

MITE CYCLE

You'll need only an "A" ration
to run this midget motorcycle.

by R. G. Fisher

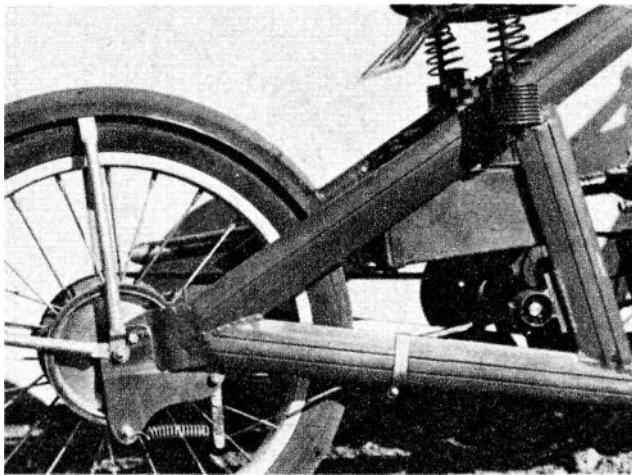
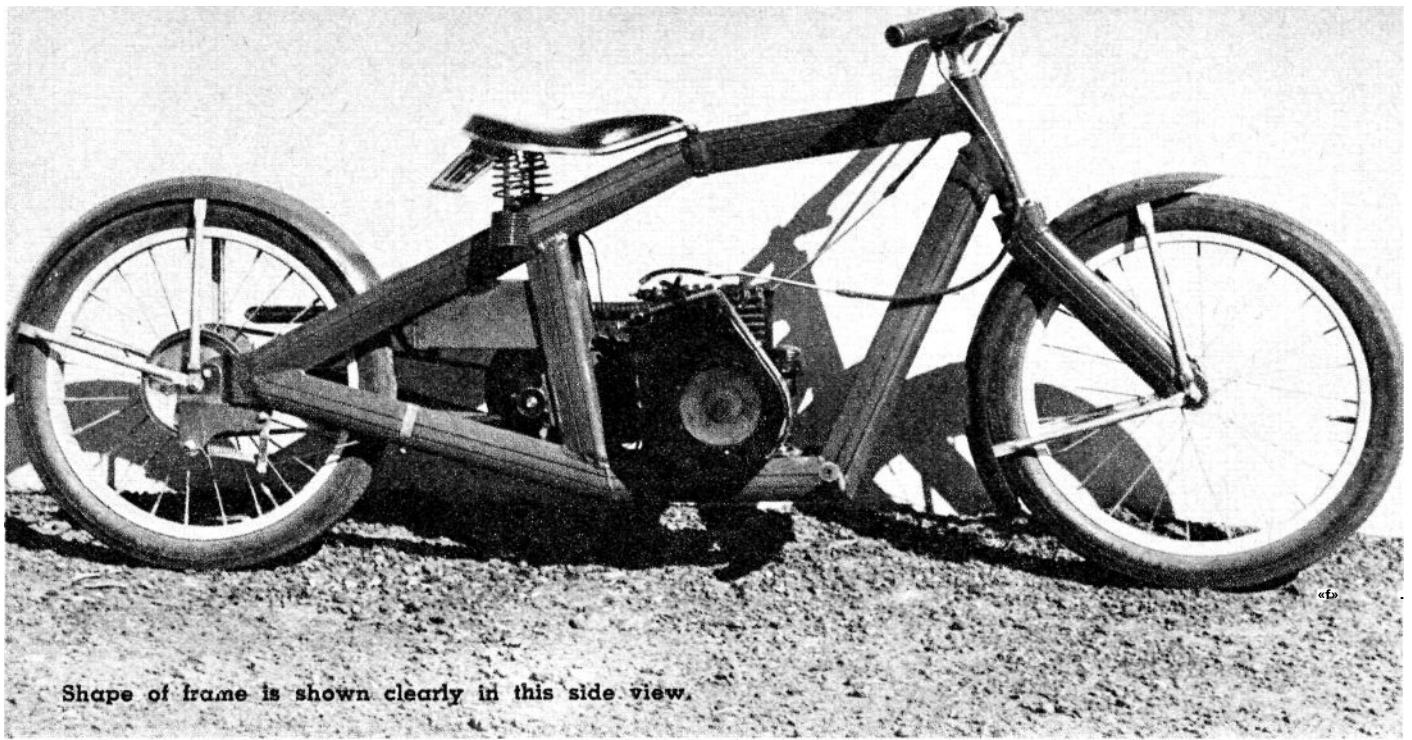
This little motorcycle has been designed to operate on wartime rations! Its construction is simple and light, but it is surprisingly practical and will carry a 250-lb. passenger without complaining. A 5/8-h.p. engine whips it along at a 25-m.p.h. clip and as for gas consumption—one gallon for every 120 miles, and we doubt if there's another motorcycle that can do better than that.

