



MI Super

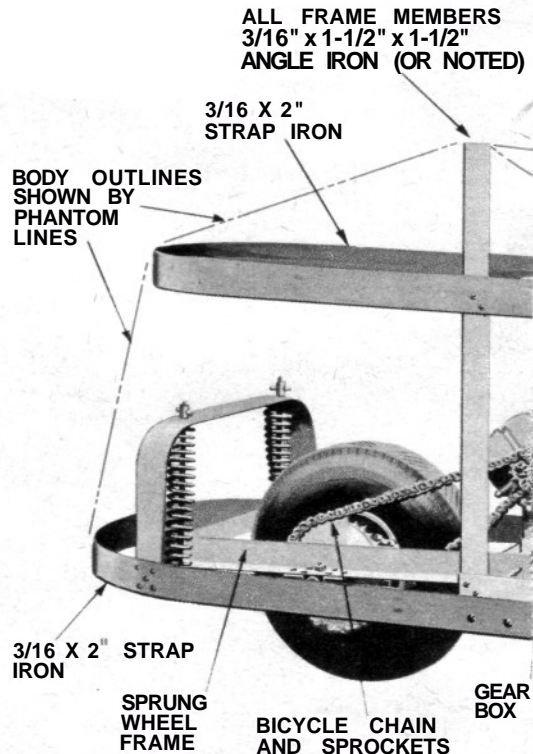
PART I

For one-third the price of a commercial unit you can build this 60-plus miles per gallon motor scooter.

BY MARYLOU AND PETER GERLACH

DESIGNED expressly for readers of MECHANIX ILLUSTRATED, the Super Scooter can be constructed by anyone who has access to the average number of metal-working tools. The power Unit in the original is a 1½-hp. Briggs & Stratton Series "N" air-cooled gasoline engine. This was considered to be sufficient power for Jacksonville, Florida, its home, because that area is so flat that hill-climbing ability isn't required. For hilly country—or if you like to "get away" with a zoom—we suggest you install the larger Series "B" Briggs & Stratton power plant or an engine of comparable size. The interior of the MI Super Scooter is sufficiently large to permit easy mounting of the bulkiest ¾ hp engines on the market.

Although somewhat larger than the popular commercial units, you'll find the MI Super Scooter as easy to ride as it is to build. The leatherette upholstered seat and sprung wheels will make riding soft while the rear compartment will easily accommodate a fair sized assortment of groceries, picnic lunch, tools or the like. And don't forget the 60 plus miles to the gallon

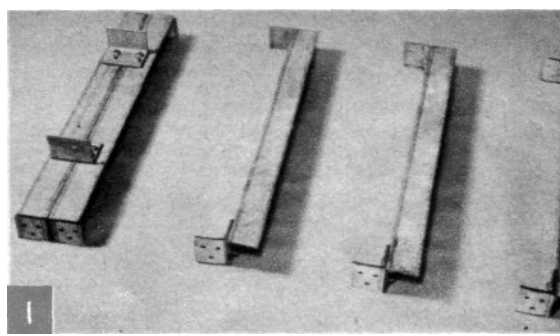


Scooter

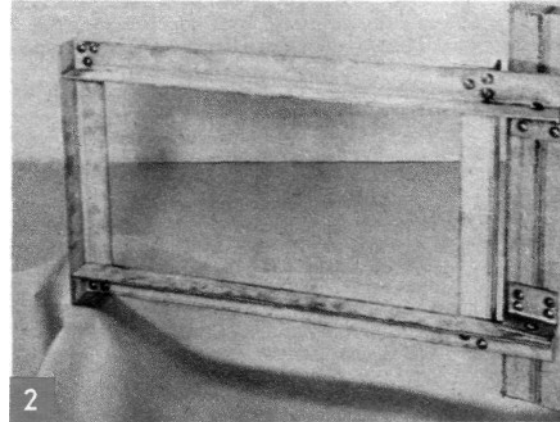
The frame is built up entirely of angle iron and does not require any welding, which is unusual for a project of this type. The frame is covered with sheet aluminum and contains simple, easy to develop, curves- Large working drawings of this project will be available after Part II appears in the July issue of MECHANIX ILLUSTRATED, which goes on sale about June 20. Building the frame will be described this month; installation of the motor and all finishing touches, next month.

Begin construction by fabricating the rear-wheel frame, which is detailed in Fig. 1. It is made from eight pieces of $3/16 \times 1\frac{1}{2} \times 1\frac{1}{2}$ -in. angle iron and fastened together with machine screws. The rear-wheel axle, which is a length of 1-in. standard steel pipe, is secured to it, as shown in Photo No. 3, by means of two easily removable bolts. Two collars, made of $1\frac{1}{4}$ -in. pipe, slide on the axle between the frame and the wheel to keep the latter properly centered.

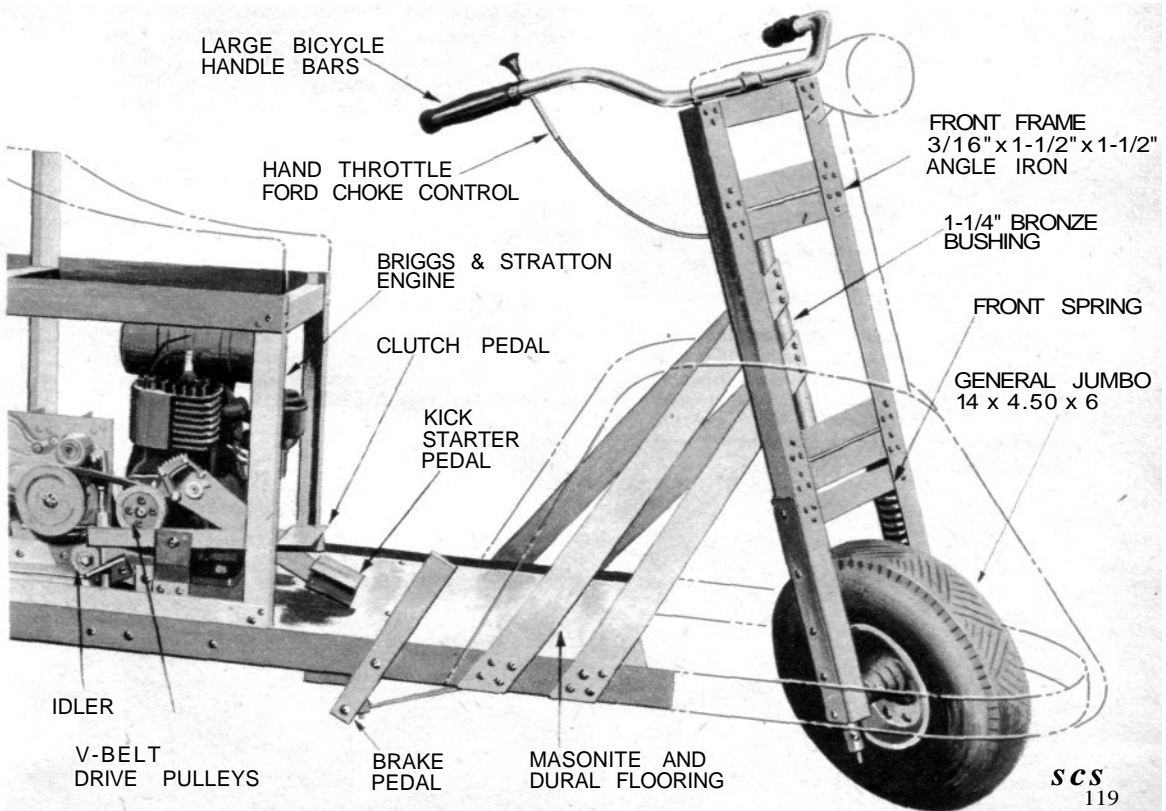
The main frame, Fig. 2, consists of two longitudinal members, six cross pieces.

