inches long. When it begins to turn red, have your buddy grip both ends of the "T" handle, applying an even twisting effort so that the bar tends to spiral, not bend. The twisting process will be very slow.

Work the torch slowly down the length of the bar toward the "T" handle, just fast enough to move the red spot along. The bar will only twist at the red spot. How much twist you get depends on how fast you make the spot move and how strong your helper is. Usually, one full turn in eight inches is the maximum without running the risk of structurally weakening the bar. One turn in 16 inches is ideal. It helps the effect to use a hex or octagonal bar, as there are more sides to show off the twist.



A "quick-and-dirty" strut can be made from the old shock but bear in mind that this ruins the shock.

Struts made from flat aluminum stock are relatively easy to make and can be shaped as desired.

Start with a longer piece than is needed so that when you cut it to length, the twist runs evenly from end to end.

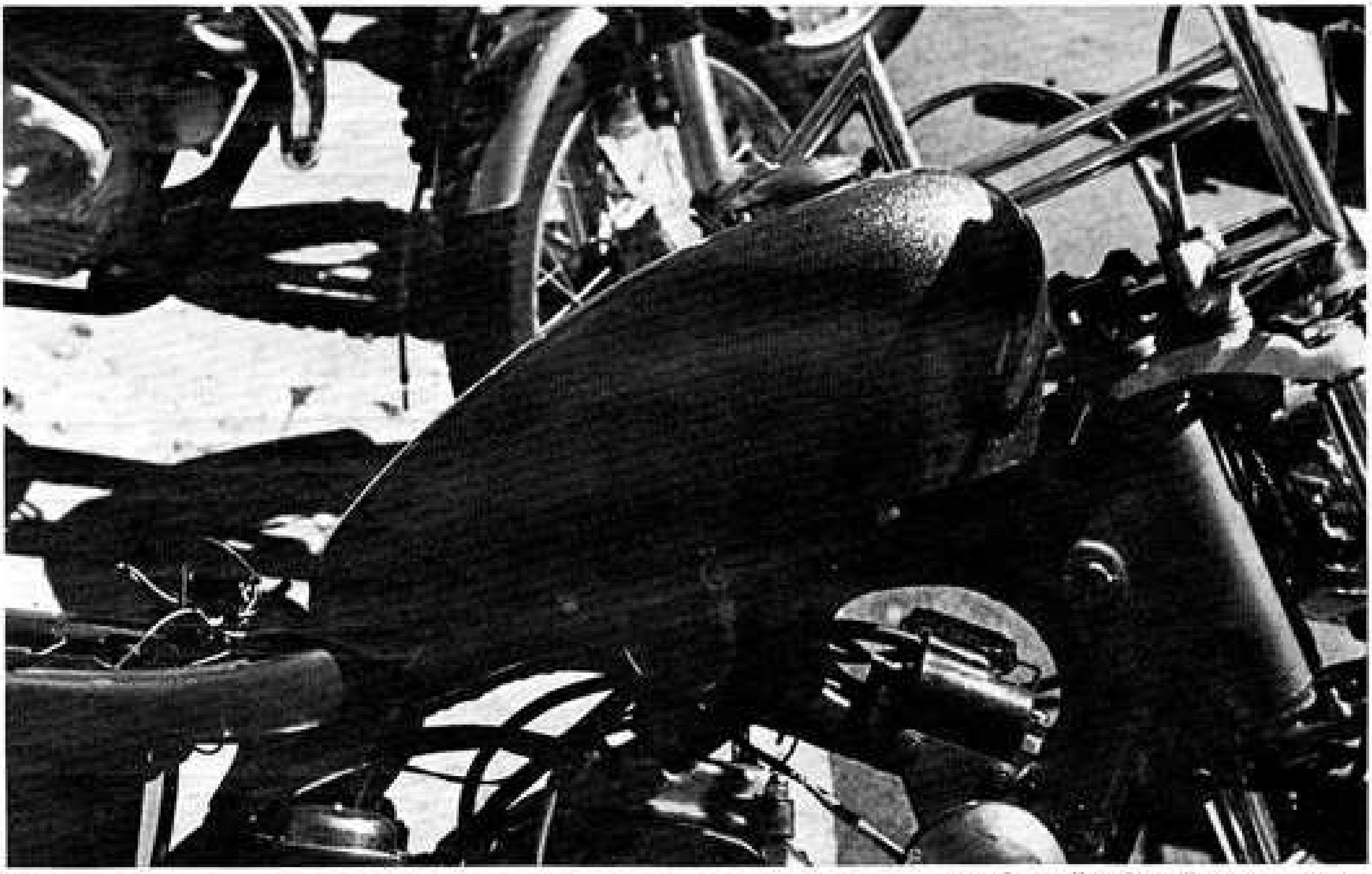
End mounting tabs are almost identical to the originals. The exception is that rubber bushings should be omitted. Without springs and shock absorbers to take up the force of road bumps, rubber bushings won't stand up to the job. This would allow the struts to work loose as the rubber was pushed out and the rear end would develop a "clunk" sound as the struts allowed the swingarm to move slightly.

Press the old rubber bushings out of the shocks and either cut or burn away the rubber from the center steel sleeve. Weld this sleeve to the end of the strut, send it off for chrome when it's finished.

Flat steel stock cut into ornamental shapes also has proven popular for struts. As long as the shape has structural strength, there is little problem with this. The idea is the same with respect to the length between the mounting eyes, and the same sleeves can be used. It's sometimes easier to drill the plate and weld the sleeves into the resulting holes. If aluminum plate is used, the original sleeves can be pressed into very tight fitting holes, or a boss can be built up with aluminum heli-arc welding so that the ends of the plate make a tight fit between the mounting tabs of the frame. Whichever way is used, be sure there is no play in the shock mounts. The swingarm must be held tightly.

Simple things like struts can be an inexpensive alternative to special frames and yet still look good if done with a little care and forethought.

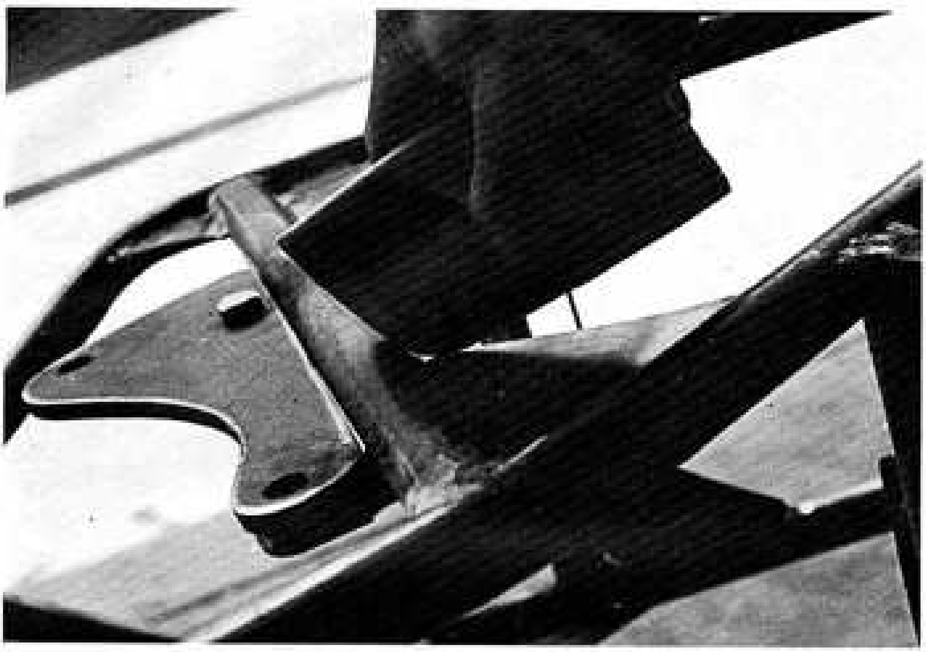
MOLDING

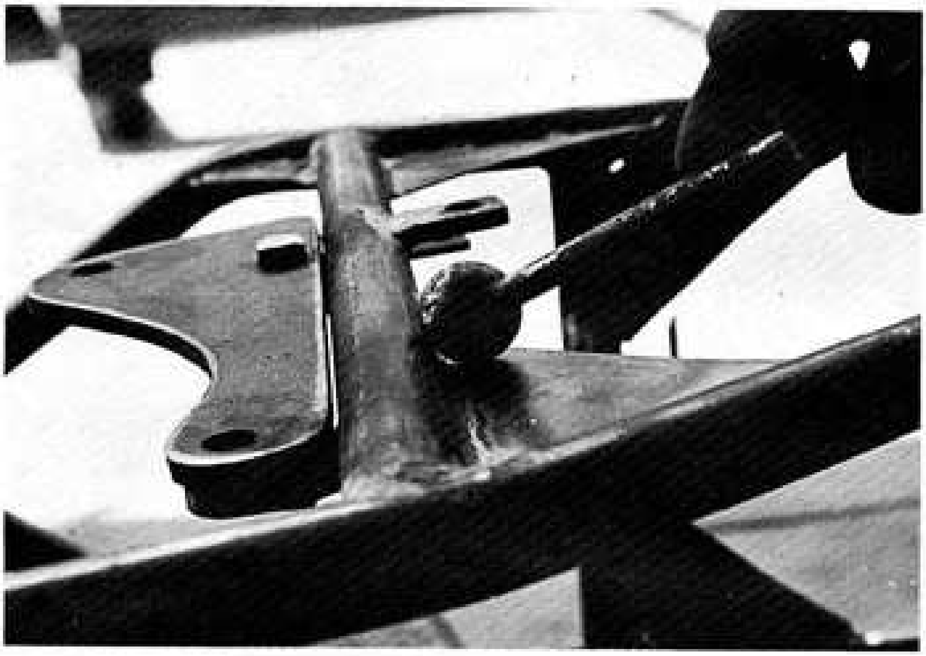


Traditionally, San Francisco originated most of the chopper styles. In fact, the first choppers were built there and a 'Frisco chop is the epitome of class. The most predominate feature is the high-mounted Sportster gas tank.

The major drawback to this mounting method is the fact that everything that was formerly hidden by the tank is now out in the open, cluttering up the lines of hte bike. Coils, wires, cables and horn can be moved to other positions or hidden relatively well. But an ugly part that can't be hidden easily is the frame itself.

Frame joints and gussets that were under the tank are now out in the open. Honda has always made an effort to keep their bikes looking good by dressing up all the exposed frame members but they have spared the efforts where a panel or tank covered them. After 'Frisco mounting the tank, something will have to be done about the steering neck. That something amounts to a can of resin -catalyst type body putty, a flexible applicator and a supply of sandpaper. Molding will also cover up the raking weld, which often isn't a work of shimmering beauty.





Preparing the area is fairly simple: knock off the unnecessary lugs, mounts and fittings and have the area sandblasted so that the putty will stick. While on the subject of fittings, BEFORE you mold the neck, make sure that you have some working fork stops for your front end. Nothing can make a bike man cry so much as to park his new bike for the first time, watch the frotn wheel flop to the side and see the triple tree dig into his shiny gas tank. Mount the tank and front end so that proper fork stops can be welded on first.

As soon as the bike gets back from the sandblaster, start work on it immediately. The bare, clean metal will start rusting in a very short time and this will call for another trip to the blast tank. The job could be done without blasting but the goop is very likely to break loose and fall off. This usually happens after the bike has been painted and ruins that too. Just sanding the surface won't get into the cracks and crannies. The putty won't have a chance of sticking there. Blasting gets it all and roughs the surface up very well to give the putty a very good "foot."

No molded area should have putty over ½-inch thick. It's asking too much of it to stand up under that heavy an application. If you want an area built up more than half an inch, first form sheet metal around that part approximating the molded area. Then cover that with putty. The sheet metal will act as a gusset, and this side benefit will help prevent the finished job from cracking due to flex. Blast it after the sheet metal is welded on since the putty is supposed to stick to that too.

There's a little trick that may be used to add some strength to the finished job, one that will also help prevent cracking. Pick up some extremely fine fiberglass cloth at a model airplane

Make dry run passes before applying putty. Applicator should be soft and flexible.

A steel ball mounted on the end of a handle is very useful in certain applications.

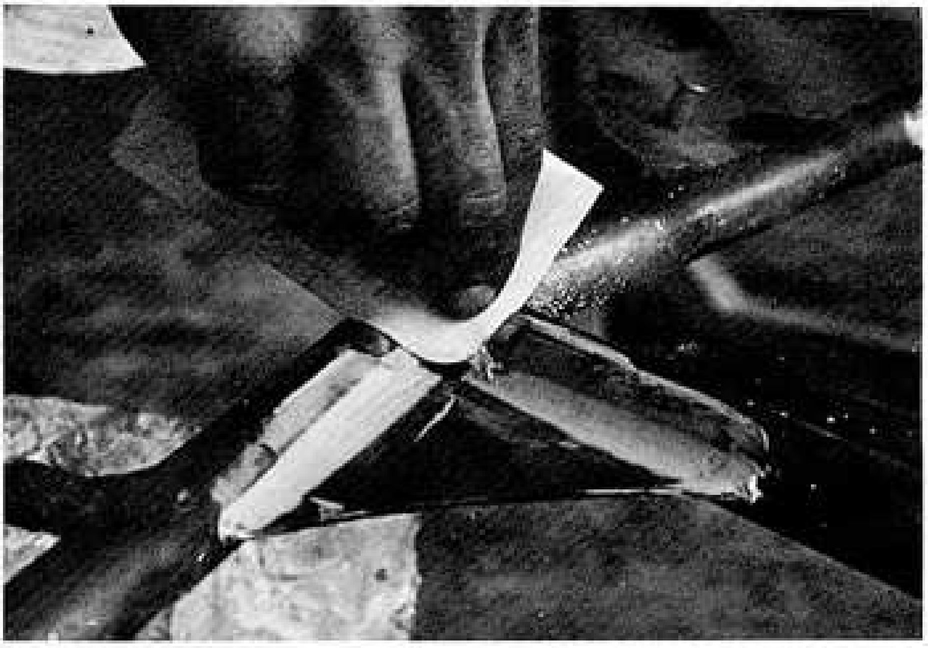
With a minimum of strokes, apply the putty evenly and smoothly.