The Mite Cycle shown here was built by the author at a total cost of \$50. It weighs 85 lbs. and is powered by a Briggs and Stratton engine. All unnecessary frills were forgotten in its construction, and the only tools used were a small lathe, a hack saw and a welding torch.

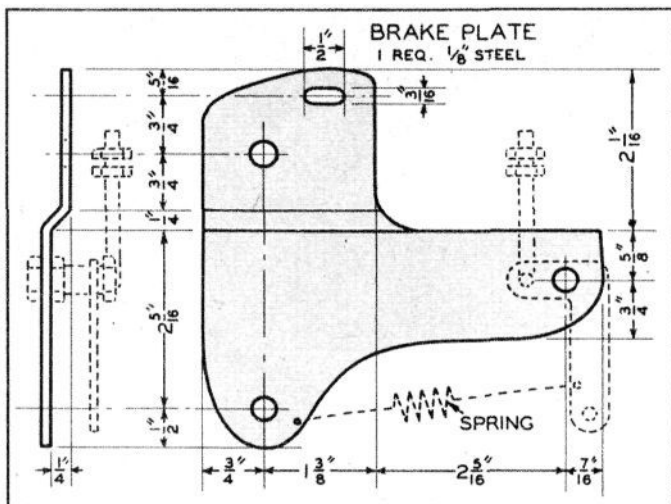
The frame, being the foundation of the project, should be built first. It is made of salvaged aircraft streamline tubing. 2-1/2"x.035 wall, procurable from any airport where small planes are repaired. These dimensions need not be adhered to exactly as a slightly larger or smaller tubing, or even a plain round tubing of 1-1/8"x.035 wall, is satisfactory. After procuring the tubing make a full-size drawing of the frame on the shop floor and cut the pieces to the angles and lengths given, fitting them to the drawing as you go. After this is completed, build the two lower frame pieces. The base tube (11-1/2") is spotted to the forward tube going up to the fork neck and also to the rear tube going to the rear wheel hangers. Three spreaders are required and these are cut 4" long from 1" o.d. .035 wall tubing; two of these are located between the lower frame sides and spotted into position as noted. The forward tubes are cut on the insides and bent together to form the V as shown in the bottom view, then welded. The upper rear tubes then are laid together and the third spreader is located 9-3/4" c.c. to the rear of the taper terminating point and welded into position. These tubes

The Mite Cycle, with its builder, is shown above. A small one-cylinder engine provides the motive power.





The brake plate, shown in the diagram below, is installed as above. Brake band is anchored at bottom.