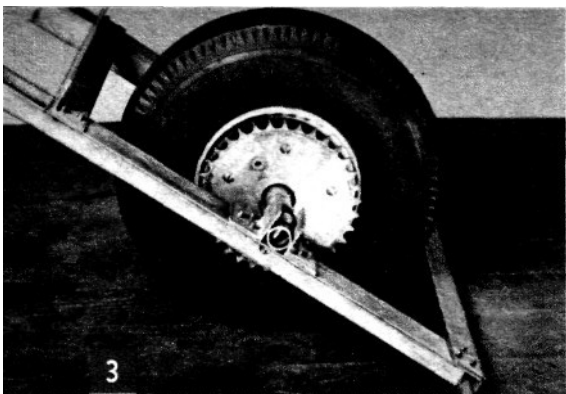


Here, ready for final assembly, are all but the forwardmost angle-iron main-frame cross members.

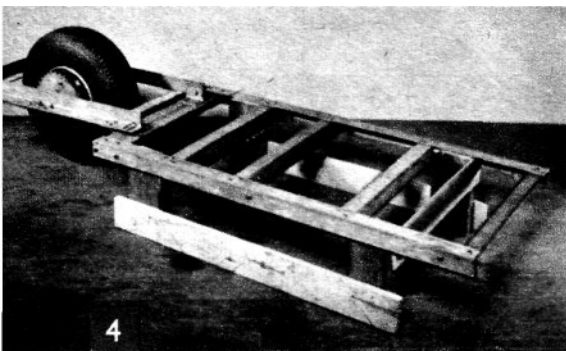


The rear set of main-frame cross members and the rear-wheel frame are temporarily bolted together.

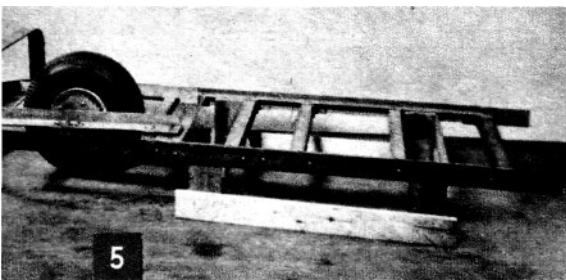




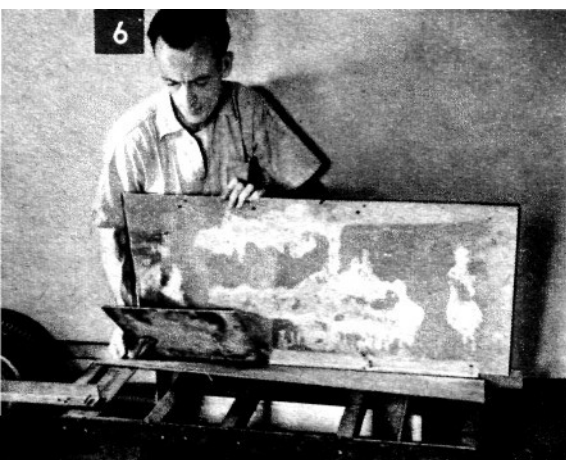
Secure the rear-wheel axle, which is made of steel pipe, to the frame with bolts and nuts.



Construct a jig of scrap lumber to support the main frame while you go on with the assembly.



Three layers, of different materials, make up the flooring. On the bottom is a full-length piece of Masonite, in the middle is a sheet of boiler plate, and aluminum or dural is on top.



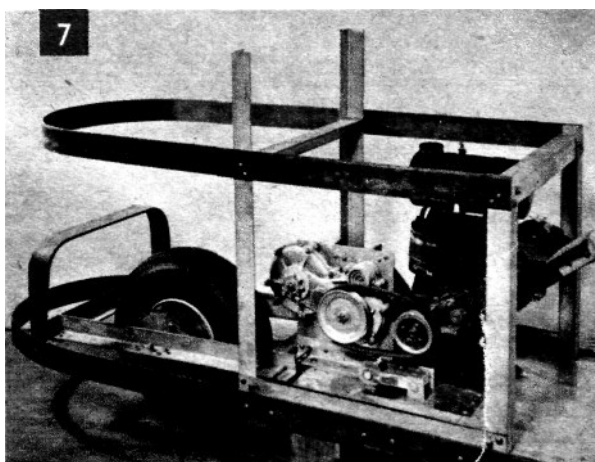
and 12 clips, all made of angle iron. The two aftermost cross pieces are bolted together to form a single unit, as detailed in Fig. 1. Mounted atop this unit are two additional angle-iron clips. These have holes drilled in them to take the piece of $\frac{1}{4}$ -in. drill rod about which the rear-wheel frame pivots. Photo No. 2 shows this cross member and the rear-wheel frame temporarily bolted together so you can check clearances and alignment.

At this point, your work will be made easier if you construct a wooden jig to support the framework while you assemble it. The jig, which is made of two-by-fours and other scrap lumber, is shown in Photos No. 4 and 5. When bolting the component members of the frame together, the three intermediate cross pieces are positioned to suit the engine selected, the two rear ones being placed under the mounting lugs on the engine to take the hold-down bolts and the other one being secured about halfway between the forwardmost engine-bearing cross piece and the front end of the frame.

Your next chore is to add the piece of $\frac{3}{16} \times 2$ -in. strap iron, 148 in. long, to the main frame. Make a mark at the center point of its length and bend it about that point into a "U" shape, using one of the tires—which are 14.30 in. outside diameter—as a jig. Since the main frame is wider than the outside diameter of the tire, the part of the strap iron falling between the frame and the "U" bend, each side, should be gently curved to "fair into" both the frame and the bend. This will give a tail that is semielliptical in shape.

Next, install the rear-wheel spring support, which is shown in Photo No. 5, bending it from a piece of $\frac{3}{16} \times 2$ -in. strap

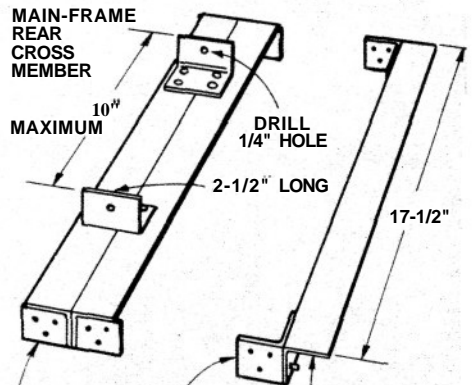
Clearly shown here are the two semi-elliptical tail pieces and the rear-wheel spring support. The engine has been temporarily set in place to make sure that it will clear the framework.



iron and securing it in place, at the point indicated in Fig. 2, with 1/4-in. No. 20 machine screws.