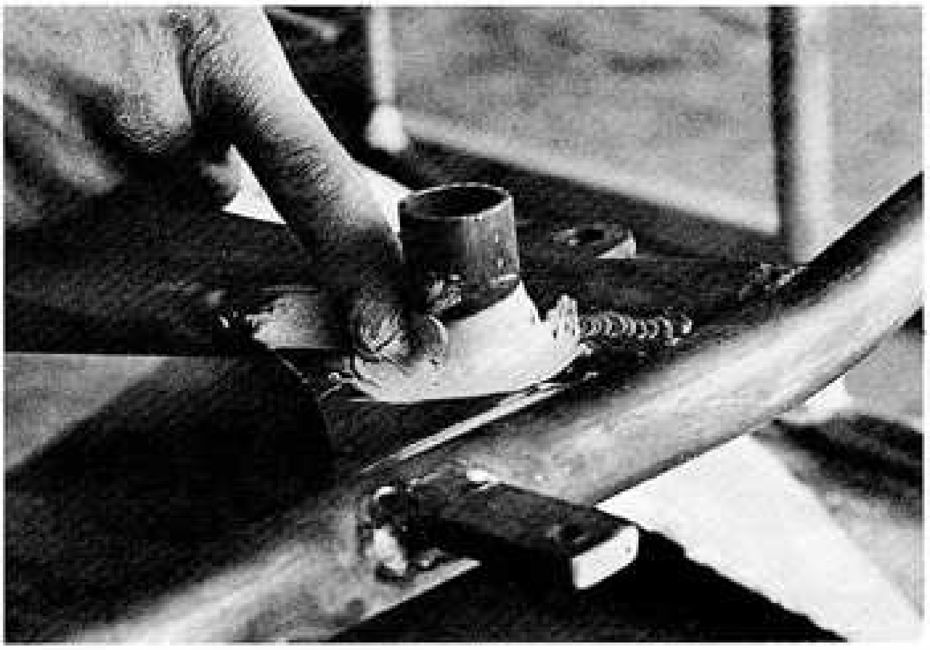
hobby store. This cloth is lighter than a single sheet of Kleenex but about 1000 times stronger. Then go to a boat store and get a small can of polyester resin and catalyst.

After the molding job is finished but before the primer coat of paint, mix up a couple ounces of resin and put a few layers of fibreglass down over the molding for reinforcement. This type of resin will not stick —to metal so don't make an effort to lay the glass out past the edge of the putty. Use your fingers to smooth the cloth down one layer at a time.

As a suggestion, mix up an ounce of resin and time it to find out how long your particular batch takes to gel, that is, until it turns too thick to work with. Humidity, temperature and the amount of catalyst all affect this gel time and it's handy to know just how long you have to put the cloth down before you start the job. No sense messing up all that molding work by gluing your fingers to it. *Do not try to use resin after it has begun to gel.* Working time can be increased by setting the resin into an ice pack to cool it.

Now that you know how to finish the job, let's back up a few days and tell you how to start it. The frame is blasted clean and is free of rust, water, and oil. Pick up some good quality plastic putty. There's no sense using junk that will give you headaches later. Most body shops use Snowhite brand. If you can't find it, try the Sears brand. Many say that it is very good. You want a flexible putty that doesn't dry into a rock. Remember, you have to sand this stuff and the easier it is to sand, the easier it is to work with. And of course, always use the two-part type of plastic putty, the kind with a catalyst. The regular drying type takes too long to harden, and it shrinks as it hardens. This causes surface cracks several weeks after it has dried.

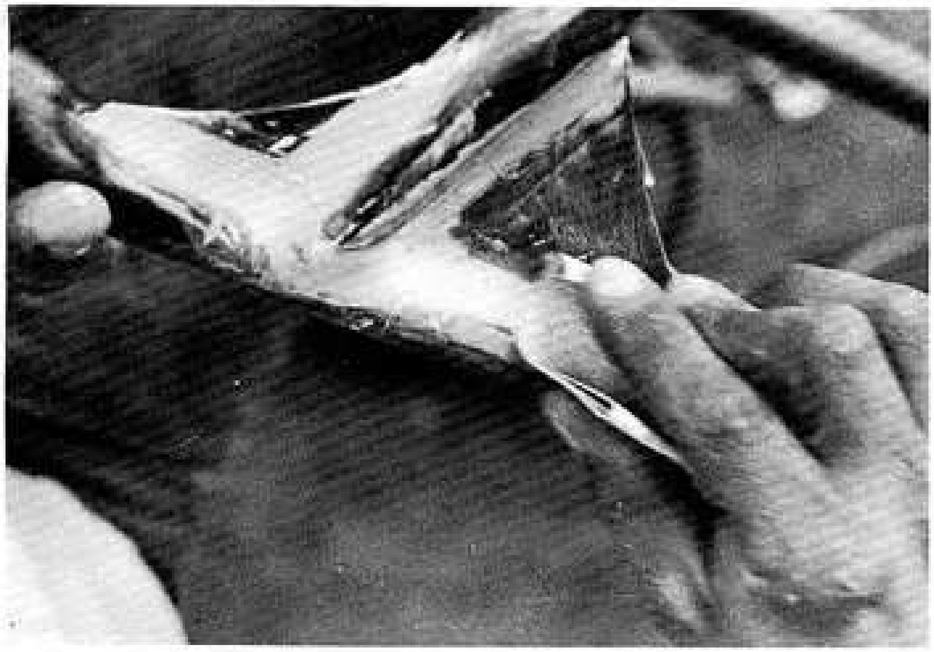


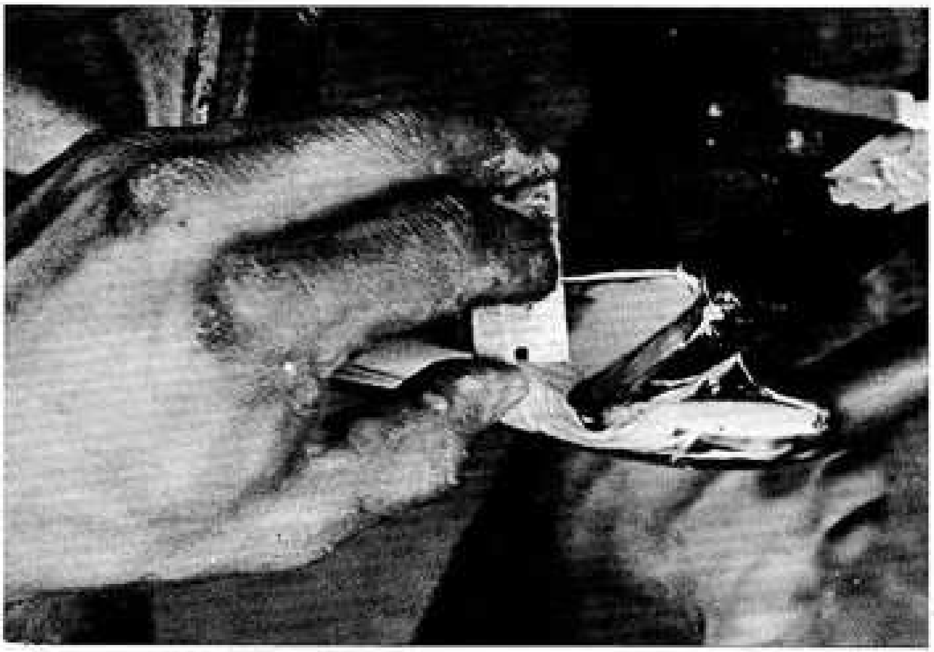


Usually sharp square corners can't be followed in one pass. Fill them in this manner.

Fingers work well in odd-ball corners and contours where it's impossible to use the applicator.

Number 80 grit sandpaper will quickly prepare the first application and help shape the molding.





The most important part of the molding job is the applicator. This little tool can save hours of sanding if you use it correctly. Ninety percent of the molding job is done as the soft plastic is spread on the frame. Sanding is done only to clean up the surface, not to shape the molding. You cannot expect to just slap the stuff on, then contour it after it's hardened.

More than one applicator will be necessary for most molding jobs: a large one for the broad areas and a couple small ones to get into corners and crannies. Generally, a soft applicator is the more useful because it can be bent or curved to fit any particular shape. And don't be afraid to cut an applicator if it doesn't fit the contour that you're working on. Fingers work well, too, but make sure they are free of oil or sweat.

Take a tip from diamond cutters—practice each spread of putty several times before actually doing it. Make a number of dry runs to find the best angle of the applicator to make the profile you want. When it comes to the actual application, there should be no more than three passes. The first to get the putty where you want it and one or two more to shape it exactly the way you have in mind. Don't "worry" it to death by making several passes with the applicator or trying to make fine adjustments with your fingers. The fewer times you touch it, the less likely you are to mess it up. A couple quick, very well thought-out passes are all that's necessary.

Sometimes, it is possible to make very minor last-minute adjustments with a fingertip as the putty begins to set up, but as a rule, don't make this a habit. A legitimate procedure is to trim edges or excess putty with a small knife or razor blade before the putty is completely hardened. This will save a lot of sanding later. Before the putty

It should be easy to follow these sharp corners when applying the second layer of putty.

Start shaping the putty before it has completely hardened with razors and files.

Work the second application down with fine sandpaper. Finish with #600 or #800.

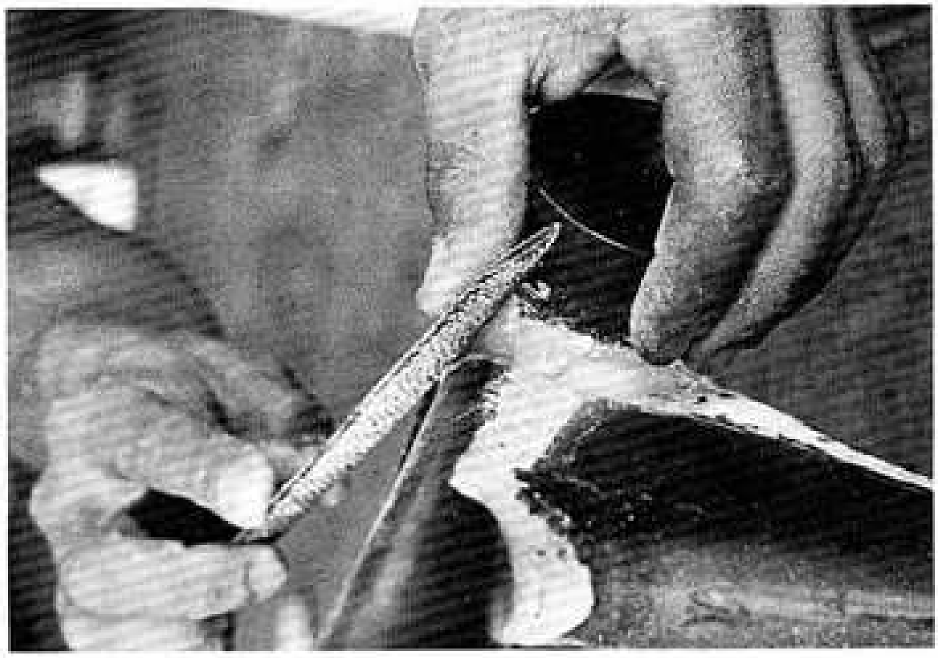
is completely hardened is also a good tim to start doing a little shaping with a rasp-type file or an automotive body shop's "cheese grator" file. Make sure that you don't start this kind of shaping before the putty has hardened a bit. It should be the consistency of aged cheese: not mushy soft but like modeling clay.

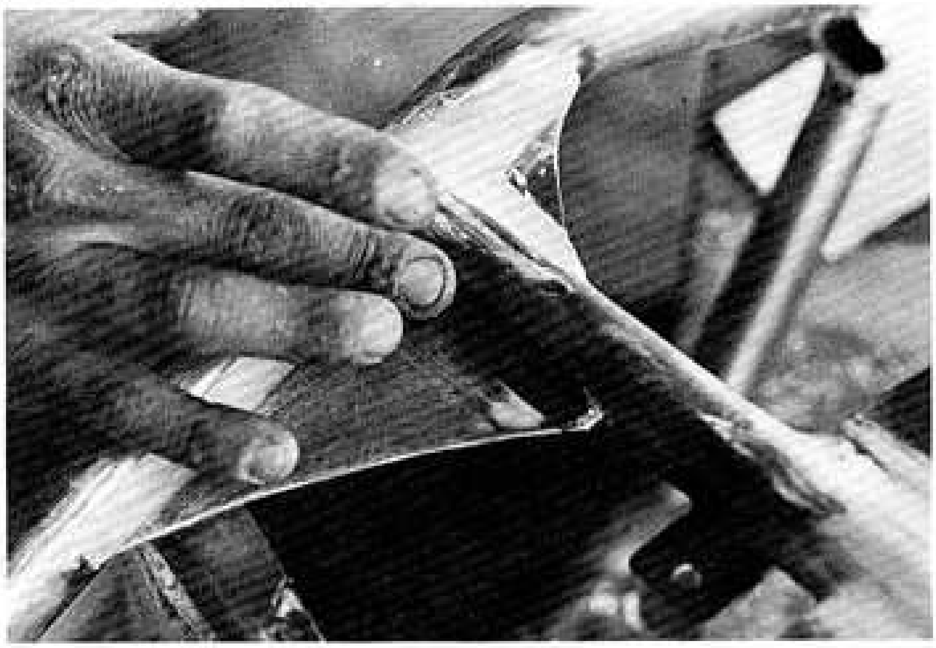
It is usually necessary to apply the putty a second time to fill in slight holes or to clean up depressions in corners. Sand the first layer with a very rough #80 grit sandpaper to give the second layer a good "foot". In most cases, this second layer will be so close to the shape that is desired that only very light sanding will be needed to smooth it out and to prepare it for the fibreglass or a coat of primer paint.