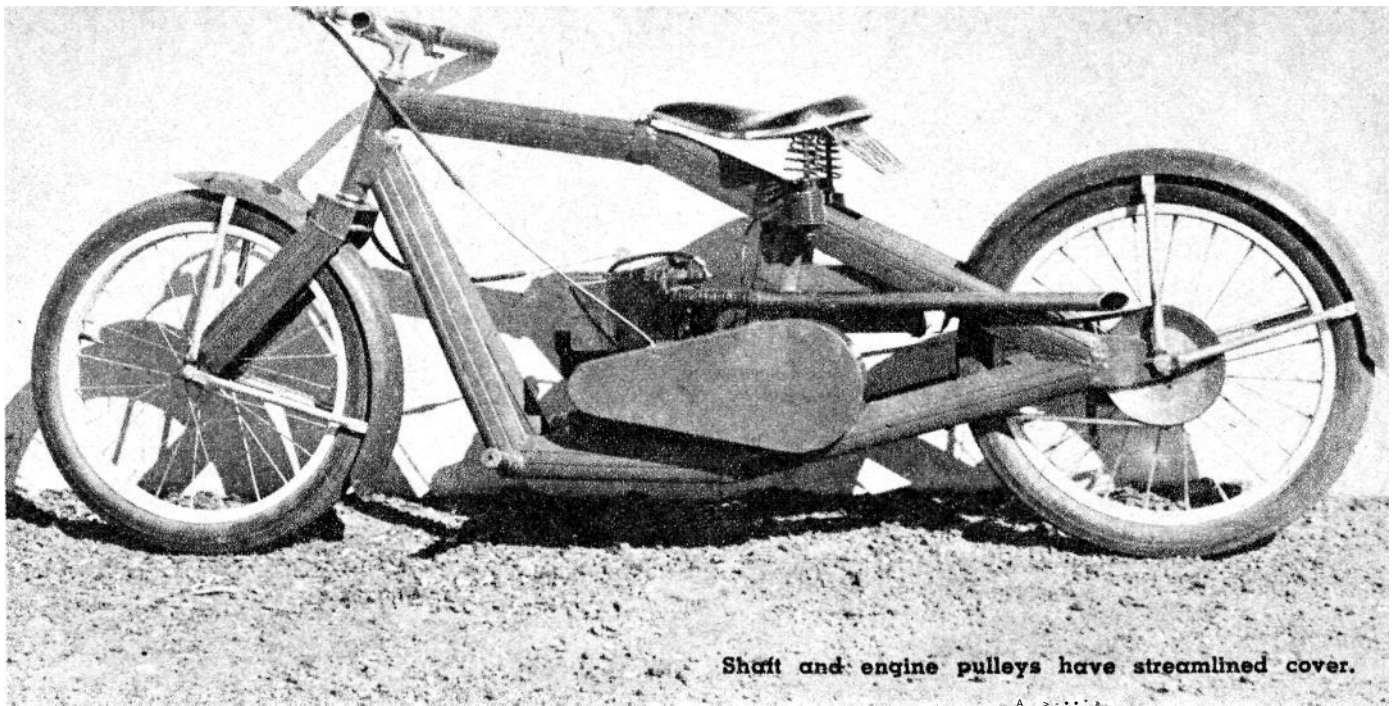


Slotted hole allows for adjustment of the drive belt.

are cut on the inside $\frac{1}{2}$ " forward of the spreader and bent to form the taper as shown in the top view. The forward tube is located and welded to the upper rear tubes. The lower frame now is set on the floor and the uprights located and spotted, the upper frame is placed into position on top and spotted, the frames are welded together at the rear wheel hangers and welding of the whole frame proceeds, work being carried forward and each section completed as it is reached.

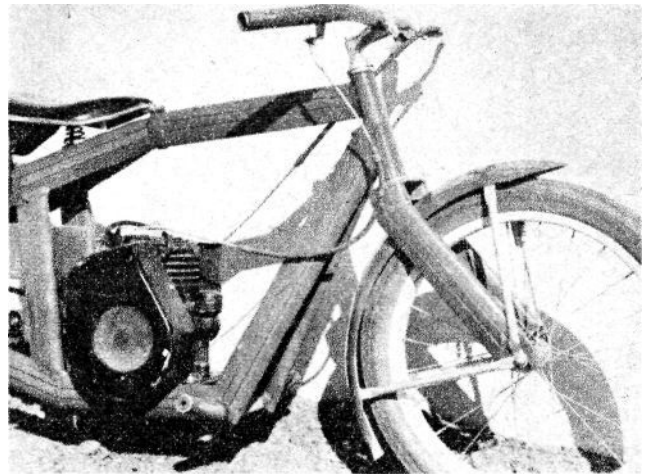
Rear wheel hangers are cut out of $\frac{3}{16}$ " cold rolled steel, cut long enough to extend inside the frame 1", and after joggling, they are inserted and leveled. It is important that the hangers are level, otherwise the Cycle will not balance; when level they are brazed in position. Before attaching the fork neck, it is necessary to procure the standard bicycle bearings and races that are used in the neck. A piece of $1\frac{1}{2}$ " X .125 wall tubing is cut $6\frac{1}{2}$ " long and each end is bored to take the races.

