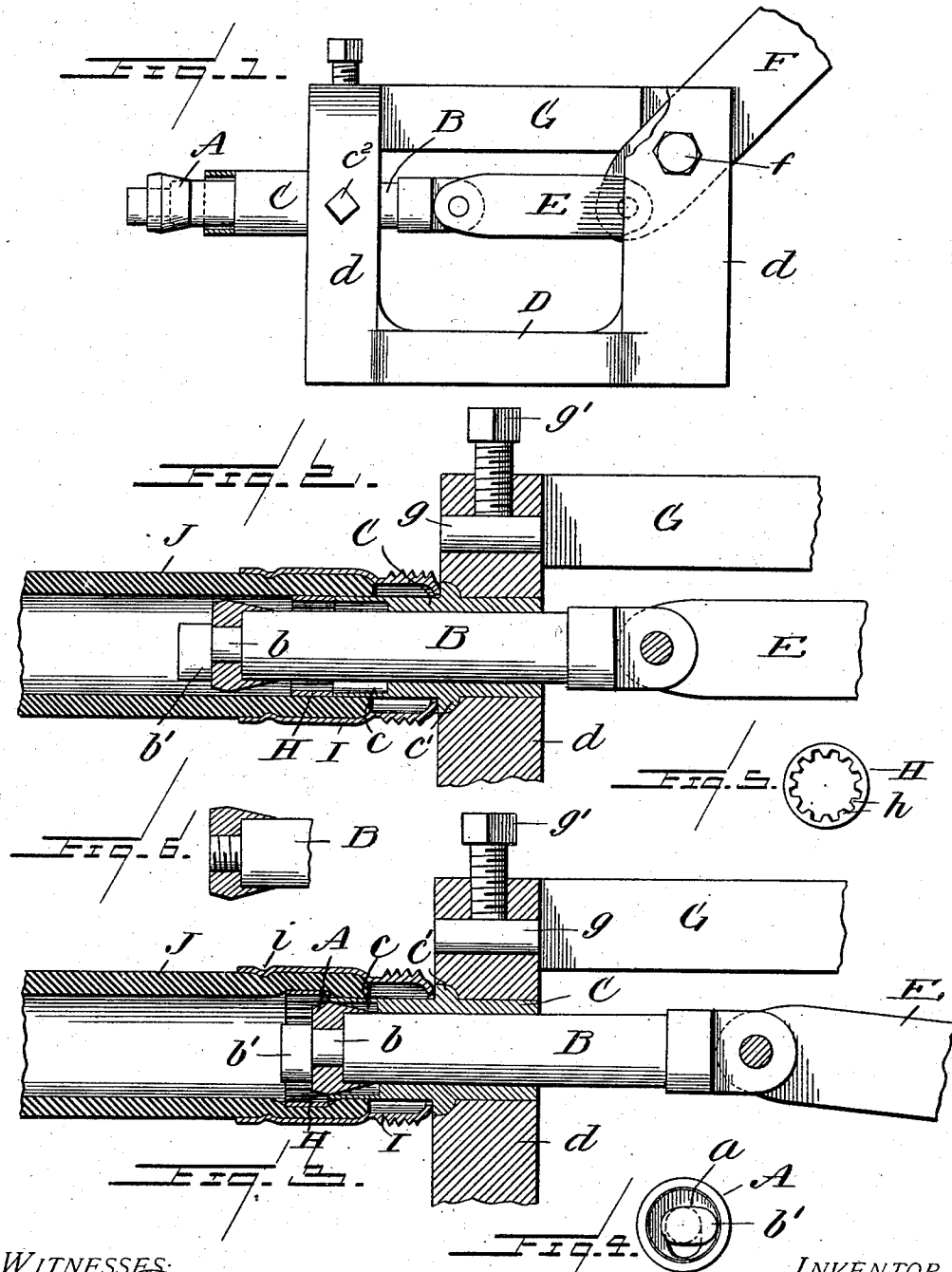


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MACHINE FOR EXPANDING FERRULES OR RINGS OF METAL.

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NO MODEL.



