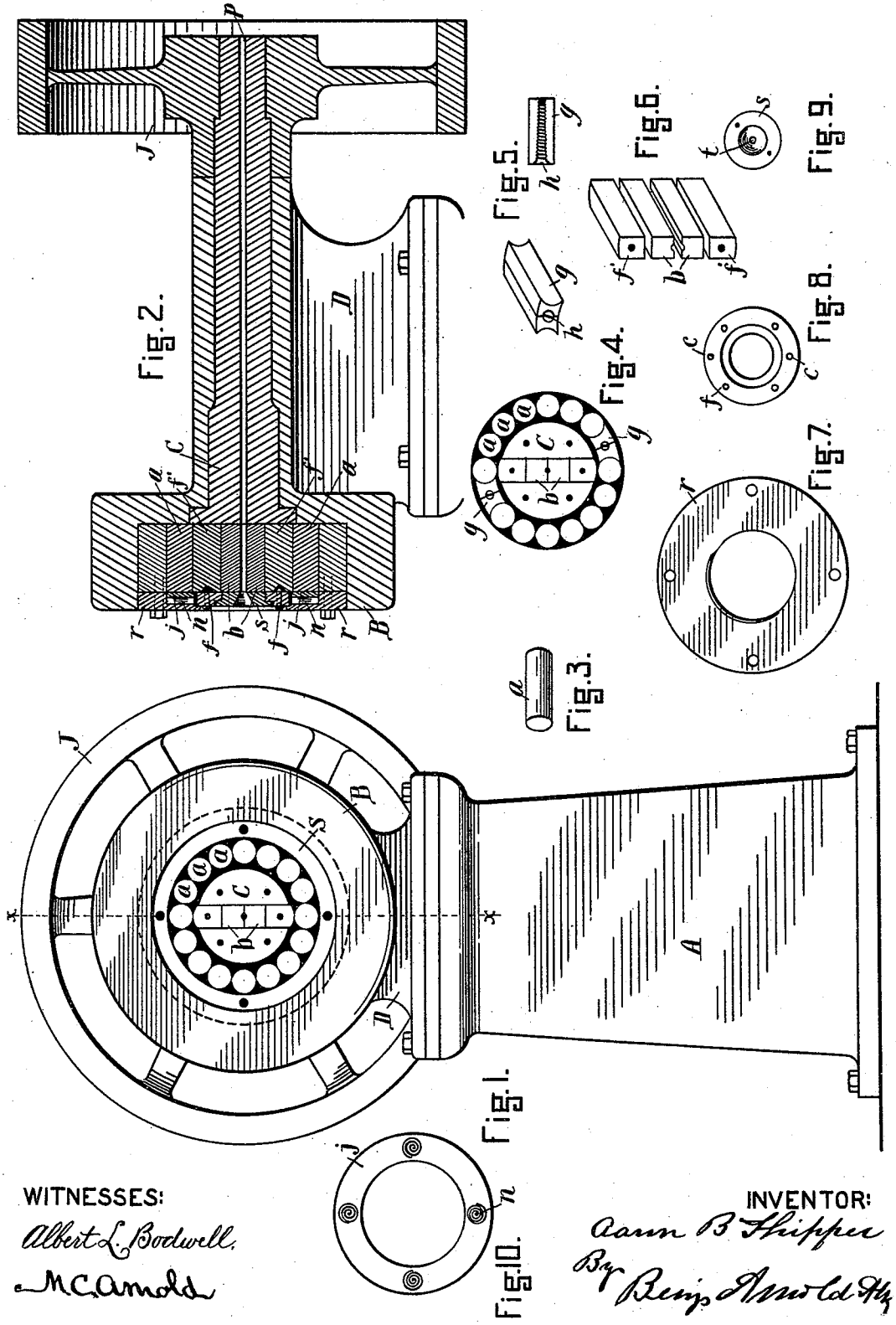
(No Model.)

A. B. SHIPPEE.

REDUCING AND SWAGING MACHINE.

No. 471,148. Patented Mar. 22, 1892.



WITNESSES:

Albert L. Bodwell.