A line is drawn on the floor, the frame is placed level on the floor straddling the line and a plumb line is then dropped from the center line of the frame at the rear wheel hangers to the line. Another plumb bob is attached to the fork neck, and the fork neck is spotted into position while both bobs are on the line. Then the frame is brazed to the neck, making sure the frame is plumb. Engine supports are made of $1\frac{3}{4}$ " x $\frac{3}{4}$ " x $\frac{1}{8}$ " angle iron and located according to the engine used. Holes through these members for engine bolts should be slotted to permit adjust-



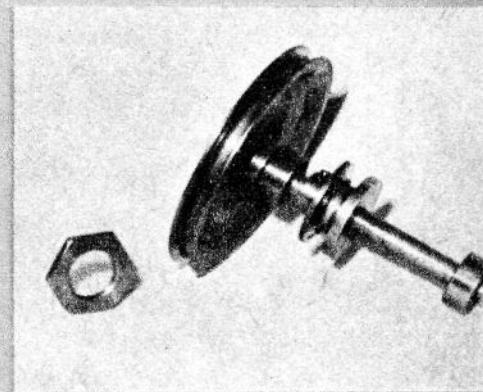
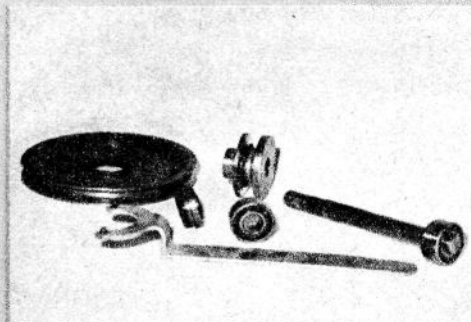
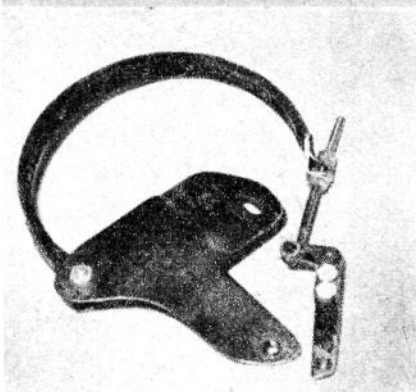
ment of the belt. Foot rests are cut to individual needs from 1"x.035 wall tubing and welded to the frame at an angle as shown. The frame is now complete except for seat-attaching lugs. An extra large bicycle seat is used and re-worked with the attachment for the seat neck removed. Pictures show the installation of the seat, but as seats vary, the attachment is left to the individual builder.

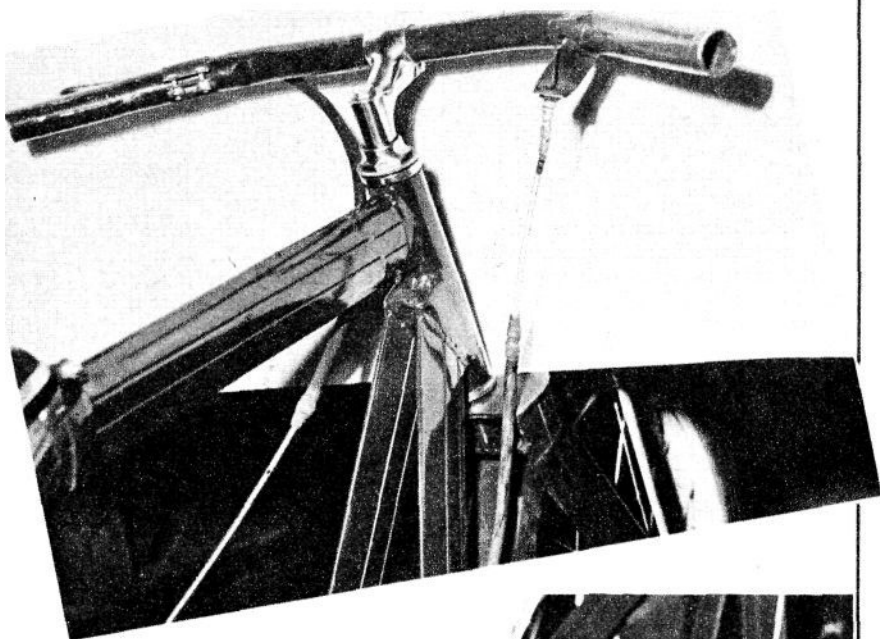
A standard bicycle fork replacement neck is used on the fork and this is purchased at a bicycle shop. Upper fork plates are cut from 3/16" steel plate and rounded to fit the tubing used. Tubes are butted against the top plate and welded; the bottom plate is cut and placed between the tubes 1" below the top plate and this is also welded to the tubes. A 1" hole