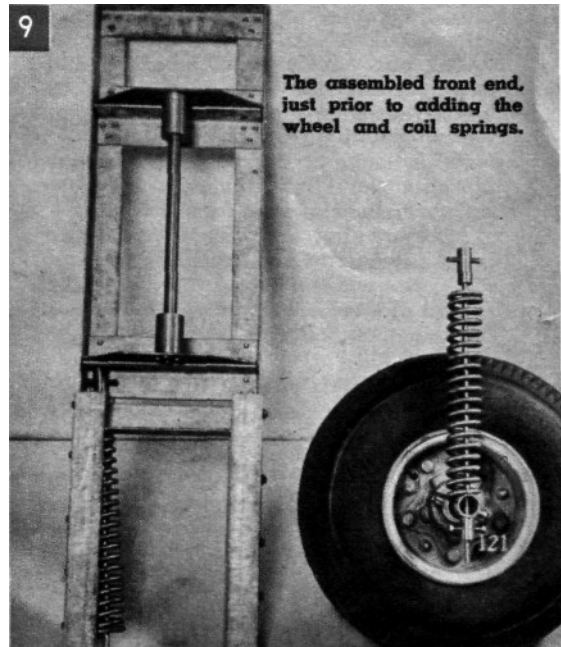
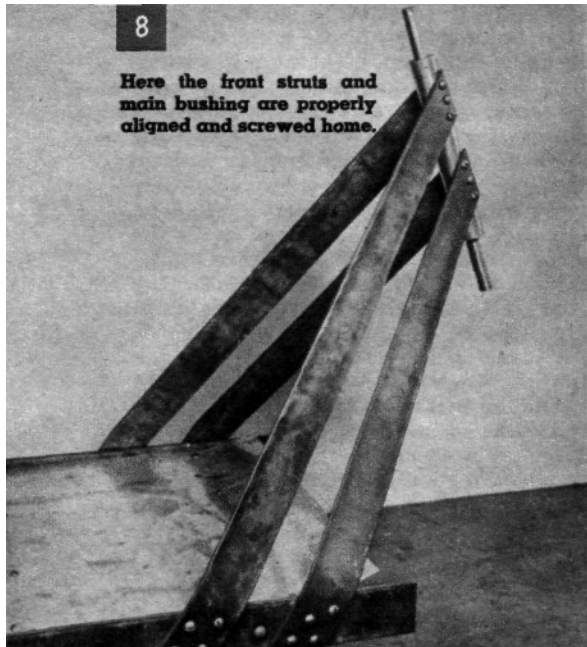
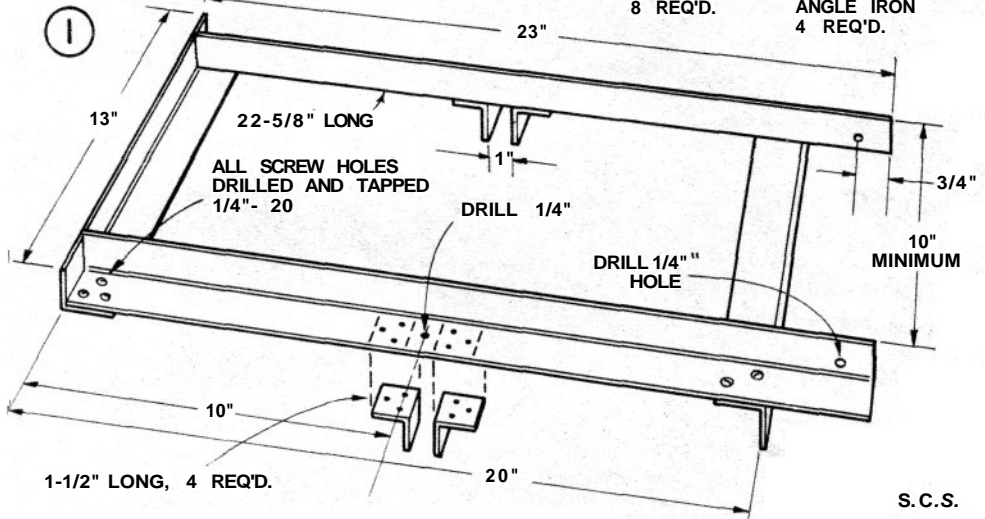
The flooring is now added. It is made up of three layers. On the bottom is a full-length piece of 1/8-in. Masonite. Next, extending from the rear cross piece to the middle one, is a sheet of 1/8-in. boiler plate. And finally, on top is a layer of 1/16-in. aluminum or dural (see Photo No. 6).

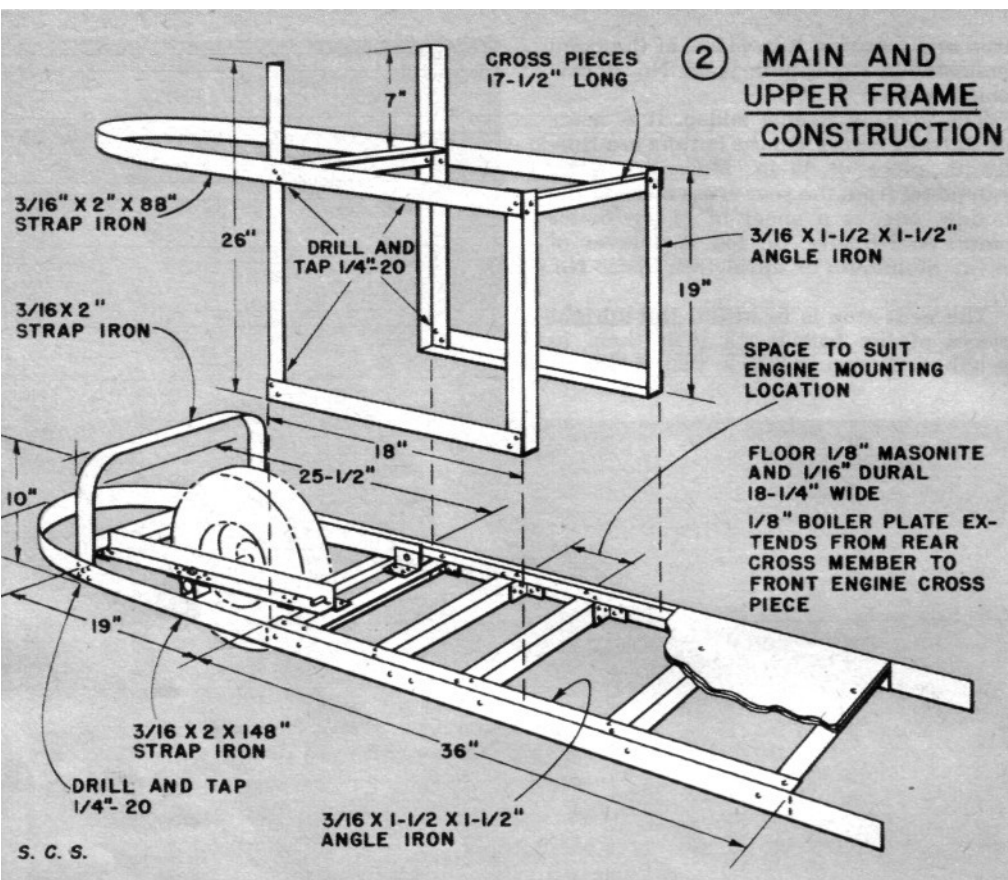
The next step is to install the upright pieces of the framework. Cut them to length, as shown in Fig. 2: then drill and



REAR-WHEEL FRAME

3/16 X 1-1/2 X 1-1/2" ANGLE IRON





tap the holes and secure the pieces to the lower part of the main frame with screws and 18-in. lengths of angle iron.