M. C. Arnold

INVENTOR:

Aaron B. Shippee

By Benj. Arnold & Sty

UNITED STATES PATENT OFFICE.

AARON B. SHIPPEE, OF PROVIDENCE, RHODE ISLAND.

REDUCING AND SWAGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 471,148, dated March 22, 1892.

Application filed May 22, 1891. Serial No. 393,677. (No model.)

To all whom it may concern:

Be it known that I, AARON B. SHIPPEE, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Reducing and Swaging Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of machines used to reduce and shape articles of metal to any desired size or form by compression or swaging by rapid repeated action of dies on the surface of the metal, and is especially adapted to producing forms having a circular cross-section, though other forms may be produced by it, if desired. It is fully illustrated in the accompanying drawings.

Figure 1 is a front elevation of the machine. Fig. 2 is a vertical section of the machine, taken through on line *x x*, Fig. 1. Fig. 3 is a separate view of one of the rolls. Fig. 4 is a front elevation showing the application of a device for adjusting the rolls for wear, &c. Fig. 5 shows one of the adjusting devices separate. Fig. 6 is a perspective view of the dies and die-blocks separate from the machine. Figs. 7, 8, and 9 show the front plates *r f s*. Fig. 10 is a front view of plate *j* with springs *n*.

This machine consists of a stand-case A, on the top of which a bearing D is secured, having a circular head B attached to the end of it, preferably by being cast in one piece with the bearing. This bearing D is bored through to receive an arbor C, and the head B is turned or bored on its inside true concentrically with the bore of the bearing D nearly through, leaving a flange at its junction with the bearing D. The arbor C is fitted to revolve in the bearing D and has its front end extended out nearly flush with the face of the head B and its back end made long enough to receive the driving-pulley J, which is made heavy to serve also as a fly-wheel for the mechanism. A steel ring S is fitted tightly into the head B, having its inner surface turned concentric with the arbor C and bore of bearing D. The series of rolls *a a* consist of an even number of plain solid steel cylinders without journals of any kind, (see Fig. 3,) shorter in length than the depth of the chamber in the head B, and of a proper size to form a circle in the ring S, the rolls just touching one another and the inner surface of the ring when in position as seen in Fig. 1. An annular plate *r* (see Fig. 7) is attached to the ring S by means of screws to keep the rolls in the ring, the opening in the center of the plate being about the size of the end of the arbor C. The rolls *a a*, being of equal diameter and of an even number, adjust themselves to bring one roll exactly opposite to another on the other side of the circle and cannot close in and touch the surface of the arbor C, but will leave a small space between the inner surface of the rolls and the arbor. The rolls *a a* and also the steel ring S should be hardened and tempered to the degree usual with the rolls employed by jewelers for rolling metal stock. A recess or slot is made radially through the center of that part of the arbor C that is in the head D to receive a pair of dies *b b* and blocks *f' f'*, (see Fig. 6,) and an annular plate *f* of the same diameter as the arbor is fastened on the end of the arbor with screws to prevent the action of the dies and die-blocks from spreading the sides of the slot and to hold the blocks *f' f'* in place. Pins *c c* are put in the plate *f*, entering loosely into recesses in the front ends of the block to keep them from getting out of place when the dies are taken out to be changed. The central opening in the plate *f* is made about the same diameter as the width of the two dies *b b* to admit of their being removed through the plate to insert others without disturbing the other parts. This opening in the plate *f* is closed with a plate *s*, made with a screw-thread on its periphery, fitting into a thread in that opening. A small hole *t*, flaring on the outer side, is made in the center of the plate *s*, agreeing with the center of the dies, through which the article to be worked is introduced and pushed in between the dies. The dies *b b* perform the direct compressing or swaging of the article operated upon and have their meeting faces at the center of the arbor so shaped, so as produce the form desired. They are preferably made square in cross-section, so that their different faces may have different forms, and

by turning them over a quarter or half turn in the slot the same pair of dies may serve for the production of several different shapes of work. The dies are made rectangular in every way and depend entirely upon their radial movement caused by the pressing outward of the work in the center and the centrifugal force solely for opening in operation. The die-blocks are made similar in shape to the dies, excepting that their outer sides are made convex to receive the impact of the rolls *a a* as they pass them.