A standard replacement neck is used on the steering fork. The fork arms are bent forward at a 22° angle.

In the photos below are the brake plate with its band and arm, and details of the countershaft assembly.

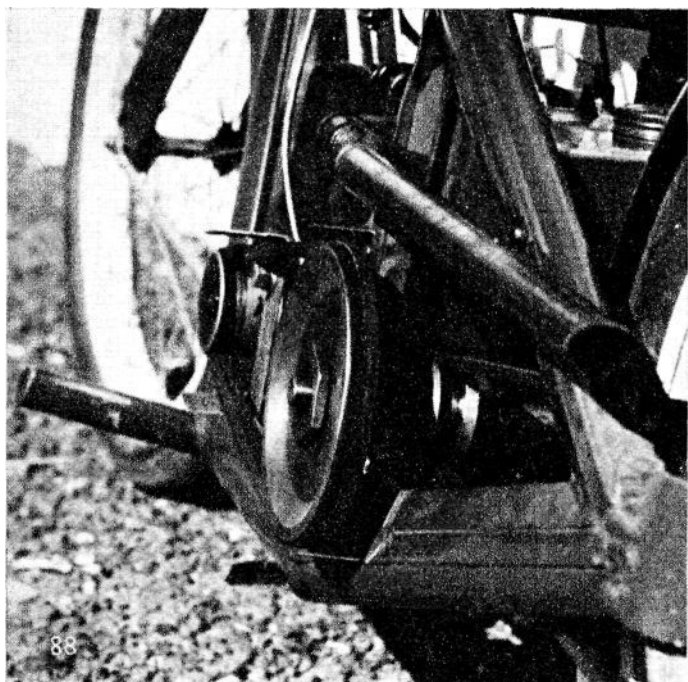
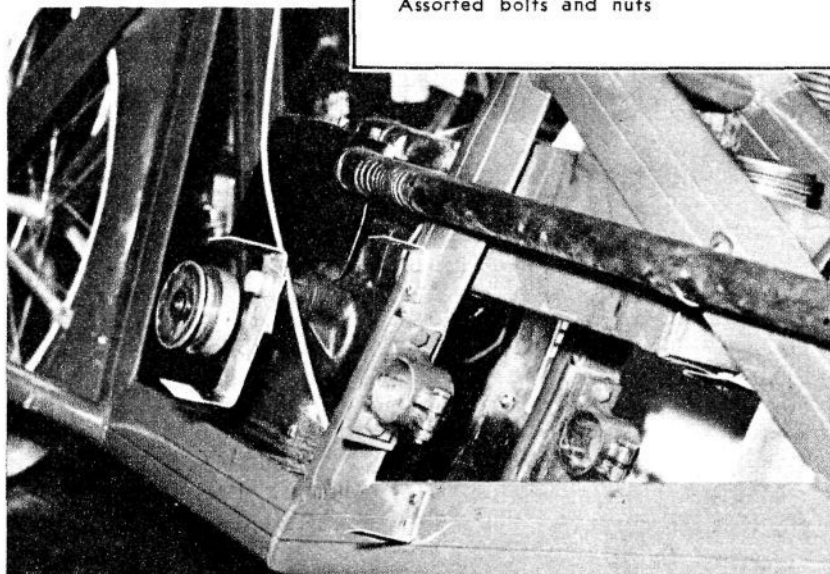




Throttle feed is mounted on handle bar; brake is on the opposite side.