If desired, a final coat of a glazing putty can be rubbed into the molding to give it an ultra-smooth finish. This putty is of the drying type. Don't put it on very thick. Only enough to cover the plastic putty and fill in the pores. After it has dried, sand it down with a very fine sandpaper, like #600 or #800 for a glassy surface.

TIPS

1. Practice the passes before applying the putty.
2. Never more than a half-inch thick.
3. Use sheet metal to back up gussets and thin webs.
4. Use lacquer thinner to clean the surfaces of oil and water.
5. Begin shaping the putty before it is completely hardened.
6. Use a heavy rasp file to shape any big globs of putty.

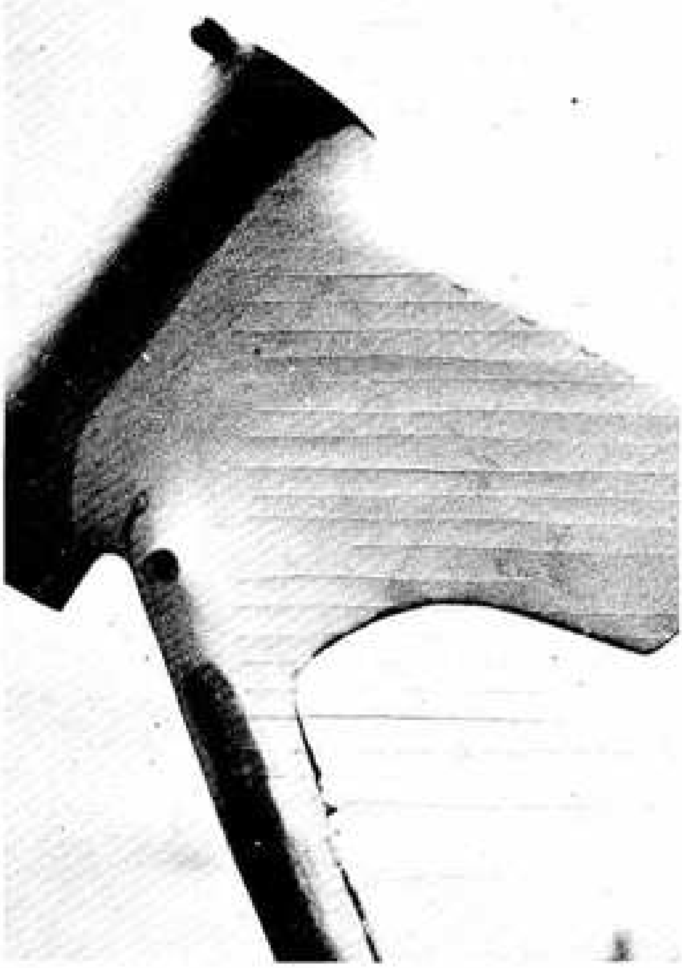




A fast way to remove a botched job is with a rotary rasp in an electric drill.

Shaping a big blob of putty with a rasp file saves a lot of time and sandpaper.

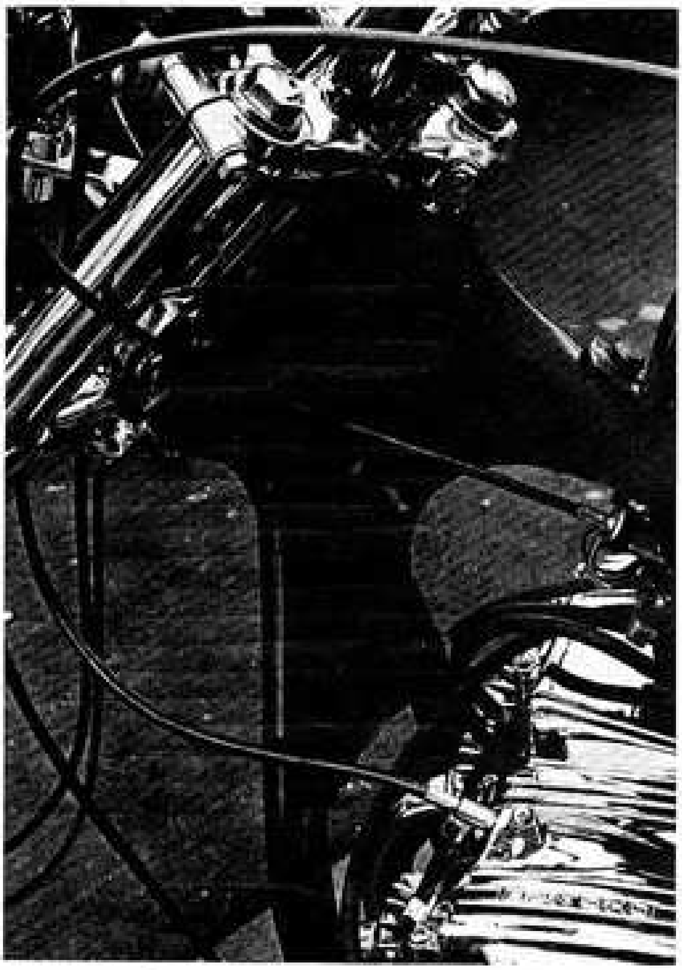
If desired, glazing putty can be rubbed into the finished body putty molding.



Always put a metal support behind any webs. Putty isn't strong enough by itself.

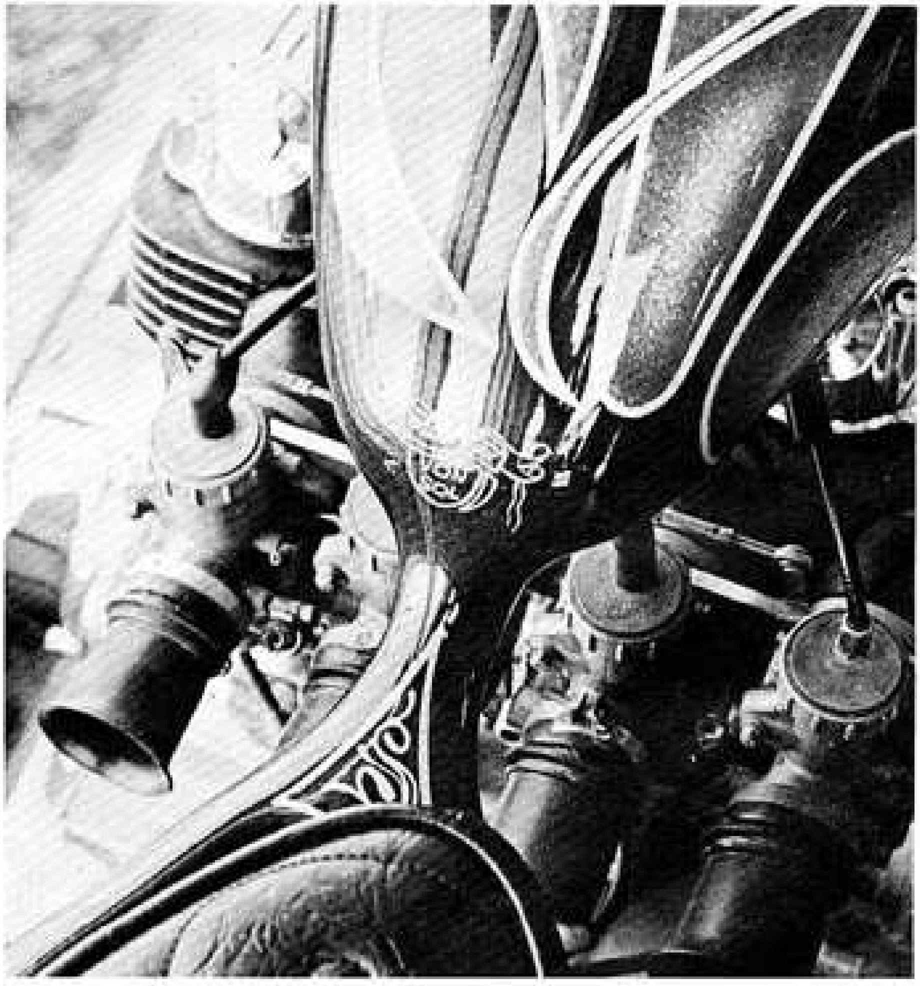
Steering necks can be given different shapes by adding sheet metal in the form desired.

Folding #80 sandpaper will make it easier to sand the tight radii.

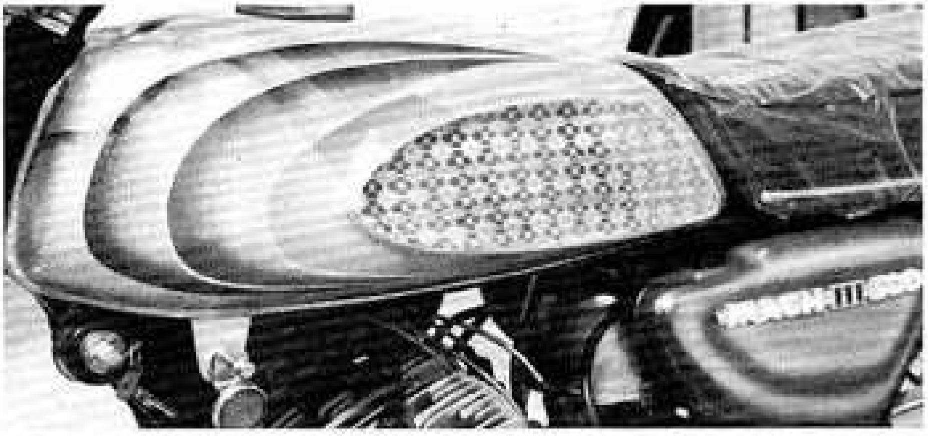


Steering heads are the most obvious places to mold in as they are the most visible.

Seat post areas are also a good place to lay the goop on.



As a general rule, it's wise to leave the gas tank removable because leaks may develop.



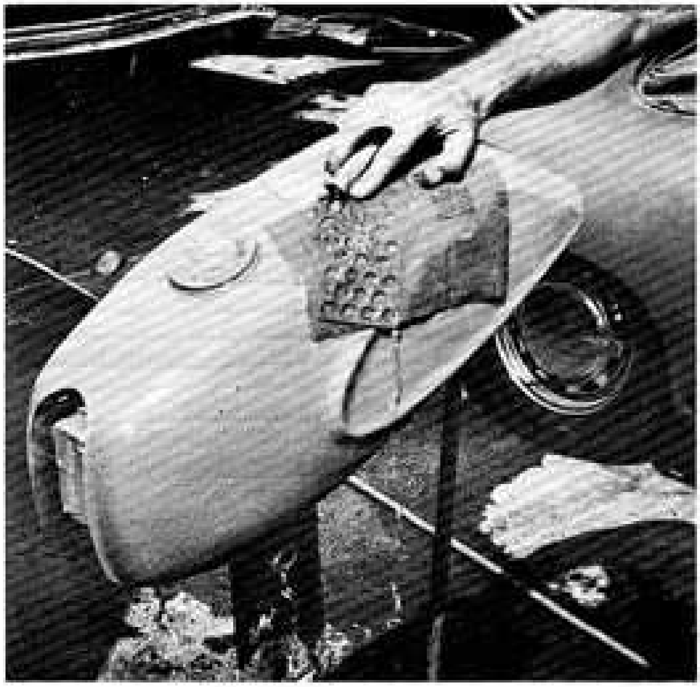
PAINTING

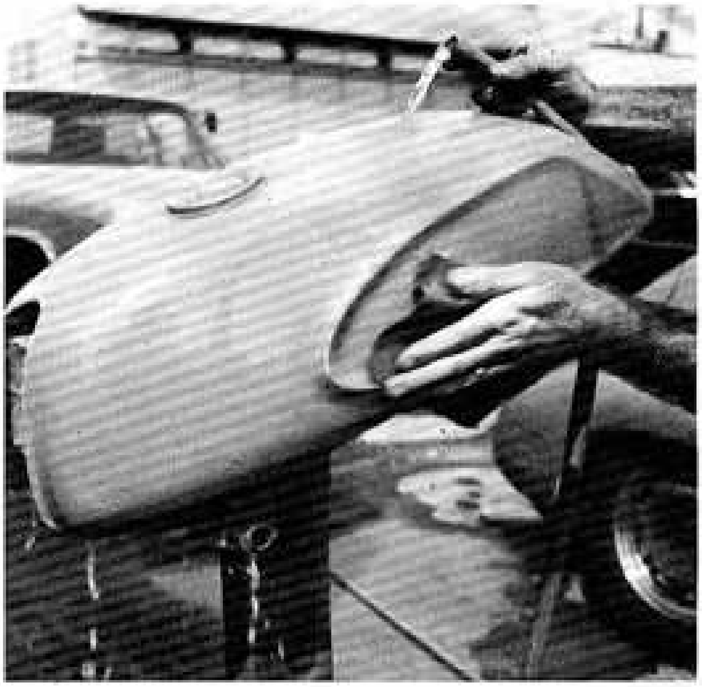
A

The first phase, naturally, is to remove the items to be painted, in this case, tank and side panels. Do not attempt to paint anything while it's still attached to the bike, as the results are sure to be amateurish.