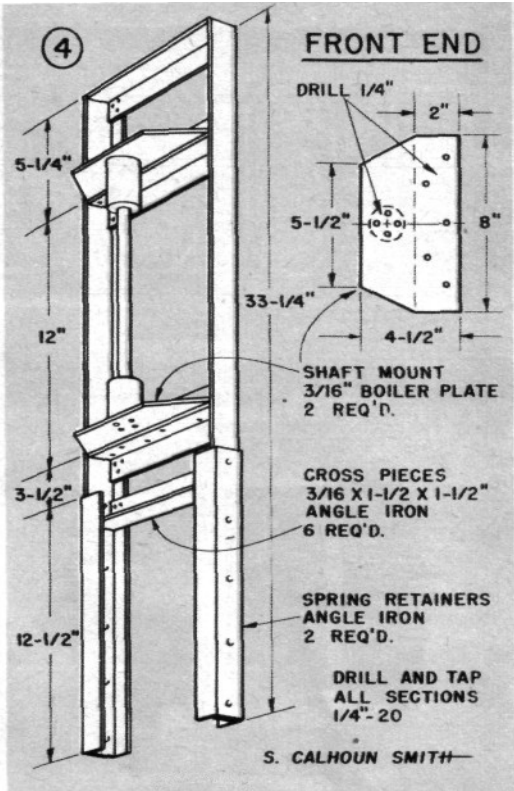
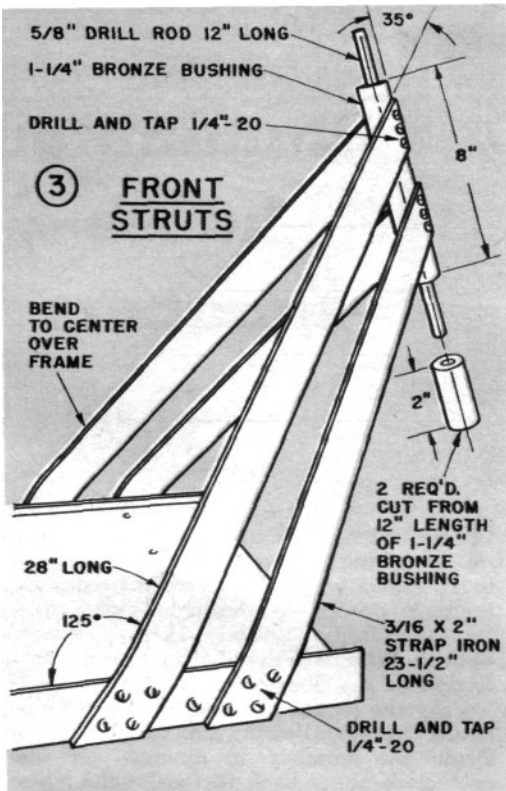
Now is a good time to make sure that the engine that you have selected will fit into the scooter with sufficient clearance all around, especially if you have followed our advice and chosen a more powerful one than was used in our example. Set it on the flooring at the point where it will ultimately be bolted. If it extends above or in front of the forward uprights, you'll have to make them longer or move them farther forward.

After making this clearance test, remove the engine and prepare and install the upper piece of strap iron, bending it, as you did the lower one, around one of the tires and securing it to the uprights with machine screws. Note that its after end doesn't extend as far to the rear as does that of the lower strap iron. Complete the frame by adding the two upper cross pieces.

You are now ready to proceed with the front-strut assembly. The first step here

is to make the bearing. It is in three pieces and is cut from a 12-in. length of bronze bushing, as shown in Fig. 3. Next, obtain a 12-in. length of 5/8-in. drill rod to act as a shaft. The front struts, two for each side, are cut to the lengths shown. After bolting them to the main frame at the angle indicated, bend them inward so their upper ends are directly in line with the center of the frame. This is important because the balance and ease of steering of the finished scooter depend on these struts being accurately centered. Their upper ends are next screwed to the 8-in. length of bearing, taking care to set the bearing at exactly the angle given in Fig. 3. With the shaft inserted in place, the front part of the frame will look as in Photo No. 8.

A glance at Photo No. 9 will show the component parts of the front end, which is detailed in Fig. 4. Made of angle iron, it consists of six 8-in. cross pieces, two 12½-in. spring retainers, and two 32-in. uprights. In addition, there are two 3/16-in. boiler-plate shaft mounts that are cut and



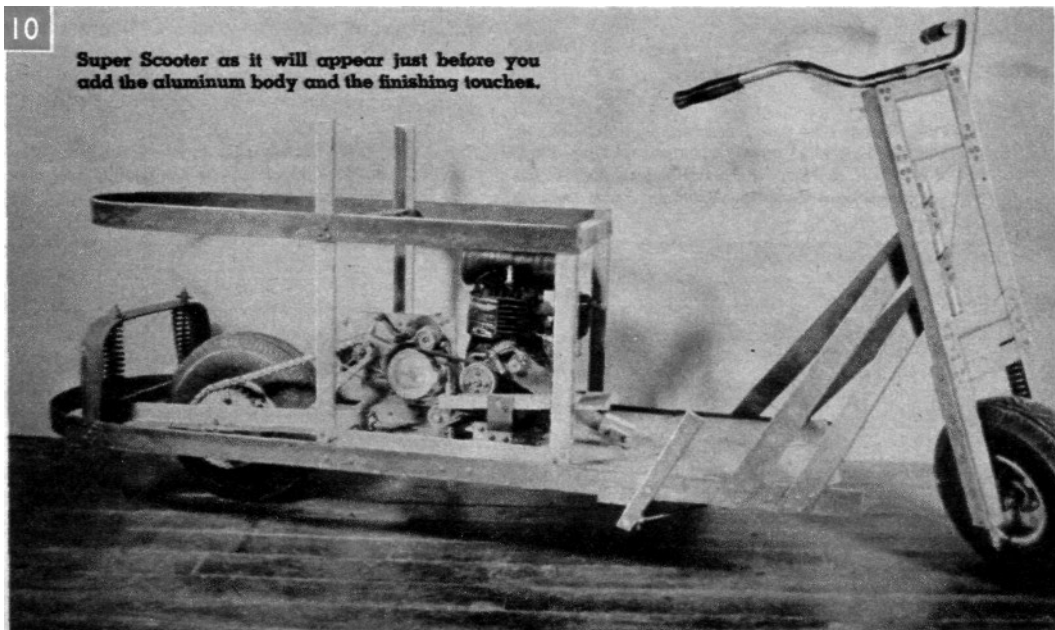
drilled as indicated. With the shaft in place in the 8-in. bearing and the two 2-in. bearings slid onto the ends of the shaft, the boiler-plate shaft mounts on the assembled front end will just slide over the ends of the short bearings, to which they are secured with machine screws. To complete the front end, mount a large bicycle handlebar atop the topmost cross piece and securely bolt it in place.