Countershaft bearing supports are mounted to frame pieces as at right.

Photo below shows countershaft belt drive and location of exhaust pipe.



LIST OF MATERIALS

- 2—20 x 2.125 bicycle front wheels, tires and hubs
- 1—1" bicycle fork replacement neck
- 1—handle bar gooseneck
- 1—set bicycle fork bearings and races
- 1—fork retaining nut
- 1—fork retaining washer
- 1—bicycle handle bar, brake grip lever and cable
- 1—large bicycle seat
- 2—New Departure No. 5202 bearings
- 1—set 20 x 2.125 fenders and braces
- 2" of 1 1/2 x .065 wall tubing
- 6 1/2" of 1 1/2 x .125 wall tubing
- 45" of 1" x .035 wall tubing
- 26' of 2 1/2" x .035 wall streamline or round tubing
- 1—1/2" x 35 1/2" V-belt
- 1—1/2" x 48" V-belt
- 24—1/8" motorcycle spokes and caps
- 1—5/8, 3/4 or 1 h. p. engine
- 2—3/4" x 6" cast-iron pulley blanks
- 1—3/4" x 6" C.R. brake blank
- 1—C.R. steel strap, 1/4" x 1" x 6"
- 1 piece 22-gauge steel, 14" x 36"
- 1 piece 1/8" C.R. steel, 12" x 12"
- 1 piece 18-gauge steel, 3" x 18"
- 1 piece C.R. steel plate, 12" x 12" x 3/16"
- Assorted bolts and nuts

then is drilled through the center of both plates and the replacement neck slipped into these holes and welded on the lower side of the plates only. A 1/2" piece of material (triangular) is removed from both tubes as noted, then the tubes are bent up to an angle of 22° and welded. The front wheel hangers are then cut out and installed and the fork is complete. The handle bar is cut 23" long from 1"x.035 wall tubing and the bicycle gooseneck is located in the center of the tube before bending. It is important that the gooseneck be in position before bending the bar otherwise it will not slip on. The bar should be bent to measurements given.

Cold rolled steel rod 9/16" o.d. 6-3/8" long is used for the countershaft; chuck in the lathe and turn to measurements given. The .590 measurement should [Continued on page 132]

Mite Cycle

[Continued from page 88]

be exact as the bearing will slip on the shaft if it is turned undersize. The pulley adapter is turned and since it is used for an arbor in turning the large pulleys, it must be left long enough to chuck in the lathe and is cut off to size only after completion of the 6" pulleys. A retaining nut is used to lock the pulleys on the adapter during their machining, and this nut now is made and mated to the adapter. Two cast-iron blanks 3/4" wide and 6" in diameter are used for the 6" pulleys, and these can be secured at the local foundry. They are chucked in the lathe, first one side and then on the other.

The pulley web, although thin (1/8"), is sufficiently strong. Upon completion of machining the web, a 1" hole is bored through the center and, with a boring bar, the diameter of the hole is enlarged to 1" .140 and threaded left hand 24 threads per 1". Using the adapter as a gauge, thread carefully until the adapter will screw into the pulley with effort, for it should be a tight fit, and after this is completed, remove the pulley from the lathe and turn the other pulley in a like manner. Next drill the pulleys for the spanner wrench which must be constructed. The adapter is returned to the chuck and a pulley is screwed on with the aid of the spanner wrench, and the nut is screwed on to lock the pulley in place. A light cut is taken on the outer diameter of the pulley to true it up. A cut-off tool is placed in the tool rest and a cut is made in the middle of the pulley to a depth of 5/16". The compound rest is swung 19° to one side and the angle is cut into the pulley, then 19° the opposite direction and the angle cut from that side. Except for a little trimming in the bottom of the V, the pulley is now complete. This process is repeated on the other pulley.

