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APPARATUS FOR MANUFACTURE OF AIR-COOLED CYLINDERS

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2 Sheets-Sheet 1

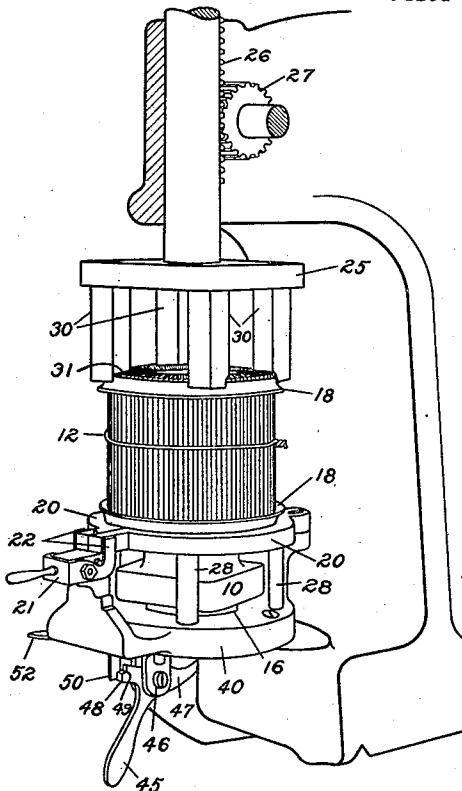


**Fig. 1**

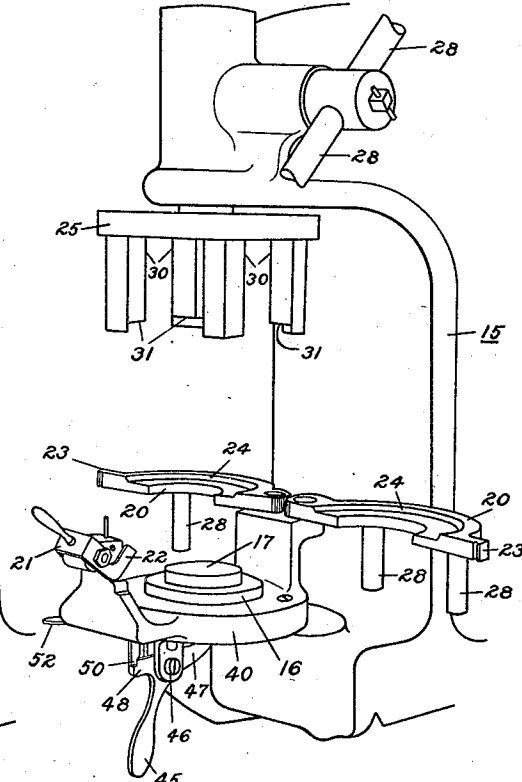


**Fig. 2**



**Fig. 3**

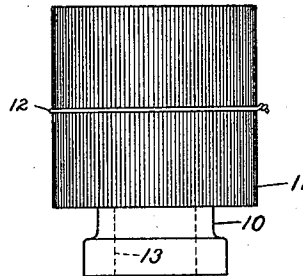


**Fig. 4**

Witnesses

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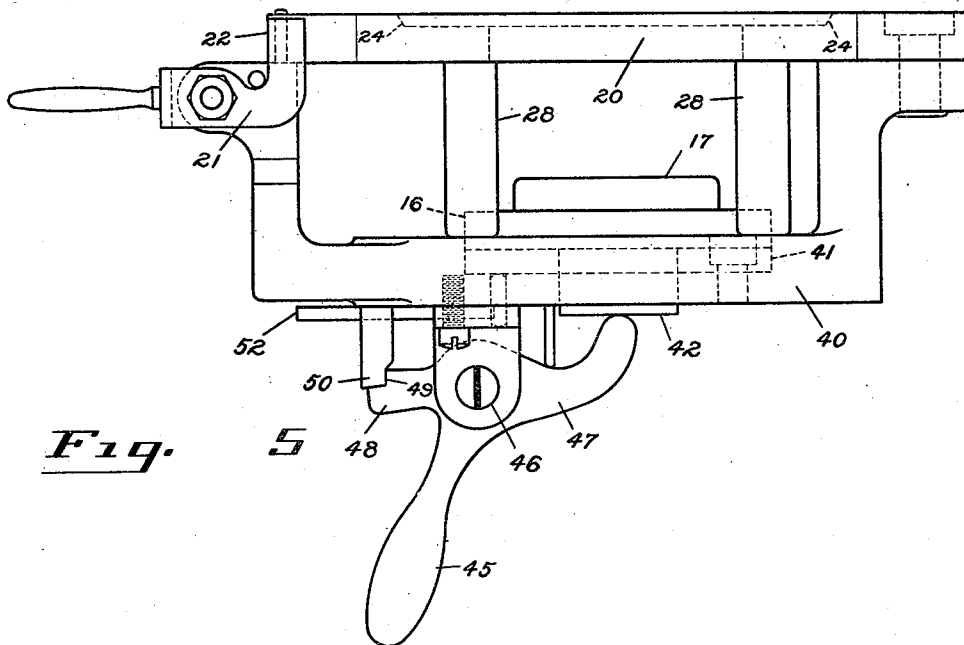