In a well ventilated area, thoroughly degrease everything with Precleano No. 900, Rinshed-Mason brand (A). There are other brands on the market which are probably equally good. Use a clean, lint-free rag. Wipe on, rub a bit, then wipe off. This is a critical stage of preparation that most people ignore, but one which separates the great jobs from the also rans. Without proper precleaning, any grease or dirt is sanded deep into the grooves and causes "fish-eyes" in the paint.

Next, wet-sand the entire surface to be painted, using 320 grit wet-dry sandpaper, until everything is dull and uniformly "scratched" (B). It is not necessary to go all the way down to bare metal, nor is it desirable, unless there is to be a shift from enamels to lacquers. Pay particular attention to the edges and don't miss the area around the filler neck. Use a plastic sanding





B

C

pad for this stage, and don't scrimp on the water (C). Blow it all dry (D), then carefully mask off all surfaces that are not to receive paint, paying particular attention to all open lips or holes. Clean again with Precleano No. 900.

Mix up a batch of primer, using a 50/50 ratio of R-M lacquer and duPont No. 3602 thinner. Spray 5 good coats of primer on (E), waiting 3 to 5 minutes between each coat, depending on the humidity. After the final coat, let it dry at least 8 hours before proceeding.

Hand sand with 400 grit wet-dry (F), using no pad to support the sandpaper. You should be able to feel the surface through the paper and thus avoid sanding ridges bare again. Use plenty of water and go over the entire surface until everything is dull and all "orange peel" has been smoothed out. Do not sand hard enough to penetrate the surface below. Blow all parts dry again, then tack off with a good quality anti-static tack rag.

You are now ready for the base coat

D

E

F

G

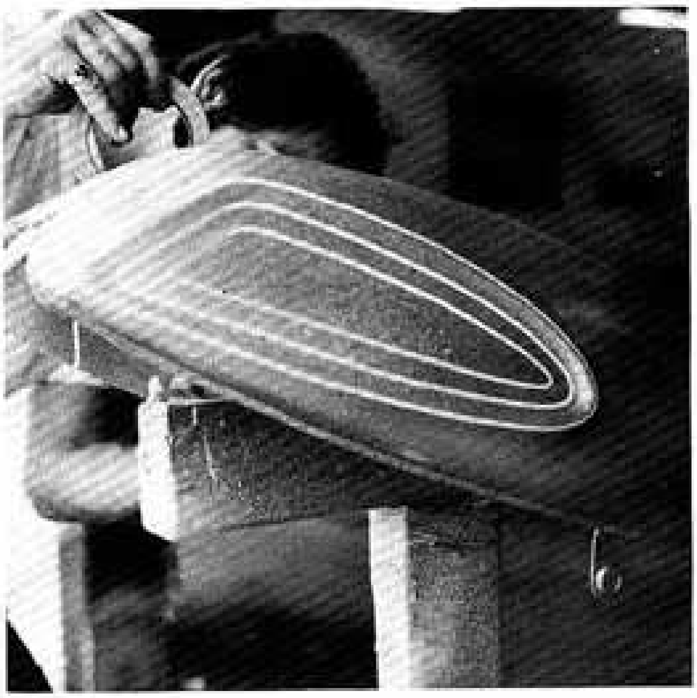
of one ½-pint Venus silver powder, one pint of clear acrylic lacquer and 1½ pints DuPont No. 3602 thinner. Be sure to strain everything carefully to prevent impurities from passing. Hit the surfaces with 2 semi-wet coats (G), waiting 3 minutes between coats and 5 minutes after the second coat.

Now comes the most critical part, the flake coat. The mixing formula is one-half pound silver flake, one quart clear lacquer and 2 quarts thinner. Keep shaking this mixture as you spray or it will separate and settle. Spray one wet coat (H), wait 10 minutes, then rub (tack) easily with your bare hands (I) to knock down the sanding flakes. Repeat this spray and tack routine 4 more times. You can tell when you have tacked off properly, as the flakes can be felt rather distinctly if they are standing. After the last hand tack, shoot 10 coats of clear acrylic, thinned 50/50, and let dry overnight.

H

I

J



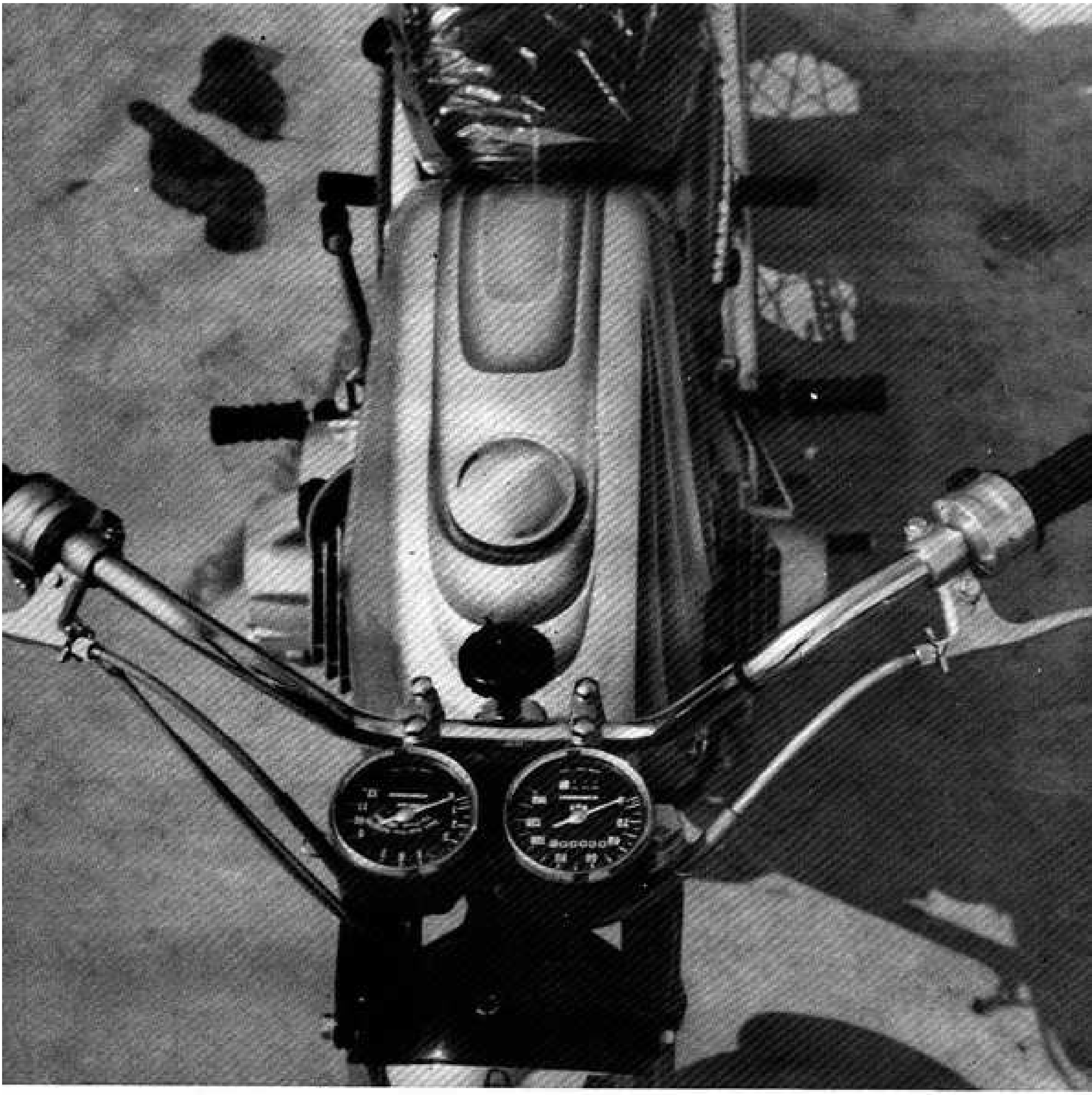
K

After thorough drying, color sand the clear to remove any orange peel that might be present.

Use 320 grit wet and sand lightly to prevent going through the clear layer. Blow dry, wipe with a damp rag, then blow dry again. After all this, hit it with a tack rag lightly and completely. You are now ready for 5 more coats of clear (J), this time at a lighter ratio for maximum smoothness. Try 60% thinner to 40% clear for starters and vary according to humidity and temperature. Let dry at least 24 hours.

The next few steps are largely a matter of personal preference and taste, but can be used as a general guide. Lay out all paneling with masking tape (K). Don't worry about the clear lifting; it won't if you've followed all these steps correctly. It's best to tape out the entire design all at once, then mask off each section separately as you paint it. This

L



prevents lifting the new colors that don't as yet have a hardened clear coat to protect them. Use acrylic candy toner for the colors at a mixture of 20% toner, 30% clear and 50% thinner. You can use an air brush or a Binks No. 15 touch-up gun at 15 to 25 lbs. pressure. Use low air and the smallest paint flow possible and shoot a tad on the dry side. If the pattern is not too intricate, and you don't have the tools, you might get away with a small touch-up spray can. Do not shoot heavy or wet. Allow at least 15 minutes drying time for each panel. Add panels till the desired effect is reached (L). Any additional fogging or lacing can be done at the discretion of the painter. *A little goes a long way* is a safe guide.

After all this, tack lightly with a tack rag, then hit with 5 or 6 coats of clear. Let it dry for 3 or 4 days, then rub it out. Best bet is an initial rubbing with DuPont No. 606, then finish with DuPont No. 7. Top off all your work with a good coat of wax and you're ready for reinstallation.

Special thanks to Mark at 'Tricks by Troinoff', 11720 Vanowen Street, North Hollywood, California, for allowing us to photograph his 'TRICKS'.

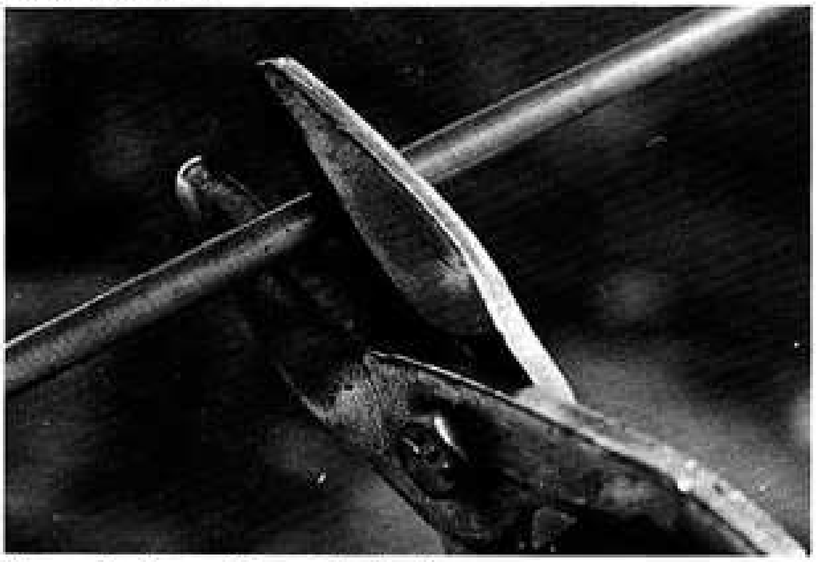
A minor problem that often drives amateur builders up the wall is making control cables of the proper size. Long cables are available, but are sometimes no help. Either they don't reach or they're so long that there are great loops of cable hanging out in the air.

The solution is to buy extra long ones and cut them back to the proper length. It's a simple matter that only requires solder, flux and a source of heat. The cable can be cut wtih metal shears or with side cutters.

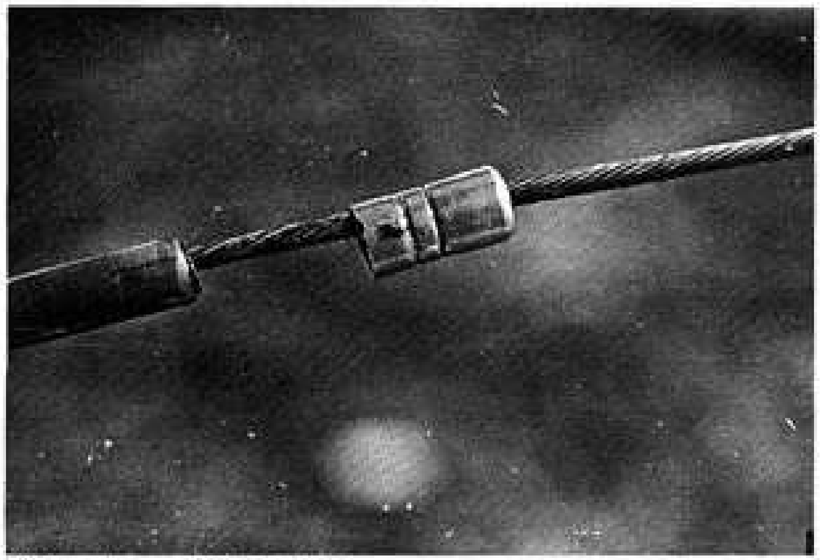
Before cutting the cable, first measure the distance that the inner cable extends past the end of the sheath. The

CABLES

First measure the amount that the inner cable protrudes from the sheath and then heat the fitting and remove it.