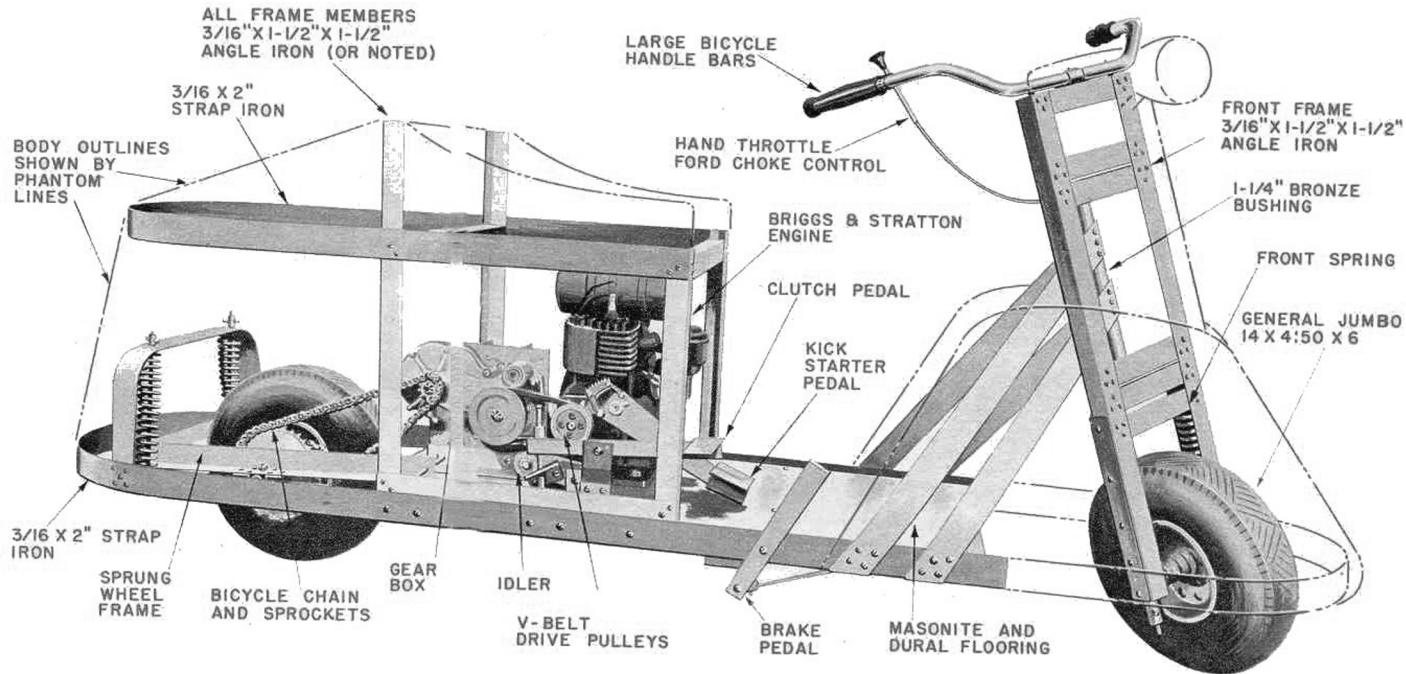
The front-wheel axle is a piece of 1-in. standard steel pipe, 7 $\frac{3}{4}$ in. long. Like the rear one, the front wheel is centered by means of collar spacers. Passing through each end of the axle is a length of $\frac{1}{4}$ -in. drill rod. The front springs go over these rods.

The rest of the story, which will cover installation of the engine and drive, will be described next month. Watch for the July MI! •

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Super Scooter as it will appear just before you add the aluminum body and the finishing touches.







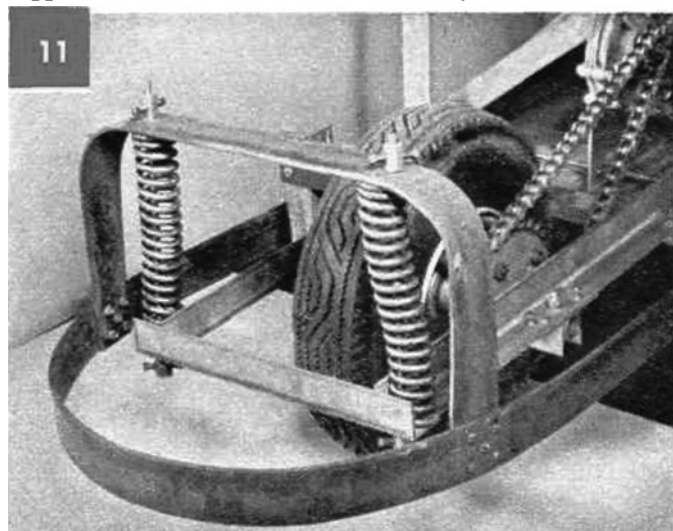
MI Super Scooter

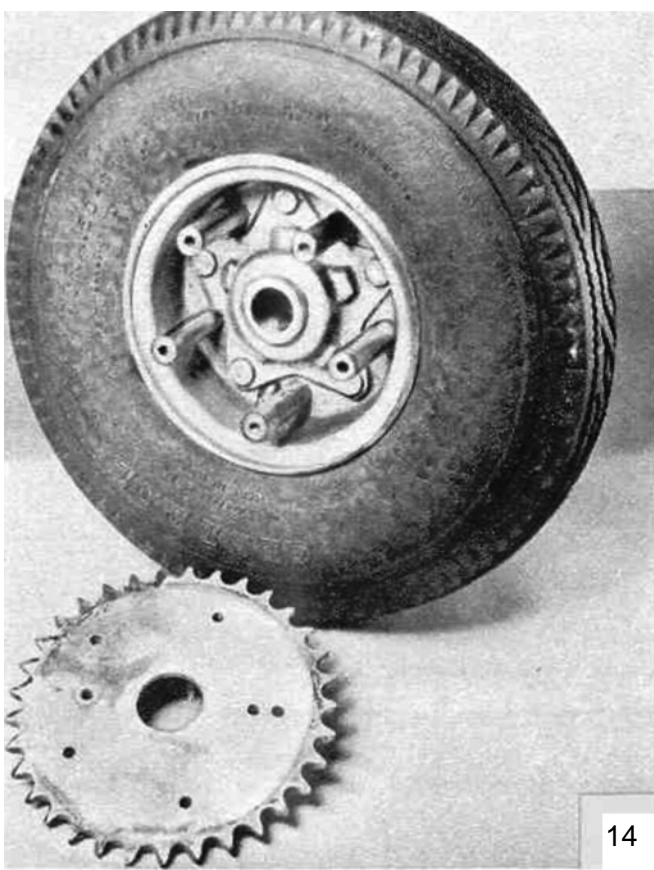
WERE now ready to go ahead on the second and final lap in the building of Super Scooter. The first thing to do is to install the rear springs, Photo No. 11. These are of the compression type, 1-1/2 in. in diameter and, when extended, 9 in. long. They are held in place by two 11-in. lengths of 1/4-in. drill rod that pass through holes drilled in the rear-wheel frame and the 3/16x2-in. spring support. Collars made from 3/4-in. drill rod go over the ends of these spring retainers and are secured with set-screws.