**Fig. 5**

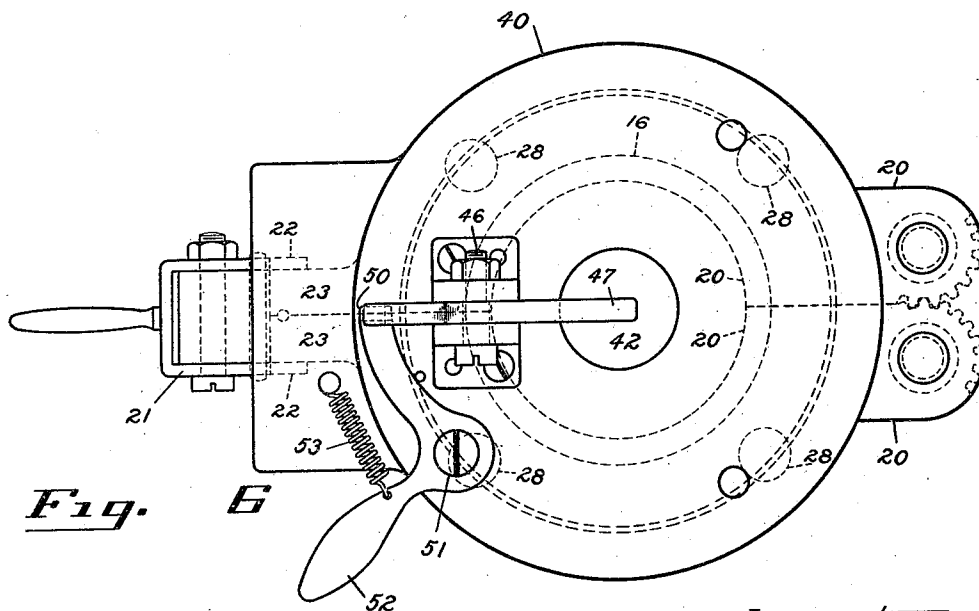


**Fig. 6**

Witnesses

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## UNITED STATES PATENT OFFICE.

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## APPARATUS FOR MANUFACTURE OF AIR-COOLED CYLINDERS.

Application filed November 8, 1922. Serial No. 599,731.

*To all whom it may concern:*

Be it known that I, CHARLES L. LEE, a citizen of the United States of America, residing at Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Apparatus for Manufacture of Air-Cooled Cylinders, of which the following is a full, clear, and exact description.

This invention relates to a method of securing fins or the like to a cylinder and to means for carrying out this method.

Among the objects of the invention is to provide an improved means for holding fins or the like tightly against the cylinder until they are permanently secured thereto by brazing or by other suitable means, and also to provide a convenient method of applying said holding means to the fins.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred forms of embodiment of the present invention are clearly shown.

In the drawings:

Fig. 1 is a perspective view of a fixture for assembling the cooling fins upon an internal combustion engine cylinder according to this invention.

Fig. 2 is a perspective view of the assembling fixture in the position ready to receive a cylinder, the movable base being in raised position.

Fig. 3 is a perspective view of one of the fin retaining rings, a part being broken away to show a cross section of the ring.

Fig. 4 is a cylinder having the cooling fins loosely held thereon by a wire, and ready to be placed in the fixture of Fig. 2.

Fig. 5 is a side elevation of the lower part of the assembling fixture.

Fig. 6 is a bottom view of the parts shown in Fig. 5.

In the drawings, like or similar reference characters refer to like or similar parts throughout the several views.

Fig. 4 illustrates a cylinder 10 of an internal combustion engine having the strip of cooling fins 11 and a sheet of brazing material (not shown) held around the cylinder by means of the wire 12. The cylinder 10, as shown in Fig. 4, first has a retaining ring 18 (Fig. 3) slipped over the lower