Remove the inner cable and shorten the sheath so that it fits the bike without any large loops or excess.



Slide the inner cable back in place, remove the cable ferrule from the cut-off and put it on the new end.

finished trimmed cable should have the same dimensions. Be sure that when you measure the cable, the inner cable is pulled all the way through the sheath and is tight against the other end.

Small soldering guns generally don't put out enough heat to do the job properly and even the large ones have a difficult time. A propane torch or a gas stove will do a good job. The kitchen stove is a handy place to do the job if the lady of the house doesn't mind.

Disassemble the cable first by heating one end of the inner cable and removing the end. Sometimes the wire core is frazzled at the tip to keep it from pulling through the fitting. If this is the case, slide the fitting up further on the wire core and cut the frayed tip off. Now you can slide the fitting off and pull the inner cable from the sheath.

Set the empty sheath in place exactly as you want it. There should be enough slack so that turning the handlebars or suspension movement doesn't pull the cable tight. Mark the place where you want to cut off the extra sheath and remove it from the bike.

After cutting it with the shears or the side cutters, check to make sure that the cut is clean. The inner cable must pass through without any binding or rubbing on sharp corners. You may have to file or grind the end of the sheath to smooth it up a bit.

Pull the cable ferrule from the short piece that you have cut off and push it onto the new end. If it's a tight fit, try gently heating it for a couple seconds to soften the plastic covering. Be careful because the plastic will burn and ruin the appearance of the cable. It's best to heat the metal ferrule and then push it on.

Slide the inner cable into place and then clean the spot where the fitting is to be soldered, using a solvent such as lacquer thinner. The cable has a light coating of grease, and the solder won't take unless the surface is cleaned.

Pull the inner cable up tight against the other end of the sheath and measure to find the spot where you want the fitting soldered. Cut off the extra after you have slipped the fitting on. If you like, you can fray the end of the wire core to help hold the fitting on.

Apply a little heat to the fitting and put a few drops of liquid acid flux on the fitting and inner core. If you have the piece too hot, the acid will boil and splatter so be careful that none of the hot acid gets on you or your clothes.

Now heat the piece until it is hot enough to melt the solder. Always remove the piece from the flame to apply the solder. Otherwise it will melt and drip onto the stove or floor before it gets a chance to work into the fitting.

If the solder isn't flowing properly for a good bond, *very* carefully put a drop of acid flux on the fitting. It will sizle and spatter all over the place so be sure to immediately rinse any off your skin. Apply just enough solder to fill in the fitting around the wire core. If you should get too much solder on and the fitting doesn't fit any more, file off the excess lead (after it's cool, of course).

You now have a custom tailored cable that doesn't detract from the looks of the bike. It's the fine points like this, the careful detailing, that makes a big difference in any chopper.

HYDRAULIC LINES

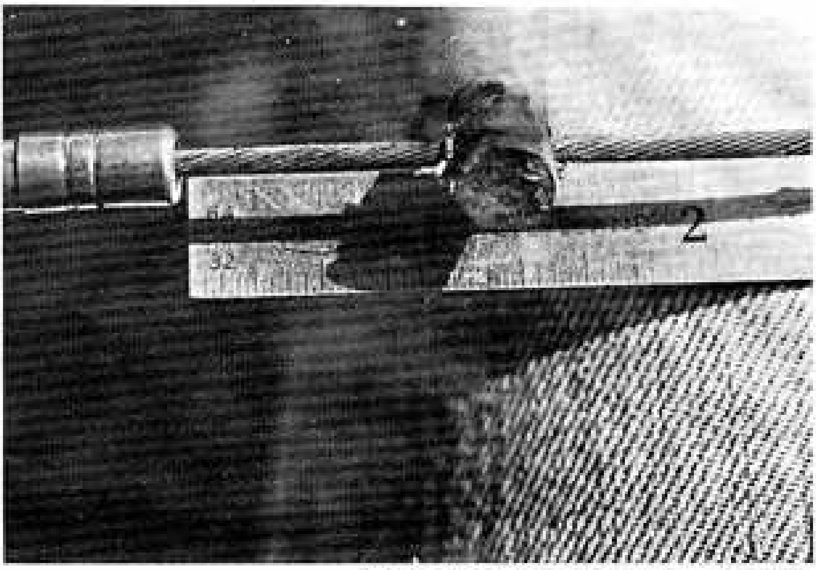
Lengthening the hydraulic lines to the front disc brakes is a big problem on a Honda fitted with a long front end. Many will put cable operated drum brakes on their 750 fours to avoid the labor. But that's a poor way to solve a relatively simple problem. There are a couple ways to do it, some are better than others. If there's no other solution, it's possible to join the two lines together at the banjo fittings to make up one long one. It's not very neat but it works.

A better way is to take the original hose and fittings to an automotive supply house and either have a longer hose made up with the Honda fittings or with fittings intended for use on automobiles. Japanese cars usually have the same threads on their fittings and are interchangeable.

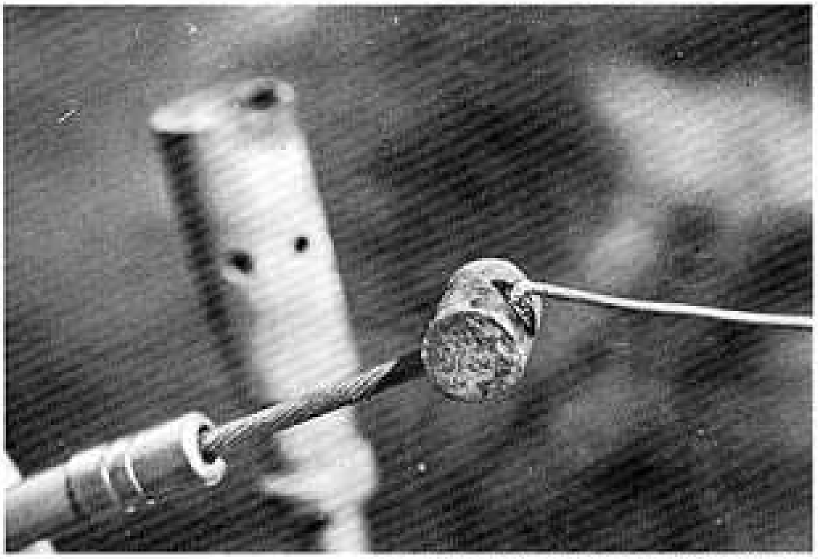
Hydraulic lines aren't easy to make up. They must withstand tremendous pressures and the fittings must be leak-free. It would be best to have a professional make them for you, as it takes some special tools to crimp the ferrules around the fittings.

Another attractive possibility is to use go-cart hydraulic lines. Standard equipment with Hurst Airheart calipers and master cylinders, these lines are very small and nearly invisible, thereby being ideal for use on a chopper. The only problem is getting Airheart fittings that will work with the Honda components. It may be necessary to have some special ones made up by a machine shop. That's expensive, but the final result would be worth it to have the little lines.

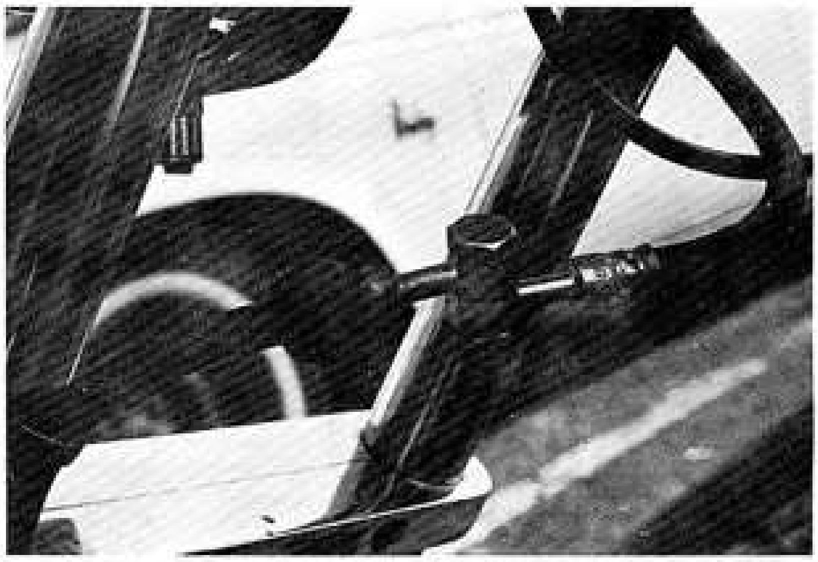
Keeping the lines and the cables from detracting from overall looks is an important part of detailing, one that makes all the difference between a so-so machine and an eye-popper.



Set the end fitting in place, measure its proper place and cut off the extra inner cable length.

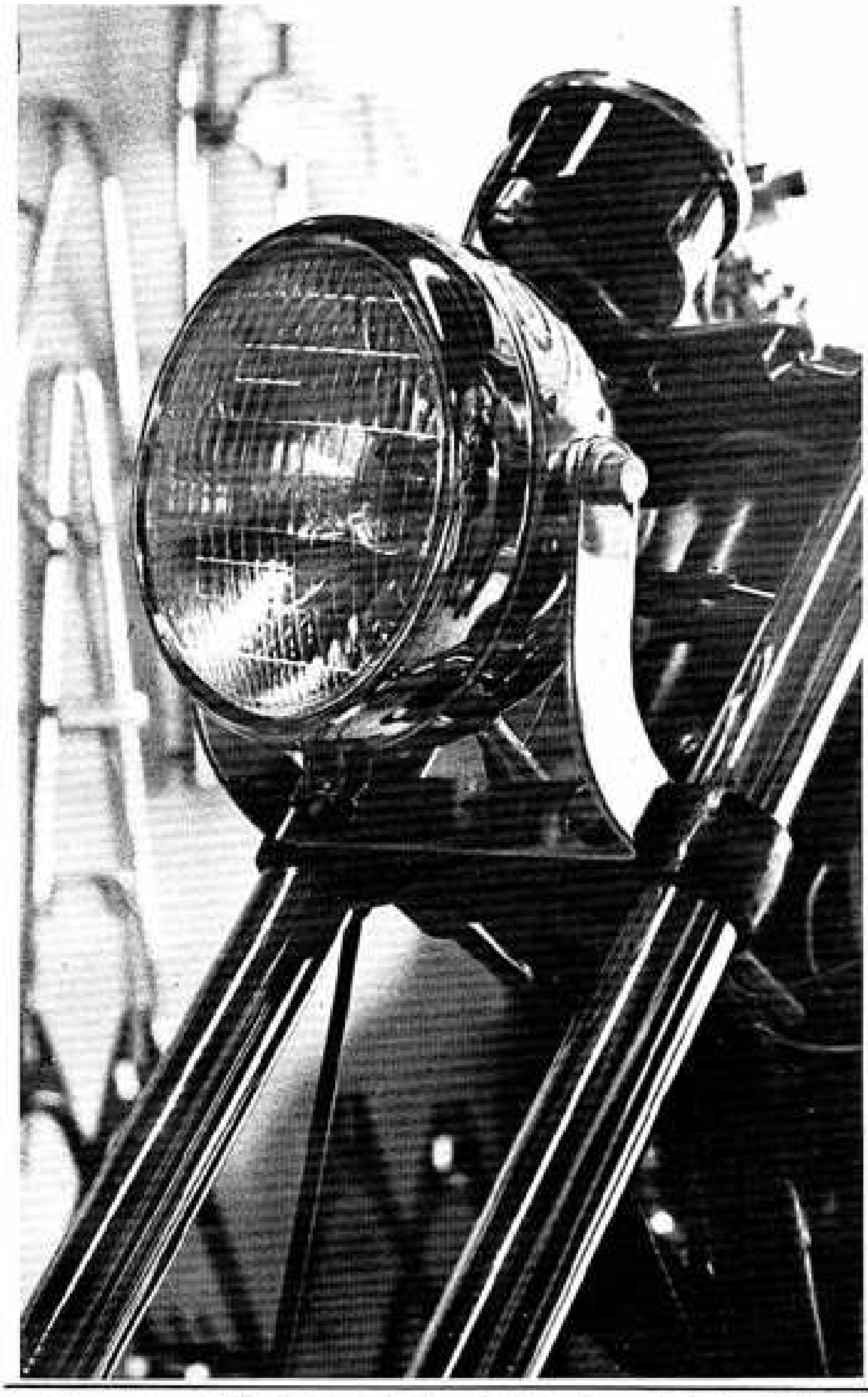


Warm the fitting and treat it with acid flux. Then heat it enough so that solder will melt into the fitting.



In a pinch, two hydraulic lines can be joined at the banjo fittings by a bolt but this method usually leaks.