Next, the rear-wheel assembly is undertaken. The wheel is a General Jumbo, 14x4:50x6, with ball-bearing rim. Also needed is a 33-tooth sprocket, obtainable at your local bicycle supply store. To bring the sprocket out the proper distance from the wheel hub, cut five spacers, 3-1/2 in. long, from 1/8-in. standard pipe. The wheel, spacers, and sprocket all appear in Photo No. 14. The brake drum and face plate are detailed in Fig. 5. Turn them down to their proper diameters on a lathe, using 1-in. boiler plate for the drum and 1/4-in. boiler plate for the face plate. For the

Part 2

Compression-type springs, set between the spring support and the rear-wheel frame, ease your ride.





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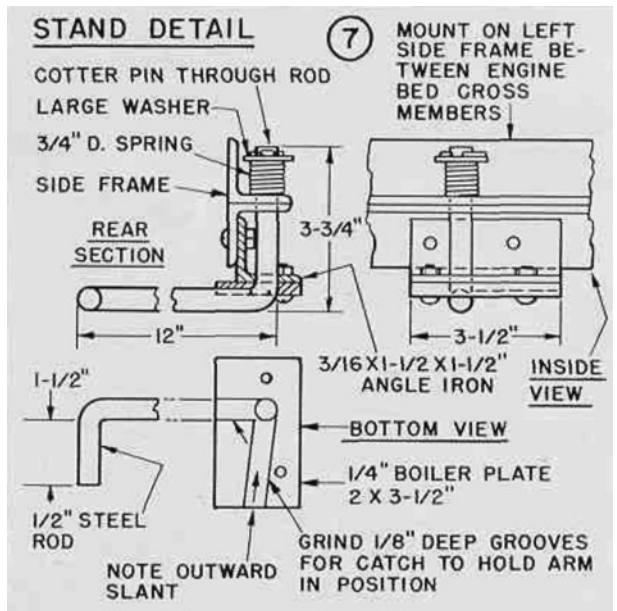
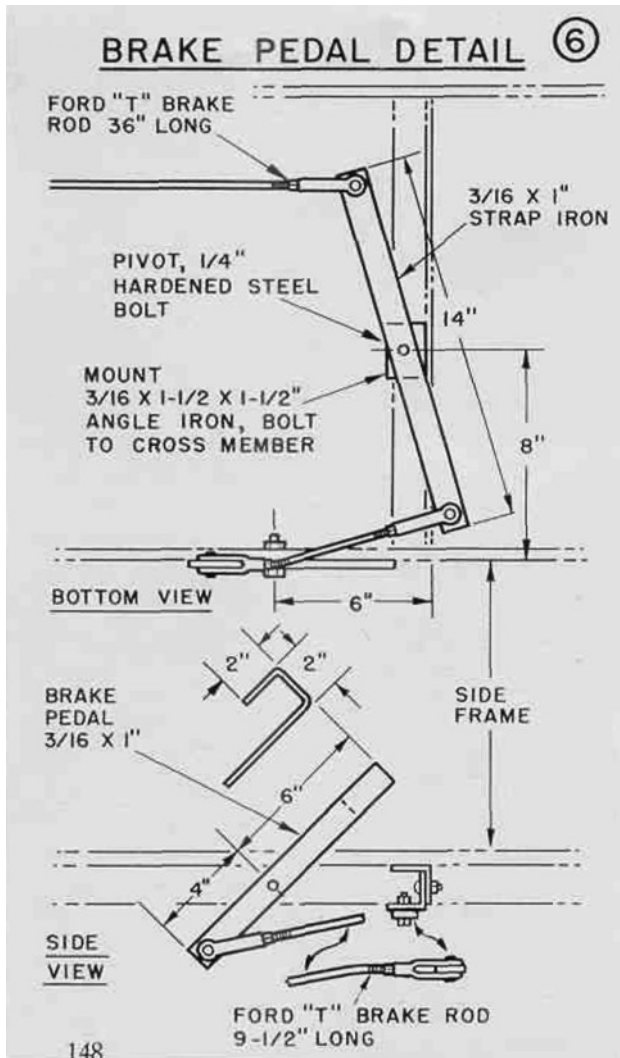
Five spacers, made from standard pipe, are used to keep the sprocket away from hub of the wheel.

brake, use half of a 4-1/2-in. pipe clamp, adding the parts shown in Fig. 5 and riveting commercial brake lining to the inner surface. The component parts of the brake appear in Photo No. 12. Using Vix6-in. bolts, spacers, and nuts, the face plate and drums are installed on the wheel as in Photo No. 13. The brake itself is bolted to the frame. A piece of Ford Model-T brake rod connects the brake and a pivoted bar at the front of the scooter. This bar is in turn coupled with an activating foot pedal, Fig. 6.

The next item is the kick stand detailed in Fig. 7. It consists of a 1/2-in. steel rod, which is bent as shown and hung from the side frame with a spring, washer, and cotter pins, and a 1/4-in. plate with two grooves in it, which is suspended from the side frame by means of two short pieces of angle. The grooves provide "up" and "down" locking positions for the stand and the spring serves to hold the stand in whichever locking positions you desire.

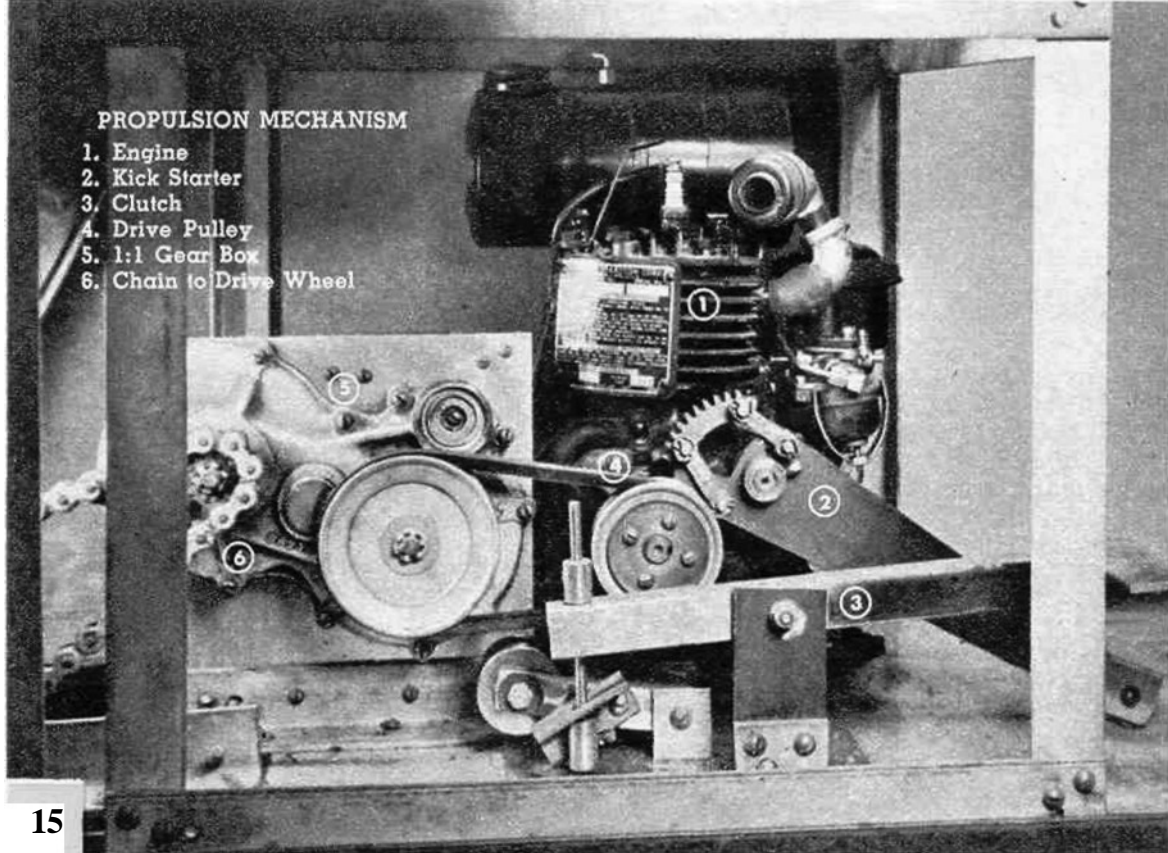
Now is the time to decide what type of drive you are going to use. Two alternatives are given. The first, Photo No. 15, is the one used in the original scooter. The second, Fig. 8, is perhaps simpler and easier to install.