WITNESSES:

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HOWARD B. SHERMAN, OF BATTLECREEK, MICHIGAN.

MACHINE FOR EXPANDING FERRULES OR RINGS OF METAL.

SPECIFICATION forming part of Letters Patent No. 743,400, dated November 3, 1903.

Application filed March 30, 1903. Serial No. 150,328. (No model.)

To all whom it may concern:

Be it known that I, HOWARD B. SHERMAN, of Battlecreek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Machines for Expanding Ferrules or Rings of Metal; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved machine for expanding ferrules or rings of metal, and is particularly designed for use in expanding ferrules in hose-coupling members to attach the hose permanently thereto.

The object of the present invention is to provide an expander which will be most powerful in operation, simple in construction, and by which the ferrules can be rapidly expanded in place, also to do away with expansible expanding-heads, to use a solid conical head, and to so construct the apparatus that the ferrules will be expanded by the outward movement of the expander, also to produce a machine which can be readily adapted to expand various sizes of ferrules in various sizes or styles of coupling members by providing interchangeable expanders and stop-tubes of different sizes which can be readily placed in or removed from the machine according to the size of hose and couplings to be connected.

The invention will be readily comprehended from the following description of the particular form thereof illustrated in the drawings, which is the simplest now known to me; but I do not restrict myself thereto, referring to the claims following the description for summaries of the essential parts and combinations thereof in which the invention resides and which I desire to protect by Letters Patent.

In said drawings, Figure 1 is a side elevation of the complete machine. Fig. 2 is an enlarged sectional view through the expanding apparatus, showing a hose, a coupling member, and an expansible ferrule therein in position to be expanded. Fig. 3 is a similar view showing the positions of the parts after the ferrule is expanded. Fig. 4 is a detail view of the expanding-head. Fig. 5 is a view of one of the preferred expansible ferrules. Fig. 6 is a detail view of a modified attachment of expanding-head to rod.

The expanding-head A is detachably connected to the outer end of a reciprocatory rod B, which is supported and guided in a tube C, attached to standard *d*, rising from a base-plate D. The inner end of rod B is pivotally connected to the forward ends of links E, which at their rear ends are pivoted to the lower end or short arm of a lever F, fulcrumed on a bolt *f* in the upper end of a standard *d'*, rising from base D. The longer arm of lever F can be extended sufficiently to give the desired leverage to operate rod B manually. The movements of rod B and lever F are limited by a stop-bar G, which is attached to standard *d* above tube C and projects toward lever F, its free end lying in position to arrest the movements of the lever F.

The head A may be removably attached to rod B in any suitable manner, as by a continuous or interrupted thread, as indicated in Fig. 6. As shown in Figs. 1 to 4, the head A is conical and hollow, so as to fit onto and over the outer end of rod B with its smaller end toward the tube C, and it has an elongated slot *a* in its base or outer end adapted to slip over the similarly-shaped head *b'* of a stem *b* on the outer end of rod B, and by slipping the head on the stem and rod and then partly turning the head the latter will be locked on the rod and stem by the head *b'*.

For different sizes of expanding ferrules different sizes and diameters of expanding-heads A may be provided. The outer end of tube C is internally enlarged, as at *c*, to permit the head A to telescope thereinto, as indicated in Fig. 3, and said tube is provided with an annular shoulder *c'*, which fits in a corresponding recess in the outer face of standard *d*.

Interchangeable tubes C of different diameters may be provided to coact with the different sizes of expanding-heads A, and the tubes are removably secured in the standard *d* by means of the tap-bolt *c''*, as indicated in the drawings. Interchangeable stop-bars G may also be provided, so as to regulate the movements of lever F, and, as shown, the bar G has a stem *g* on its forward end engaging a corresponding hole in the standard *d* and secured therein by means of a tap-bolt *g'*, as shown.

The foregoing parts form a complete machine; but I wish it understood that I do not

restrict myself to the particular construction shown nor especially to the devices shown for reciprocating rod B.