HEADLIGHTS

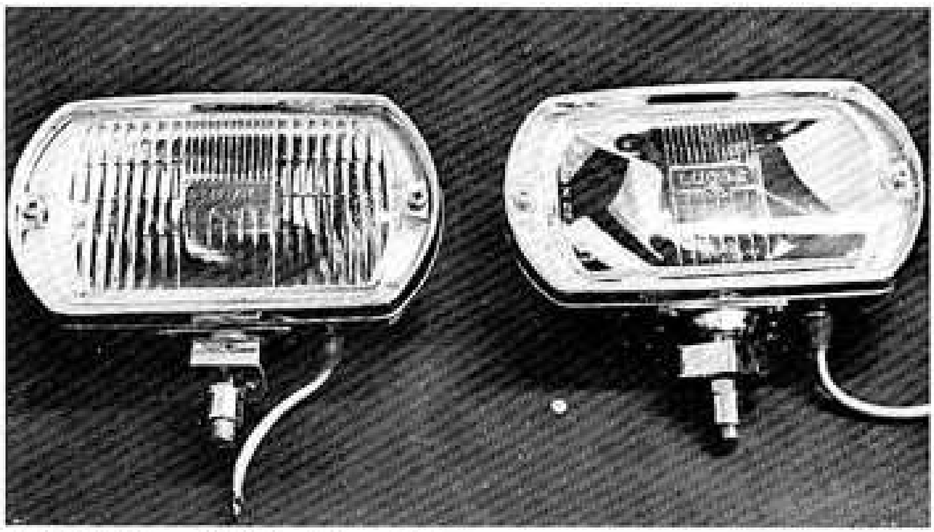


Because jammin' doesn't stop at dusk, a chop needs a good set of night eyes. The standard Honda light is good: very bright, very dependable and very big. So big that it doesn't look good on the front of a light set of forks. Just ruins the lean look.

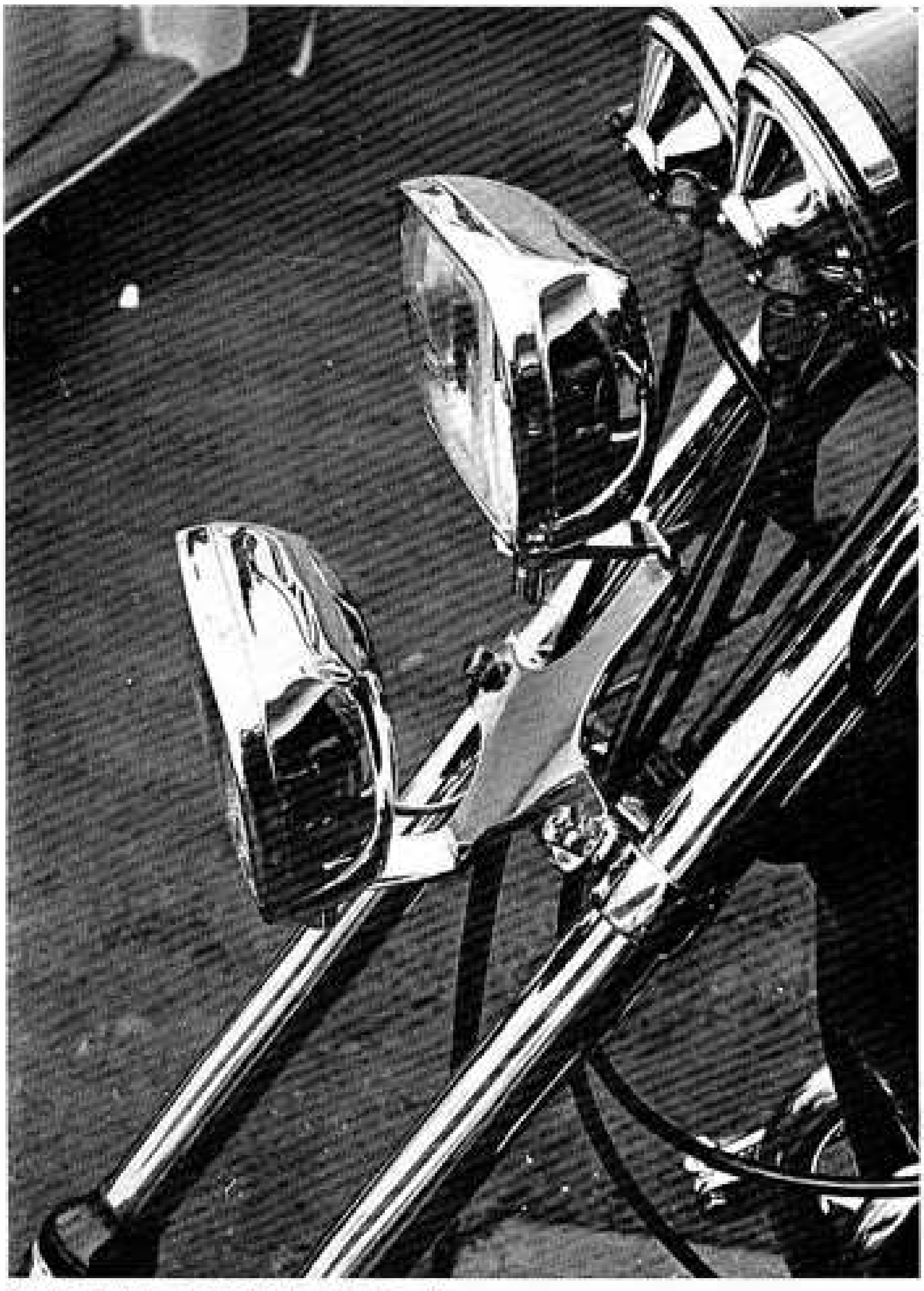
Standard procedure in the past has ben to drop on an accessory unit such as the one by Bates. It's a good unit and is legal in most states. In those where it is not, you can remove the old bulb and reflector and replacé them directly with a sealed beam unit that is legal everywhere. The light output from these units isn't exactly the brightest. In fact, it's a bit on the anemic side. Speeds over 45 mph will have the scooter overdriving the lights.

Some people have been running Volkswagen back-up lights for a headlight and this is downright dump. A scooter is overdriving this light as soon as the shift to second gear is made!

Riders who have discovered the lighting hassle have taken a tip from the foreign sporty car drivers and have mounted the super-bright quartz iodide light from Europe. They are small, light, rectangular and good looking. They are also extremely bright. In some states they are considered too bright and have been outlawed. Natur-



Quartz iodide on left is legal in most states but clear lens on right isn't.



Tandem plate-type mount is the hot set-up for double quartz lights.

ally, all headlights must be adjusted very carefully. Should the light shine in the oncoming traffic, those drivers will be temporarily blinded.

At this time, all lights with clear, unlined lenses are illegal. The lens must have lines embossed in it, as in a sealed beam. It must also have a high and a low beam in it in many states. Only one quartz light has that at the present time.

HEADLIGHT BRACKETS

After trotting home with a nice new trick light, it would be a shame to mount it to the old Honda headlight ears. They are big and ugly. The small lights don't go at all with them. Those who have the springer or girder front ends on their machines haven't any choice, they must make up some other means of mounting the lights to their scoots.

There are two basic types of light mountings: the ear type that attaches to the sides of the light and the plate type that the bottom of the light bolts onto. There are also a couple of variations that can be worked out.

Ear types can be attached by a U-shaped bracket which is itself bolted to the lower triple clamp. These can be bought ready made to fit many bikes. If a special one has to be made up, it is often difficult to arrange the bends properly so that the light points straight ahead. One side is often bent more than the other and this throws the beam off.

The plate type is very easy to make and adjust. The ball-joint in the bottom of the light makes it a simple matter to get the light on the road ahead.

Springers and girders work best with the plate type mounts. There are too many problems in attaching the ear type. The flat plate is relatively simple to bolt to the springer frame or to the girder.

When double lights are used, as is common with the small quartz iodide lights, a tandem plate mount can be made up (or bought ready-made) that will hold both lights. These usually have a serious shortcoming: they vibrate a lot and can break off. What's needed is some kind of a small brace to kill the vibration movement and hold the lights steady.

It seems that lighting is the single most common hassle on a chopper. If it's not getting a good looking set stuck on the front end that doesn't hurt the overall appearance, then it's a big problem keeping the Man happy. Safety inspections and registration inspections are always nerve wracking. The clipboard man will stand beside the newly completed chopper and cast an evil eye on that new set of small lights while you stand aside and sweat. Obviously, then, it's a wise move to know the law as well as he does.

Ear type bracket works very well on extended standard forks and some springers and girders.

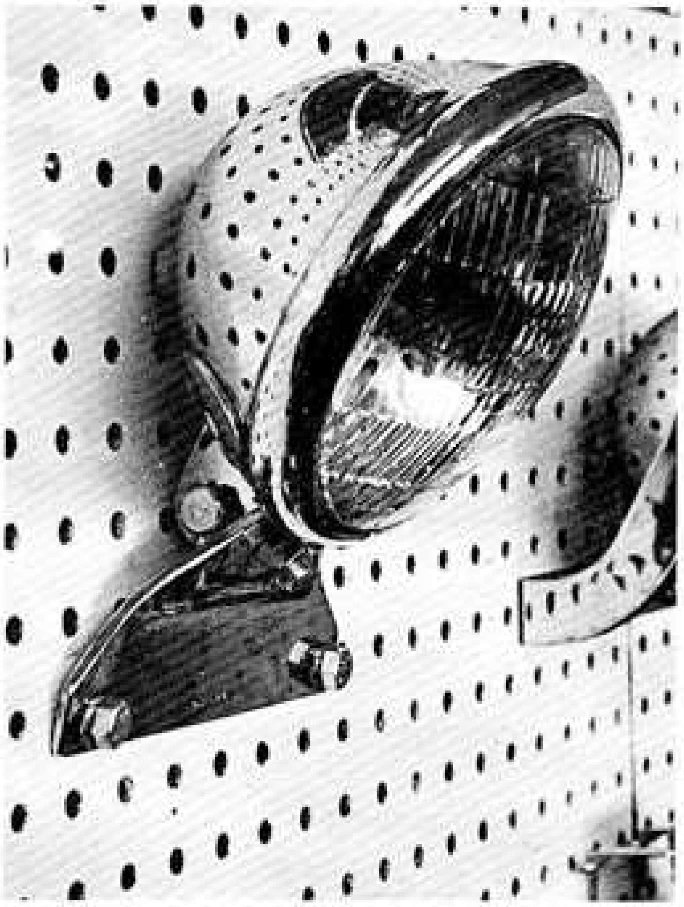
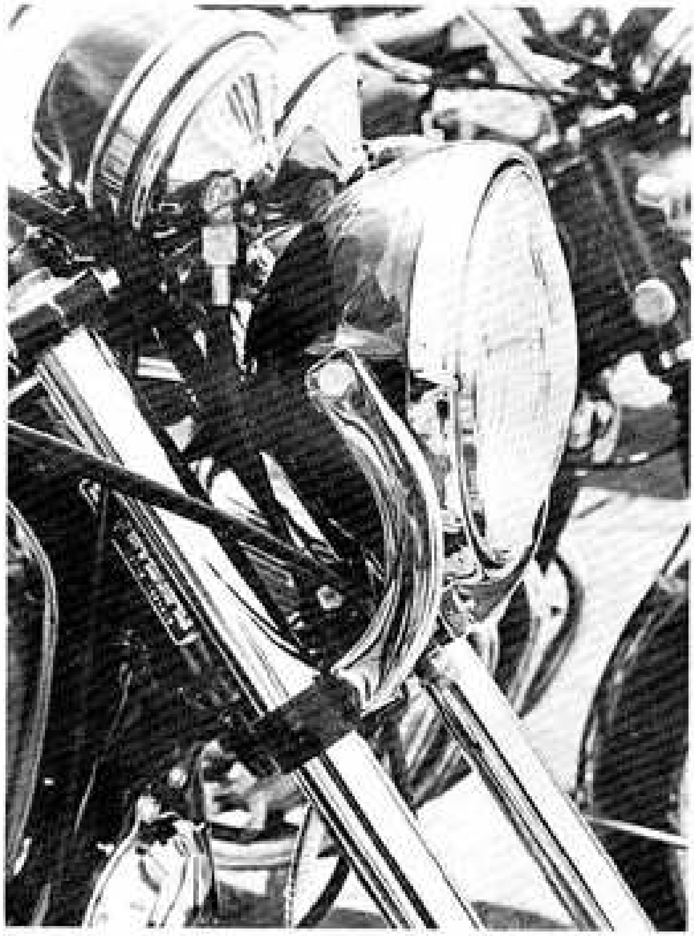


Plate type is sturdier and works well on all front ends with a bottom mount headlight.



Some standard light, especially those from small bikes, look good on a chop.