In the first installation, a 1:1 war-surplus gear box is used to change over from belt to chain drive. The sprocket shaft from this box must be placed in direct vertical line with the pivot point of the rear-wheel frame so the chain drive will move correctly with the frame. The sprocket is an eight-tooth affair. On the other shaft of the gear box goes a 4-in. pulley for a 1/2-in. V-belt. A 3-1/2-in. pulley is put on the engine shaft. The idler-type clutch is detailed in Fig. 9. A 2-in. polished wheel is mounted in a pivoted yoke and the whole bolted to the flooring in such a manner that.



PROPULSION MECHANISM

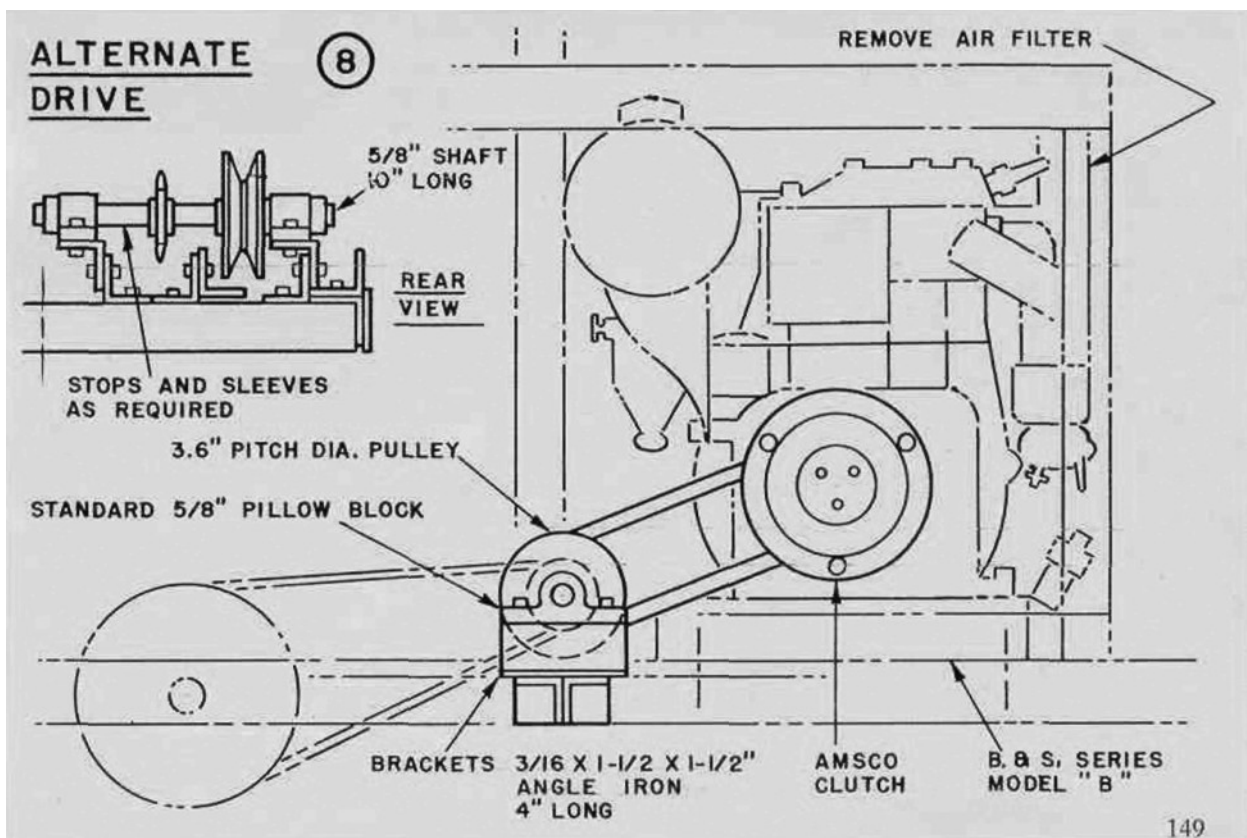
- 1. Engine
- 2. Kick Starter
- 3. Clutch
- 4. Drive Pulley
- 5. 1:1 Gear Box
- 6. Chain to Drive Wheel



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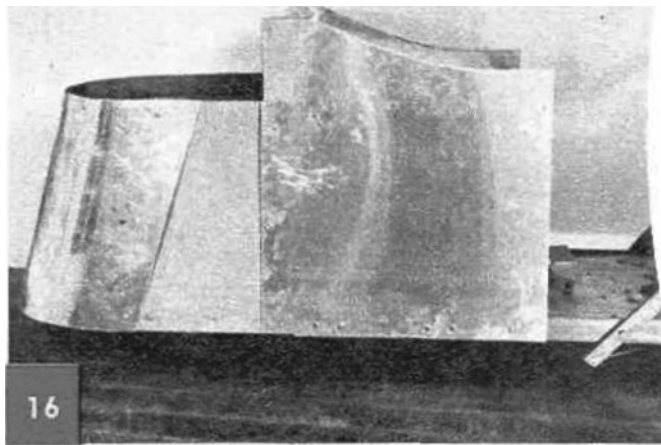
when the wheel is raised by depressing the foot pedal, the V-belt is tightened about the two pulleys. Fig. 10 shows complete details of the kick starter that was added to facilitate starting the Briggs & Stratton Series "N" engine. The gear can be secured from the Cushman Motor Works, Lincoln, Neb.