The operation is as follows: A rotary motion is given to the arbor C by means of a belt on the pulley J, and the dies *b* and blocks *f'* will be carried around inside the rolls *a a*, which, as above stated, do not touch the arbor, but do come in contact with the convex sides of the die-blocks *f'*, which project out beyond the periphery of the arbor and push them in, crowding the dies forcibly toward the center and compressing whatever is placed between them. The rod or article to be reduced is entered through the opening in the center of the plate *s* and pressed between the dies, which open sufficiently when the die-blocks are between two contiguous rolls *a* to allow the rod to enter a little ways, and when the die-blocks come between two opposite rolls *a* the dies will be forced in and compress the rod between them. This opening of the dies and advancing of the rod and closing of the dies and compression of the rod take place between and at each pair of rolls, rapidly reducing the rod in size. The rolls *a a* move in the circle only when the contact of the die-block turns them a little, and they roll a short distance on the inside of the ring S. It will be readily seen that the friction between the die-block, rolls, and ring S when exerting the greatest pressure on the dies is a rolling friction and not a rubbing action, and consequently will not absorb much power or be likely to wear the parts, which makes the machine durable and easy to operate.

In reducing an article round in cross-section, like a rod, it is held fast in the hands; but for other forms of work the article is allowed to turn with the arbor, so as to maintain the same position with regard to the dies at all points of their revolution.

In Figs. 4 and 5 are shown devices for adjusting the rolls *a a* in case they wear in use, &c. It consists of a split block *g*, having a taper screw *h* placed between its two parts, fitting in a part of a screw-thread cut in each side, so that the two divisions of the block are forced apart when the taper screw *h* is screwed inwardly. Two of these split blocks take the place of a pair of opposite rolls, as seen in Fig. 4, the sides of the block being made concave for contact with the rolls in each side. There may be two or more of these devices placed in the circle of rolls, as may be deemed best. The screwing in of the screw *h* spreads the two parts and presses the rolls *a* on each side close together, so as to bear against the inside of the ring S. An annular plate *j* is placed between the plate *r* and the ends of the rolls *a* and has springs *n* placed between it and the plate *r* to press the plate *j* against the rolls and keep them in place.

Having thus described my improvement, I claim as my invention—

1. In a machine for reducing or swaging metal, an arbor revolubly supported and having at its end a transverse recess containing dies and a series of plain rolls without journals arranged around said arbor, and a fixed head having a recess containing said rolls, the rolls being held in a circular position by contact with each other, and an outside support encircling said rolls, in combination with said outside support, substantially as set forth.

2. In a machine for reducing or swaging metal, the combination of the bearing D, having a head B, a recess therein, a ring S in said recess, arbor C, journaled in said bearing, having a transverse recess and dies *b* located therein, and rolls *a a*, arranged around said arbor and within said ring S, substantially as described.

3. In a machine for reducing or swaging metal, the adjusting-block *g*, composed of two parts and having a taper screw *h* fitted to turn between those parts, as described, in combination with a bearing D, having a head B, a recess therein, a ring S in said recess, arbor C, journaled in said bearing, having a transverse recess and dies *b* located therein, and rolls *a a*, arranged around said arbor and within said ring S, substantially as specified.

4. The combination of the bearing D, having a head B, a recess therein, a ring S in said recess, arbor C, journaled in said bearing, having a transverse recess and dies *b* located therein, rolls *a a*, arranged around said arbor and within said ring S, die-blocks *f'*, and plates *r*, *f*, and *s*, constructed and operating substantially as set forth.

5. The combination of the head B, having a recess containing ring S, rolls *a*, arbor C, having a transverse recess for holding dies, dies *b*, die-blocks *f'*, and plate *r*, having an annular recess to receive plate *j* and springs *n*, with plates *f*, *s*, and *j* and springs *n*, substantially as specified.

AARON B. SHIPPEE.

Witnesses:
BENJ. ARNOLD,
M. C. ARNOLD.