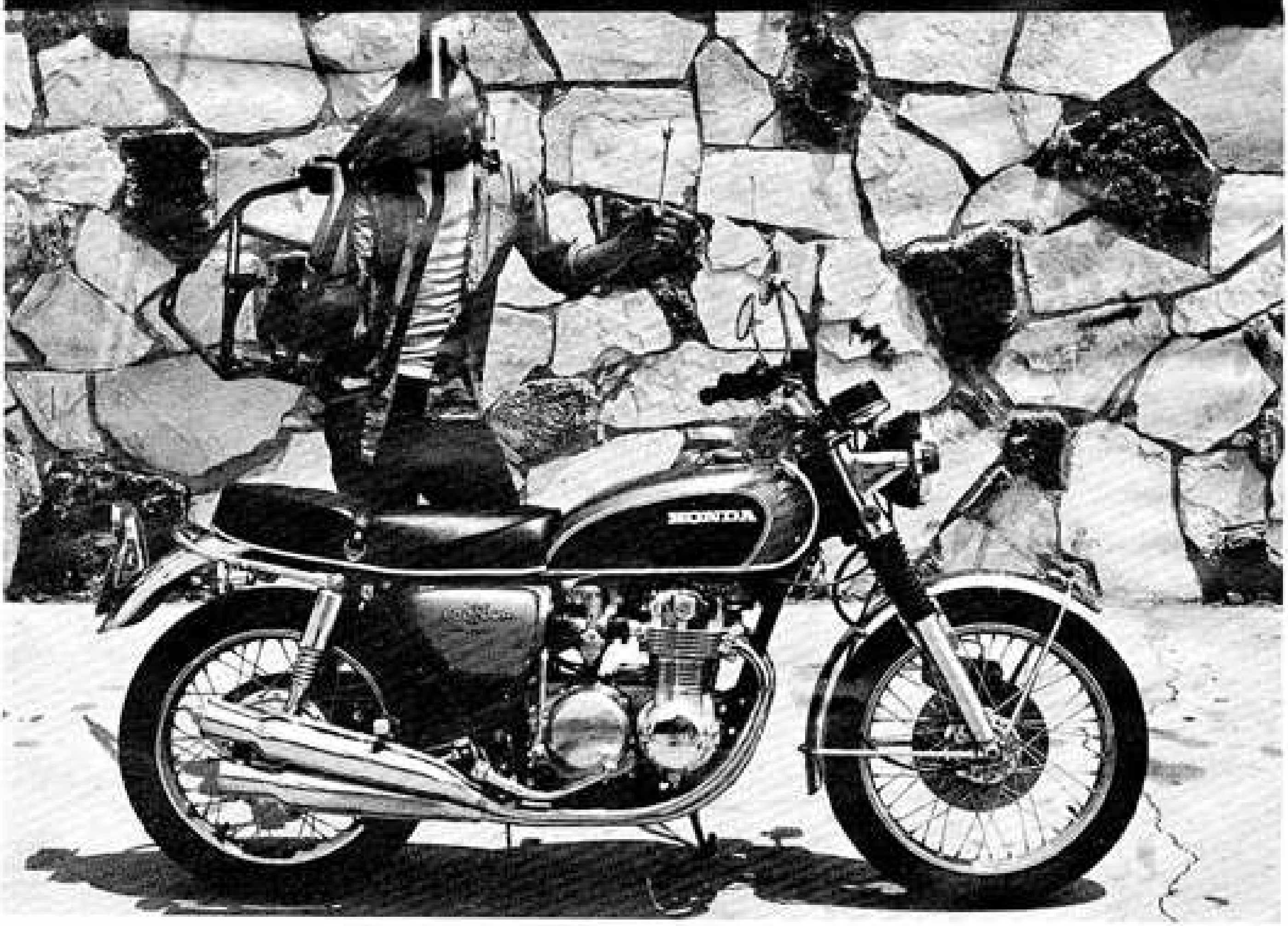
Variation on ear type is this clamp-on ear mount that is adjustable for height.

Now you know how to do it, right? Or at least you have an idea of what's involved in customizing a Honda and where to start. The actual starting place *is* with a complete bike. Disassemble it, buy, find, *make or* have made the special pieces to get the effect you desire and put it together.

Creating this Honda 500 Four rigid frame chopper took a bit over 125 man-hours of labor, about two weeks for a couple of people. The initial cost of the bike was $1400, the parts, chrome and paint came to about $600. In its finished form, the chopper is worth close to $3000.

It sounds simple. With a great deal of forethought, it is. The first-time customizer will usually spen[illegible] equal amount of time thinking abou[illegible] has to be done as he will spend [illegible] doing it. Rushing into a job with the brain disengaged will only result in a lot of wasted work that has to be done over or a lot of wasted ti[illegible] making poorly thoughtout pieces[illegible] Always think!

HONDA 500



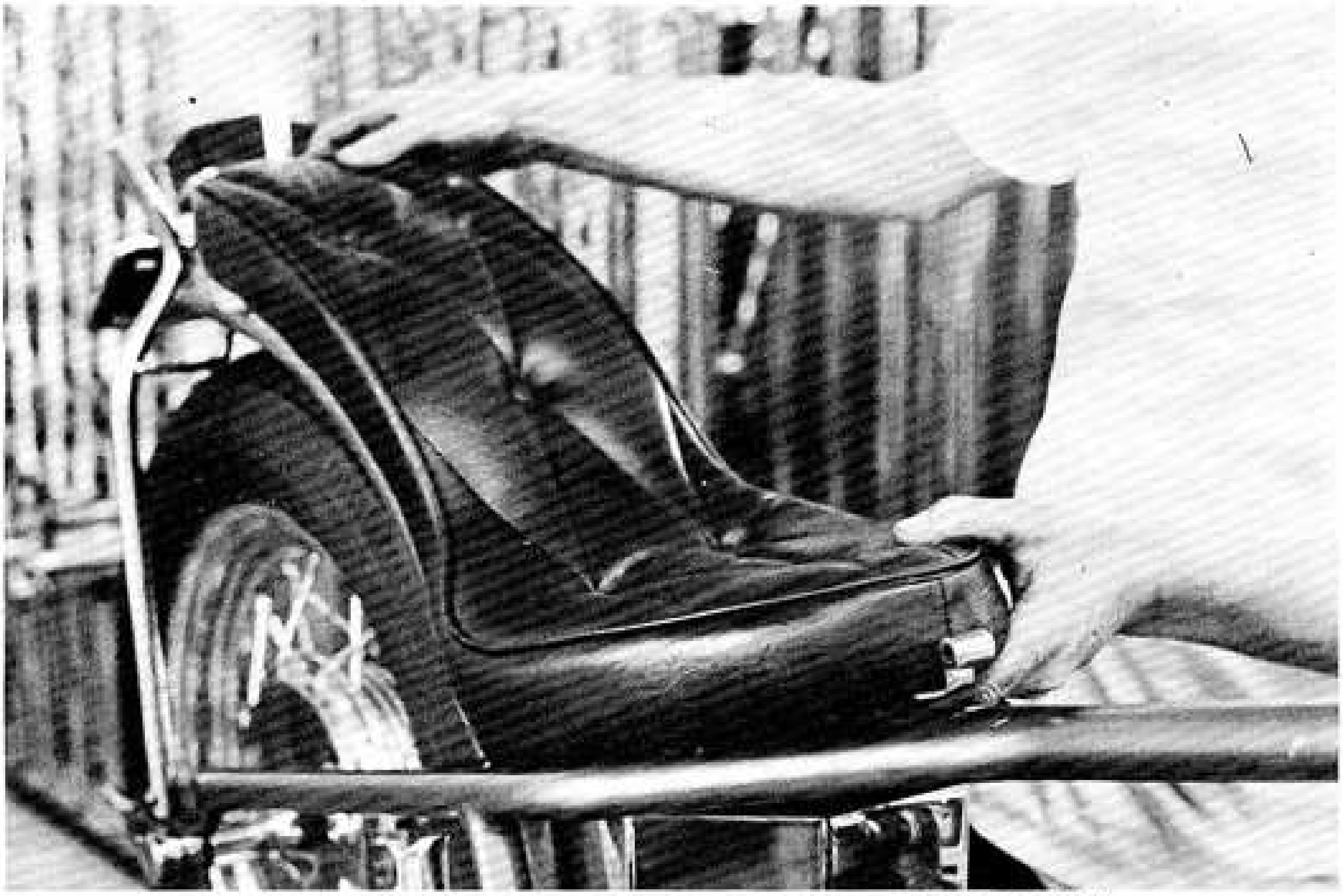
Take one new bike, a rigid frame and stir well with a wrench.

Always bolt fender, chain guard and sissy bar in before wheel is set-in place. Easier that way.

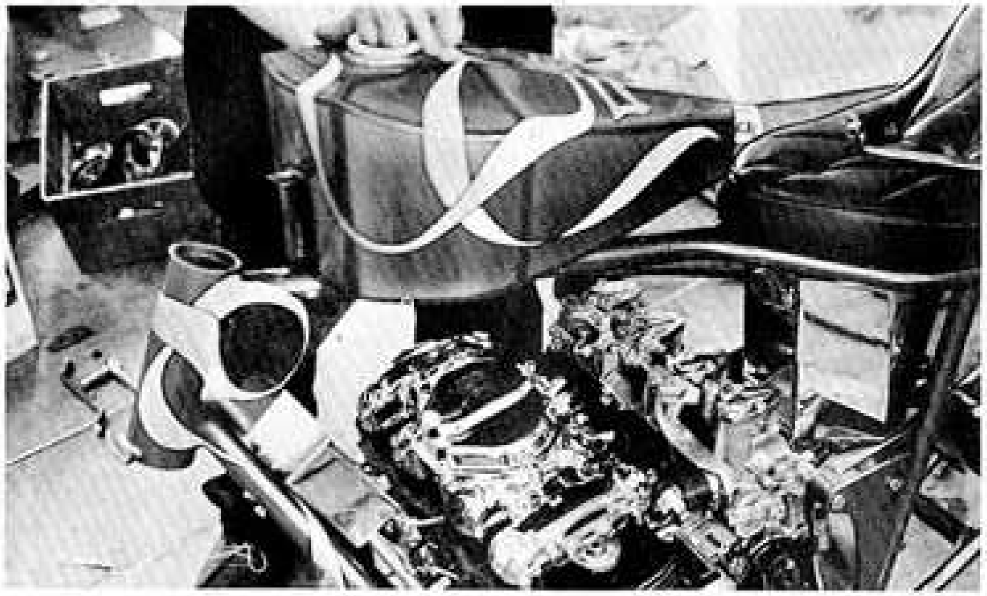
Honda 500 engine carries its own oil. Imitation oil tank holds electricals and tools.

Biggest problem is always where to put the wires and making them work right.

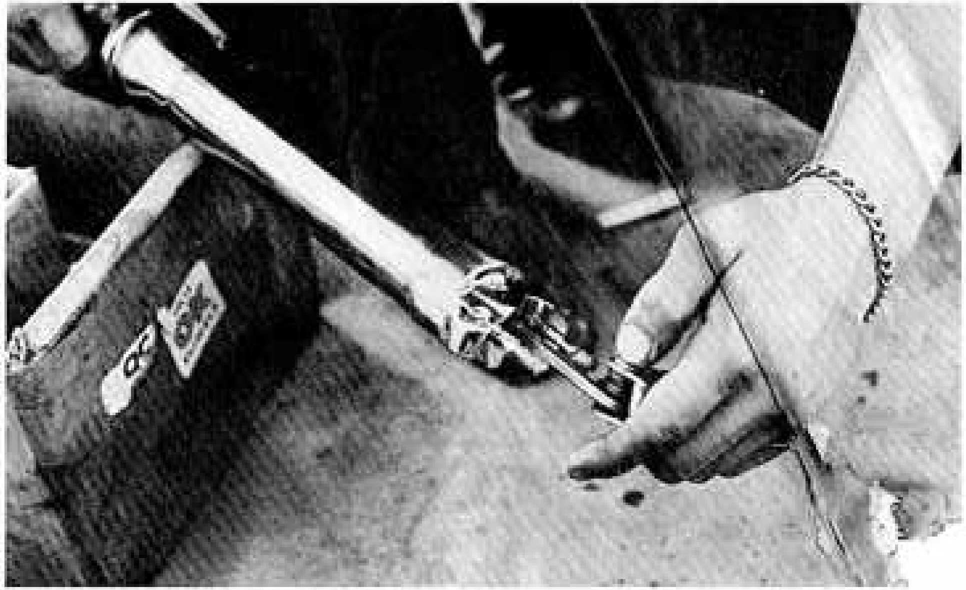
Set the chromed triple clamps in place without the legs. Be sure to get the proper bearing pre-load.



Most seats will require a little bending to make it fit the curves of the fender tightly.

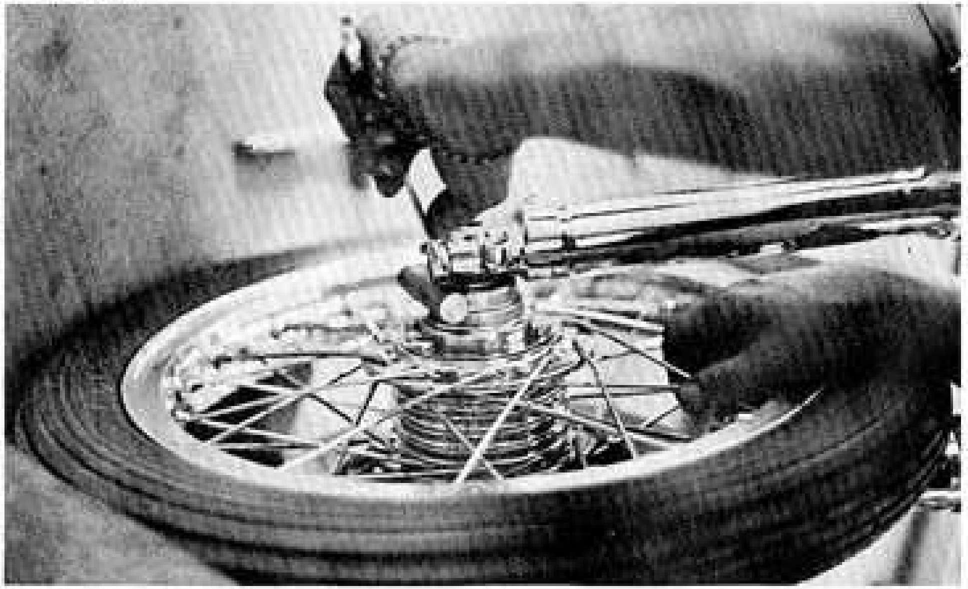


If you are a careful worker, the gas tank goes on next. If you're clumsy, save that to last.