In the second installation, a larger en-

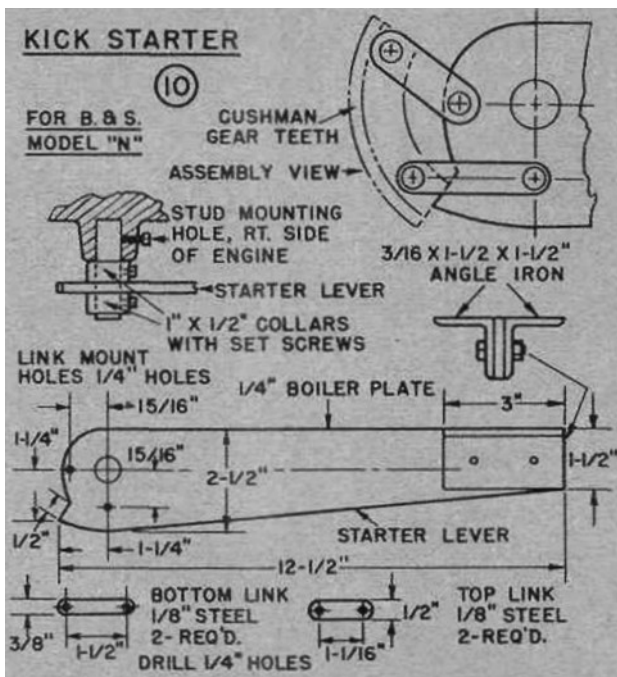
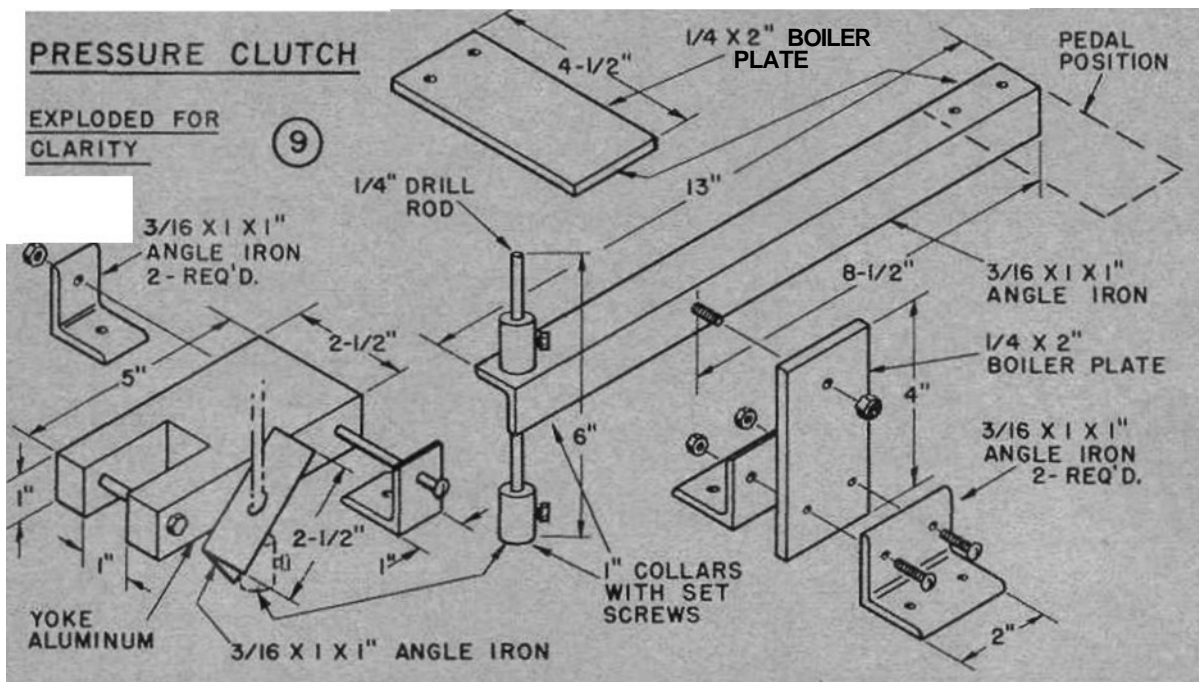


gine—the Briggs & Stratton Series "B"—is shown. Mounted directly on the drive shaft, is an AMSCO centrifugal clutch, manufactured by the American Motor Scooter Co., 628 W. Lake Street, Chicago, 111. Directly above the pivot point of the rear-wheel frame is a 5/8-in. shaft that is supported by two pillow blocks. On this shaft are a 3.6-in. pitch diameter "Bisection pulley and an eight-tooth sprocket. A "B"-section V-belt couples the pulley on the clutch and the one on the shaft and a chain connects the sprocket on the shaft and the one on the drive wheel.

Sizes of the various pieces making up



Here's how the body looks with the Masonite and the first three sheets of aluminum put in place.



the body are given in Fig. 11. First cut two seat sides from 1-in. pine and one 7x17-in. back support from 1/2-in. plywood. The luggage flat, also of plywood, rests on the rear spring support and the wall at its forward end is bolted to the frame uprights. Extending from the front edges of the forward frame uprights to the points where the strap-iron tail frames start to curve in, are two pieces of 1/8-in. Masonite, bolted to the framework. The back of the scooter is covered with a single sheet of 1/16-in. aluminum. Two more pieces of aluminum are placed over the Masonite and seat sides. Photo No. 16 shows the progress of the covering at this point. The Masonite shown exposed in this picture is next covered with aluminum. Now cut out the luggage-compartment top and form it over a piece of plywood that is shaped to the contour of the [Continued on page 168]

MI Super Scooter

[Continued from page 150]

back top edge of the scooter frame. Two butt hinges hold this cover in place. Next, make the seat from hardwood or plywood, pad it with 3 in. of Kapok, and cover it with leatherette. The back and arms of the seat are likewise padded and covered.

At the front end of the scooter, a piece of 3/16 x 2-in. strap iron, 58 in. long is bent into a "U" shape on a 7-in. radius and bolted to the projecting ends of the 2-in. strap iron that covers the main frame. A piece of aluminum for the left front cover section is now bolted to the forward strut and bent around and bolted to the strap iron, Photo No. 17. Using the lower edge of the strap iron as a guide, scribe a line on the aluminum; then cut away the excess material. Install an identical piece on the right side, overlapping the left covering piece. Secure it in place with a bolt passing through both coverings and the strap iron. Draw a line down the exact center of the front covering and drill holes at 4-in. intervals; then put machine screws through the two coverings, put on bolts, and tighten them home. An additional segment is added at the back end of each of these pieces to cover the rear pair of struts. A splash pan, if desired, is now installed. It is triangular in shape to fit the opening framed by the two forward struts and the flooring and has three flanges that bolt to the struts and the underside of the flooring.

Three wooden frames are next cut to shape, as shown in Fig. 11, and bolted to the front-end assembly. An aluminum sheet is fastened to these frames and the upright angle irons (see Photo No. 18).

The hand throttle is a 6-ft. Ford choke-control cable. The control end is fastened, with a hose clamp, to the righthand handlebar. The cable is then run down under the scooter and back up through a hole drilled at a point directly below the engine's throttle control, to which the free end is connected. Install a six-volt bicycle spotlight and a small taillight. Power for the lights comes from a six-volt heavy-duty bicycle battery carried in the luggage compartment. A simple switch on the battery turns on both lights.

Now the scooter is ready for painting. The original was finished in fire-engine red. Rubber matting, cut to fit the floor of the scooter, adds a final professional touch. A rubber heel, fastened to the floor where the kick starter hits prevents damage.

If you're going to use Super Scooter on public highways, you'll have to register it with your state motor-vehicle commission and install license plates. A length of flat bar bolted to the scooter acts as a license-plate bracket. •