The machine shown is especially designed for expanding ferrules in hose-coupling members to fasten hose ends thereto, and I preferably employ the ferrules shown in my application for patent filed herewith, one of such ferrules being shown in Fig. 5 and comprising a solid ring H, having a series of inwardly-projecting teeth or corrugations *h* on its inner surface, such a ferrule being more easily expanded than a solid ferrule of equal thickness would be. Ferrules have to be of a certain thickness or they would not expand sufficiently to secure the hose in the sleeve, and if the ferrule was not corrugated or grooved it would be much harder to expand. My peculiar ferrules are as readily expanded as the ordinary thin ones and as tightly fitting when expanded as thick ones.

In the drawings, I represents a coupling member, and J the hose, either and both of which may be of any desired construction. The sleeve of the coupling member is preferably provided with an inwardly-projecting rib *i* near its outer end.

In using the machine to expand ferrules in hose-couplings the operation is as follows: The expanding-head is removed from the rod B, the handle-F being lowered to project the rod A. Ferrule H is then slipped on the rod and up against the end of tube C, which stops it. The expanding-head A is then replaced and locked on the rod. The end of a hose is then inserted in the sleeve of a coupling member, and the latter with the hose end slipped over the head, rod, ferrule, and tube, while the parts are in the position indicated in Fig. 2 of the drawings. If the parts are properly proportioned to the work, the ferrule will lie within the hose and tube in advance of rib *i*. Then the rod B is moved back, drawing the conical expanding-head A outward through the ferrule H and expanding the latter, so as to bind the hose tightly against the sleeve, as indicated in Fig. 3 of the drawings. The coupling member, with the hose and ferrules all tightly united, is then slipped off, and the operation can be repeated to secure another hose and coupling together. The tube C prevents the ferrule moving forward with the expander and retains it in position while being expanded by the passage of the head A.

It will be observed that the expander-head does not expand or contract radially. The expansion of the ferrule is effected by the wedging action of the tapered conical surface of the head acting uniformly and simultaneously on the inner circumference of the ferrule. The head draws out of the ferrule and coupling, so that the latter can be easily removed. This construction is obviously much more powerful and simple than are the radially-expansible devices heretofore used for expanding the ferrules, and there is no possibility of the ferrule being misplaced if tubes,

ferrules, and expanders of proper dimensions be employed, nor is there any danger of the expanding-head cutting the hose. The head can have a greater diameter, substantially equal to the interior diameter of the hose, so that when expanded the ferrule will offer no appreciable obstruction to the passage of fluid, and this retardation will be lessened when interiorly fluted or toothed ferrules, like that in Fig. 6, are employed. The machine is powerful enough to expand ferrules of uniform thickness; but equally good results are obtained by using the fluted ferrules and less power is required.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. In a machine for expanding rings and ferrules, the combination of a reciprocatory rod, a guide therefor and an expanding-head detachably connected to said rod, to permit a solid ring ferrule to be slipped on the rod between the head and guide, substantially as described.

2. In a machine for expanding rings and ferrules, the combination of a ferrule-stop a reciprocating rod adapted to support a ferrule, and a conical expander-head attached to the outer end of said rod with its apex toward the tube and means for drawing the rod and head outward through the ferrule to expand the latter, for the purpose and substantially as described.

3. In a machine for expanding rings and ferrules, the combination of a longitudinally-movable rod a guide for said rod, also serving as a ferrule-stop, a conical expander-head adapted to be attached to said rod after the ferrule is slipped thereon, and means for drawing the rod so as to pull the head through the ferrule and expand the latter, substantially as described.

4. In combination a longitudinally-movable rod, adapted to support a ferrule, a conical expander-head adapted to be detachably secured to the outer end of said rod after a ferrule is placed thereon, a stop for limiting the outward movement of the ferrule, and means for moving the rod so as to draw the head through the ferrule and expand the latter, substantially as described.

5. In a machine for expanding rings and ferrules, the combination of a reciprocatory rod, means for reciprocating said rod, a removable tubular combined rod-guide and ferrule-stop, a removable expander-head on the outer end of said rod, and means for drawing the rod through the guide to pull the head through a ferrule, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HOWARD B. SHERMAN.

In presence of—

CHAS. R. SYLVESTER,
F. M. ANDRESS.