The extension on the adapter now can be cut off and the adapter drilled and tapped for the set screws. A smaller drive pulley of 2-1/8" is turned and the V is cut as on the large pulleys; a 9/16" hole is drilled through and the end is tapped for a 5/16" screw as noted. Bearing housings are made simply with 1-1/2"x.065 wall tubing brazed to a 1/4"x1"x3" cold rolled steel strap; the 3/8" tubing is then brazed on the 1-1/2" tubing and the unit is split with a hack saw. Two of these are required. The countershaft bearing supports are made of 18-gauge steel and are drilled to mate with the bearing housings. Bolt the bearing housings to the supports and assemble the countershaft, putting the two New Departure 5202 bearings in place, and then install the adapter with one 6" pulley screwed to it. The bearing housings are slipped over the bearings and clamped into position. The whole assembly is put into place on the frame uprights and the countershaft bearing supports are spotted in position on the uprights. This makes sure that the countershaft will not bind when installed on the frame supports. Bearing housings should be loosened and the countershaft removed

from the frame when the supports are welded.

Two standard bicycle wheels 20x.125 are used; these are 24-spoke front wheels complete with bearings and axles. One is used without change for the front wheel of the Mite Cycle. The hub is removed from the wheel to be used on the rear and the spoke holes are redrilled for 1/8" spokes. Chuck the hub in the lathe and turn the ends to 1" .180 then thread left hand 24 threads per 1". Use the large pulley as a gauge and thread until the pulley can be screwed on with effort. When both ends are completed, remove the hub from the lathe and re-spoke the rear wheel with 1/8" motorcycle spokes. These can be procured from an old motorcycle wheel and must be cut to 6-3/8" lengths and then re-threaded to fit the spoke caps. With the rear wheel re-spoked, screw a pulley permanently in place with the spanner wrench. Then machine the brake drum and screw permanently in place on the opposite side of the wheel. The brake band is 18-gauge steel lined with regular lining cut to the size required. The band is a 3/4" type and is self-energizing as it has a tendency to wrap itself around the drum when the brake is applied.

The brake plate is made of 1/8" cold-rolled steel and jogged 1/4"; the top slotted hole allows for adjustment of the rear belt. The band anchors on the lower bolt hole and actuates from a small bellcrank and rod anchored at the forward end. A standard bicycle handle-bar squeeze lever and cable is used to actuate the brake. The cover for the countershaft and engine pulleys is made of 22-gauge tin cut to streamline and has 2" flanges soldered to it. Now procure a set of standard 20x2 .125 fenders from the local bike shop and our Mite Cycle is ready to assemble.

Install the front wheel and fender on the front fork, install the bearings in the fork neck and attach to the frame. Install the handle-bar gooseneck into the fork tube, line up and tighten. The engine is installed next and has a 2-5/16" pulley attached to the crankshaft. This is a die-cast pulley and may be purchased locally for about fifty cents. The countershaft is installed; the rear belt must be in position around the shaft before tightening the clamps, this rear belt being 1/2"x48". The large pulley is installed on the countershaft and a 1/2"x35-1/2" belt is used between engine and countershaft. Adjustments are made and the engine tightened securely.

The gas tank has been left to individual taste, but if an injection carburetor is used, a standard one-gallon can, located inside the frame underneath the seat, will be satisfactory. The can screw top is carefully cut out and a piece soldered over the hole; this screw-top portion then is soldered on the side and at the rear of the can. Small lugs also are soldered to the can, and it is installed with sheet-metal screws running through the

[Continued on page 134]

Mite Cycle

[Continued from page 132]

lugs into the frame members. The rear wheel is installed next, and here it will be found necessary to spread the frame slightly to clear the brake drum and pulley. Place the brake plate on the side shown and secure the rear wheel after adjusting the belt. The rear-wheel hanger is drilled and tapped 10-32 and bolted through the slotted hole in the brake plate. The rear fender is bent out on the forward end and attached to the tank with a sheet-metal screw through a small lug soldered to the tank.