end of the cylinder and up against the bottom ends of the fins 11, and the cylinder unit is then placed upon the raised base 16 (see Fig. 2), the projecting portion 17 of the raised base 16 fitting snugly within the bore 13 of the cylinder to hold it in place. The means for raising and lowering the base 16 will be later described herein. The swinging jaws 20, which are shown open in Fig. 2, are next swung to their closed position shown in Fig. 1, and the catch 21 having the lugs 22 engages the ends 23 of the jaws 20 and locks them in closed position as clearly illustrated in the drawings. The jaws 20 each has a beveled shoulder 24 which conforms to the shape of the lower retaining ring 18 and serves as a support therefor. Therefore when the base 16 is lowered the cylinder unit is also lowered until the fins 11 abutting against the tapered inner periphery of the ring 18 support the cylinder unit. A second ring 18 is next placed over the top of the fins 11 but inverted with respect to the lower ring 18 so that its tapered inner periphery rests upon the edge of the fins, as will be readily understood. The movable head 25 is then lowered by suitable means, such as by the rack 26 and pinion 27 and hand lever 28 shown in Figs. 1 and 2, until the projections 30 abut the flared portion of ring 18. By a further turning of the hand lever 28 pressure is then put upon the top ring 18 to force it over the fins 11 and cause it to firmly clamp the fins to the cylinder. After the top ring 18 has been forced down to the position shown in Fig. 1 the shoulders 31 abut the top of the fins 11 and further lowering of the head 25 will therefore force the lower ends of the fins 11 downward through the lower ring 18 to clamp the lower ends of the fins to the cylinder. The base 16 having been lowered the desired amount as mentioned above, no obstruction opposes the downward motion of the cylinder 10 while the lower ring 18 is being forced on. If the lower ring 18 should be more easily forced on than the upper ring it will of course be forced to position first until the bottom of cylinder 10 abuts the lowered base 16, after which the upper ring 18 will be forced to position by the projections 30. The rings 18 should be of a material having a lower coefficient of expansion.

sion than copper and are preferably made of steel of such quality that they will not receive any permanent expansion from being pressed over the fins 11, thereby permitting their repeated use. Being of steel or other material having a low expansion coefficient they will of course also expand less than the copper fins 11 when heated up during the brazing operation. Therefore as the cylinder and fins are heated up the rings 18 will greatly increase the pressure between the fins 11, the cylinder, and the sheet of brazing material therebetween and thus facilitate getting a better bond.

The cylinder with the fins firmly clamped thereto by the rings 18 is readily removed from the assembling fixture 15 by running the head 25 to its raised position and releasing catch 21 to permit the jaws 20 to open. The jaws 20 are preferably provided with the projections 28 which serve to support said jaws while the rings 18 are being forced on, as will be readily understood.

The base 16 and its projection 17 rigid therewith may be raised and lowered by any suitable means, however the means illustrated in the drawings will be described in some detail. The movable base 16 moves in a recess 41 in the stationary base 40 (Fig. 5). The base 16 is provided with a projection 42 extending downward through a hole in the base 40. A hand lever 45 pivoted at 46 has an arm 47 which bears against the bottom of projection 42 and serves to raise the movable base 16 when handle 45 is moved to the right as seen in Fig. 5. The lever 45 is also provided with an arm or lug 48 having a notch 49 therein which is adapted to engage with the catch 50 pivoted at 51 (see Fig. 6). The catch 50 is yieldingly held against the lug 48 by the spring 53 so that when the lever 45 has raised the base 16 the desired distance catch 50 will snap into the recess 49 and thus hold the base 16 at its raised position. When it is desired to lower base 16 the catch 50 is withdrawn by means of the handle 52, whereupon base 16 will move by gravity to its lower position against the bottom of recess 41.

While the forms of mechanism herein shown and described, constitute preferred forms of embodiment of the present invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What I claim is as follows:

1. In combination, a cylinder, fins separate from said cylinder applied thereto, and closed retaining rings for holding the fins to the cylinder, said rings encircling the

fins and clamping them tightly against the cylinder.

2. In combination with a cylinder and cooling fins adapted to be brazed thereto, means for temporarily holding the fins tightly against the cylinder comprising a plurality of closed retaining rings encircling the fins and clamping them to said cylinder.

3. The method of clamping separate fins to a cylinder including: arranging the fins around the outside of the cylinder in their positions and then pressing a ring endwise around the outside of the fins, said rings being of such size that the fins will be tightly clamped to the cylinder.

4. The method of clamping separate fins to a cylinder including: arranging the fins around the outside of the cylinder in their positions and then pressing a ring endwise around the outside of the fins at both ends of said fins, said rings being of such size that the fins will be tightly clamped to the cylinder.

5. The method of clamping separate fins to a cylinder including: arranging the fins around the outside of the cylinder in their positions, and then pressing a ring having a tapered inside diameter endwise around the outside of the fins, said rings being of such size that the fins will be tightly clamped to the cylinder.

6. The method of clamping fins to a cylinder including: arranging the fins in their positions around the cylinder; placing a retaining ring having a tapered inside diameter loosely over each end of said fins, and then pressing said rings completely over the outside of the fins, the smallest diameter of said rings being of such size that the fins will be tightly clamped to the cylinder.

7. In a method of attaching cooling fins to engine cylinders, assembling the cylinder and a complete set of fins with suitable bonding materials and securing the assembled parts in fixed relation by pressing over the ends thereof clamping rings.

8. In a method of attaching cooling fins to engine cylinders, assembling the cylinder and a complete set of fins with suitable bonding materials and securing the assembled parts in fixed relation by pressing over the ends thereof clamping rings of material having a smaller coefficient of expansion than the metal of the fins.

In testimony whereof I hereto affix my signature.

CHARLES L. LEE.

Witnesses:

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