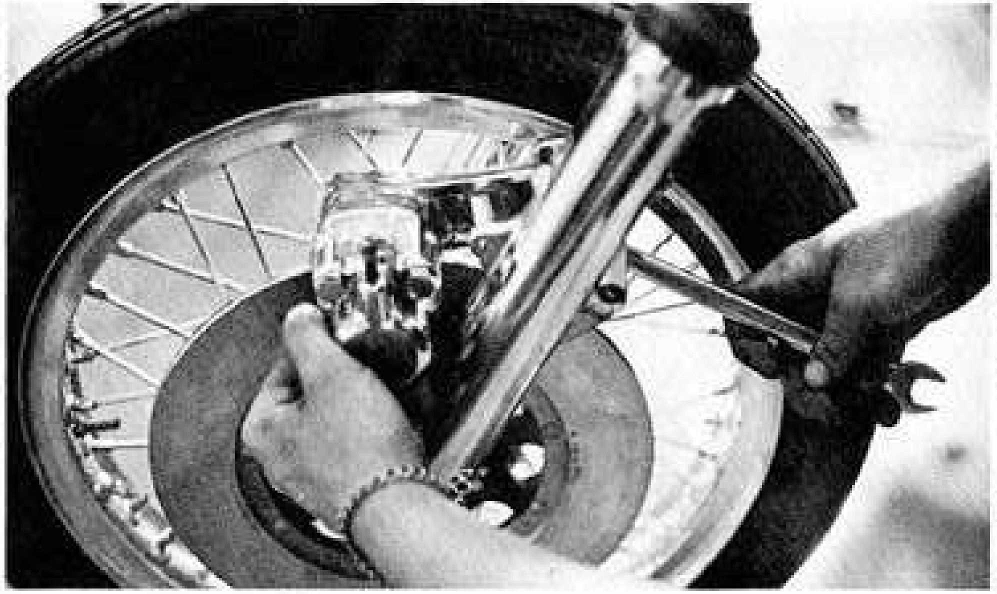


Disassembling the forks to mount the longer legs is a simple matter of one allen bolt in the bottom.

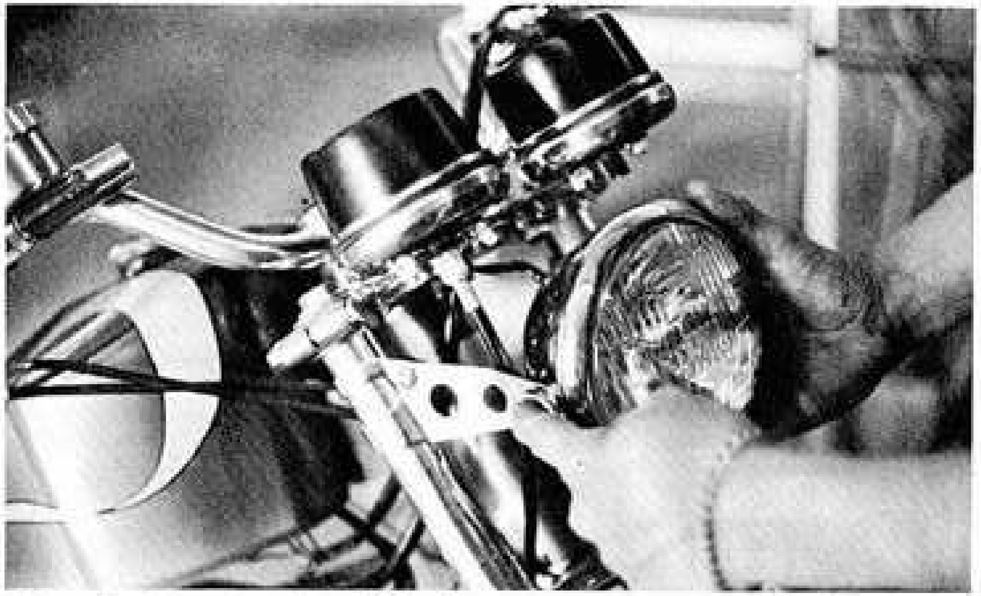
Slip the legs into the triple clamps and bolt the handlebars on. Don't ding the paint on the tank.



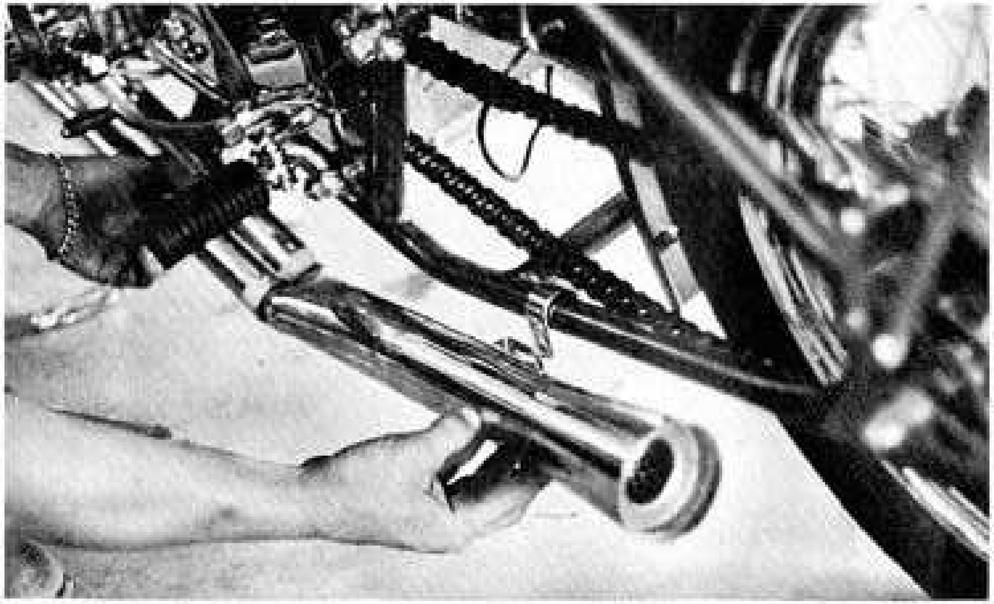
Prop the bike up on a stand and put the front wheel in place. Make sure the forks are straight.



Chroming the disc brake caliper helps the looks. But don't chrome the disc, the brakes won't work.



Hook up the instruments, put on a light and make up some control lines. Don't get careless at this point.



Honda Fours sound good with straight pipes but a good muffler will save you a lot of $ $ $ in tickets.

The only thing left now is to hook up the fuel lines and fill it up. Time to go puttin'.

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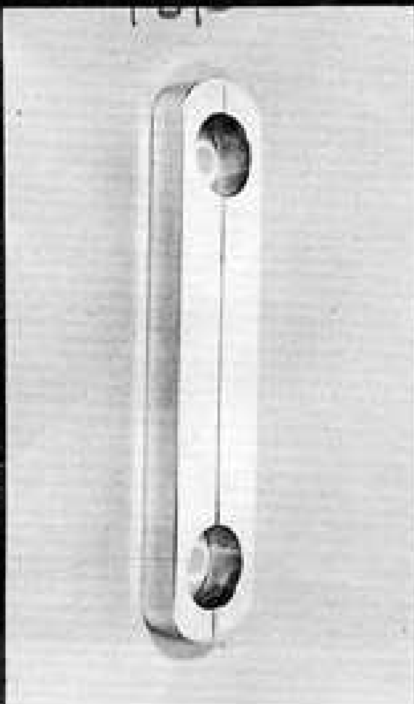
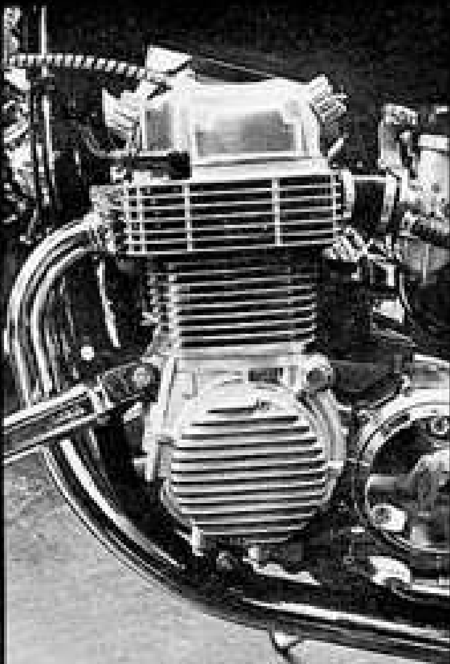
Illuminated oil pressure gauge keeps an eye on the engine's internals.

Cigarette lighter just above the carb bell eliminates hassles lighting on the move.



Tweak bars keep the front end tighter.

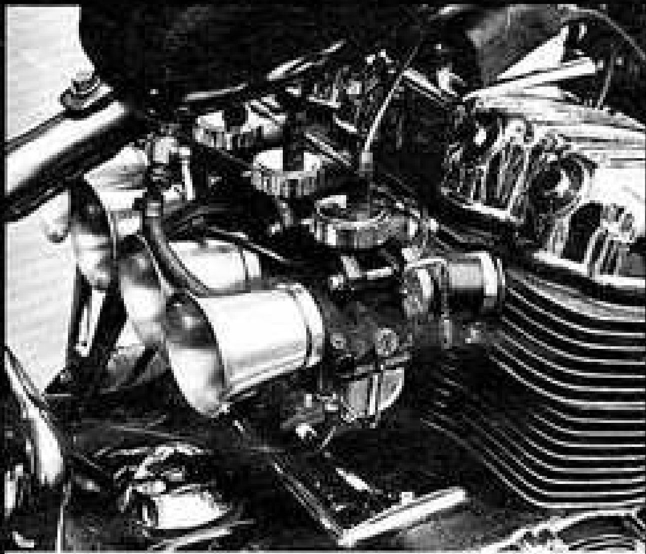
Sissy bar made up of welded and chromed chain.



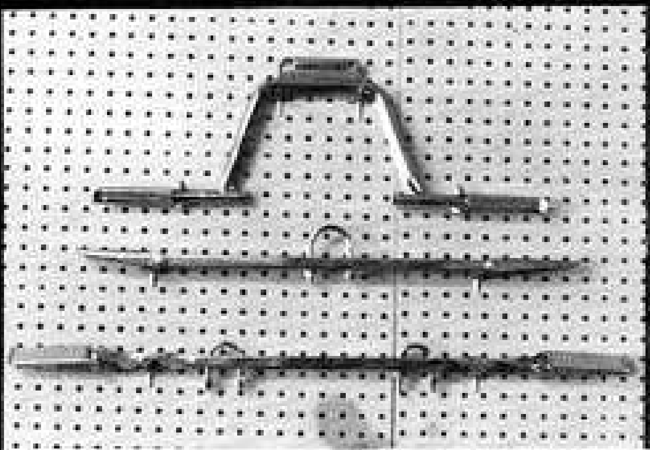
Ribbed cover matches the fins on the cylinder and head.

Moving switches up on handlebar eliminates some clutter.

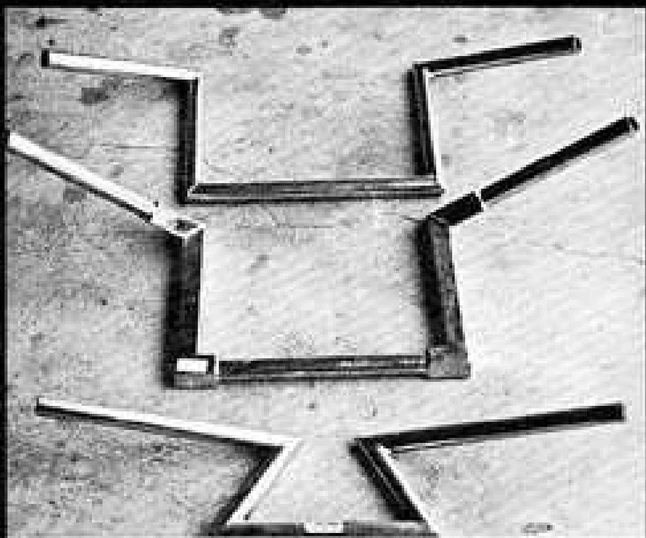
Popular Sportster style gas tank with concave sides and 'Frisco type mount.



Black painted carbs, head and cylinder contrasts well with chrome pieces.

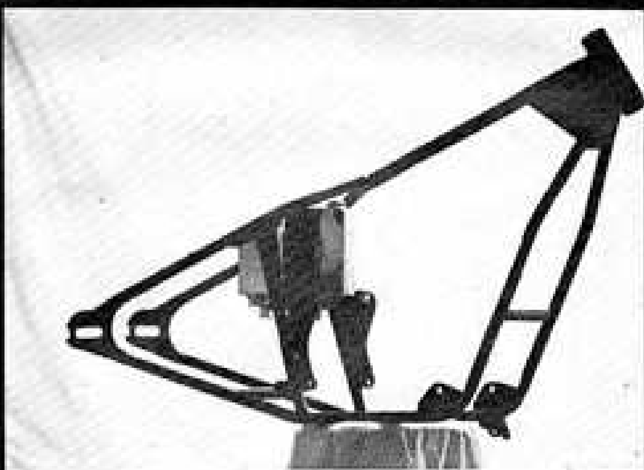


Freeway pegs come in different mounts and shapes.



Various types of Z-bars available.

License plates are placed in many different spots on the bike.



Frames come in many different sizes and shapes.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ONE IDEA IS WORTH A THOUSAND RIDES