No. 819,261. PATENTED MAY 1, 1906.

W. A. WOOD.

APPARATUS FOR TREATING HEATED METAL UNDER PRESSURE.

APPLICATION FILED JULY 25, 1905.

2 SHEETS—SHEET 1.

FIG. 1.

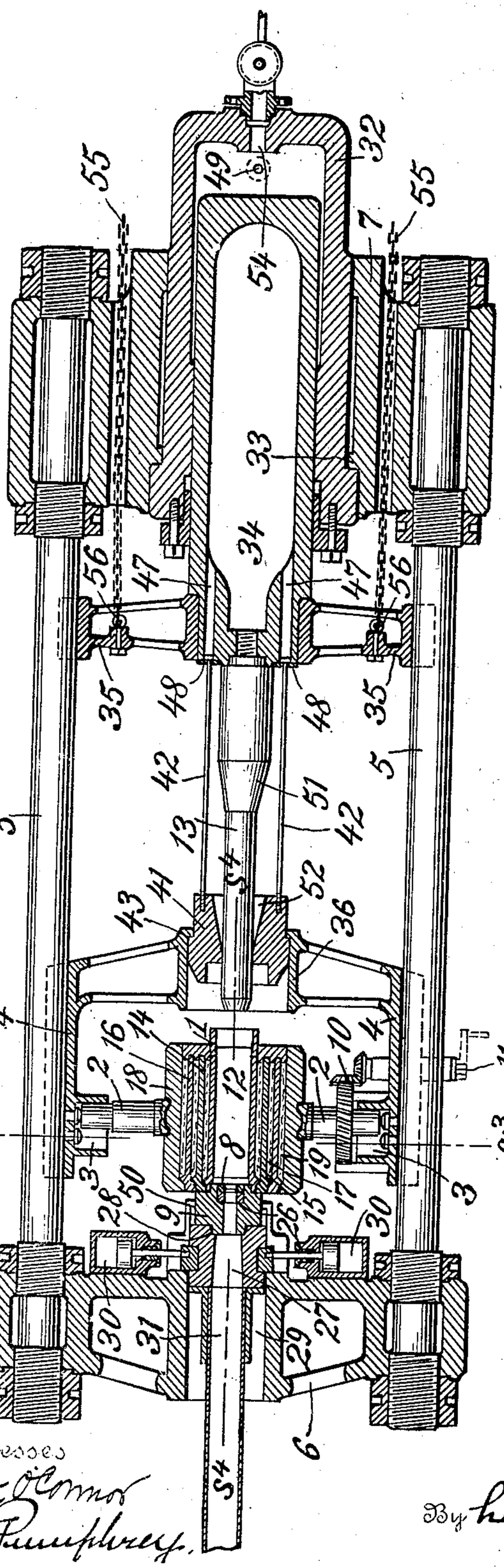
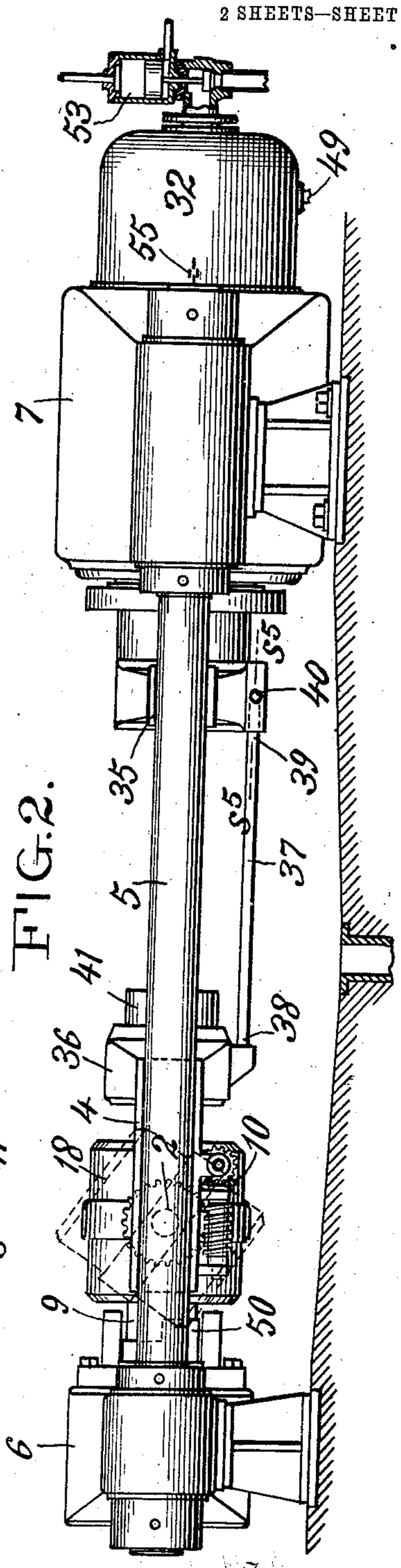


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

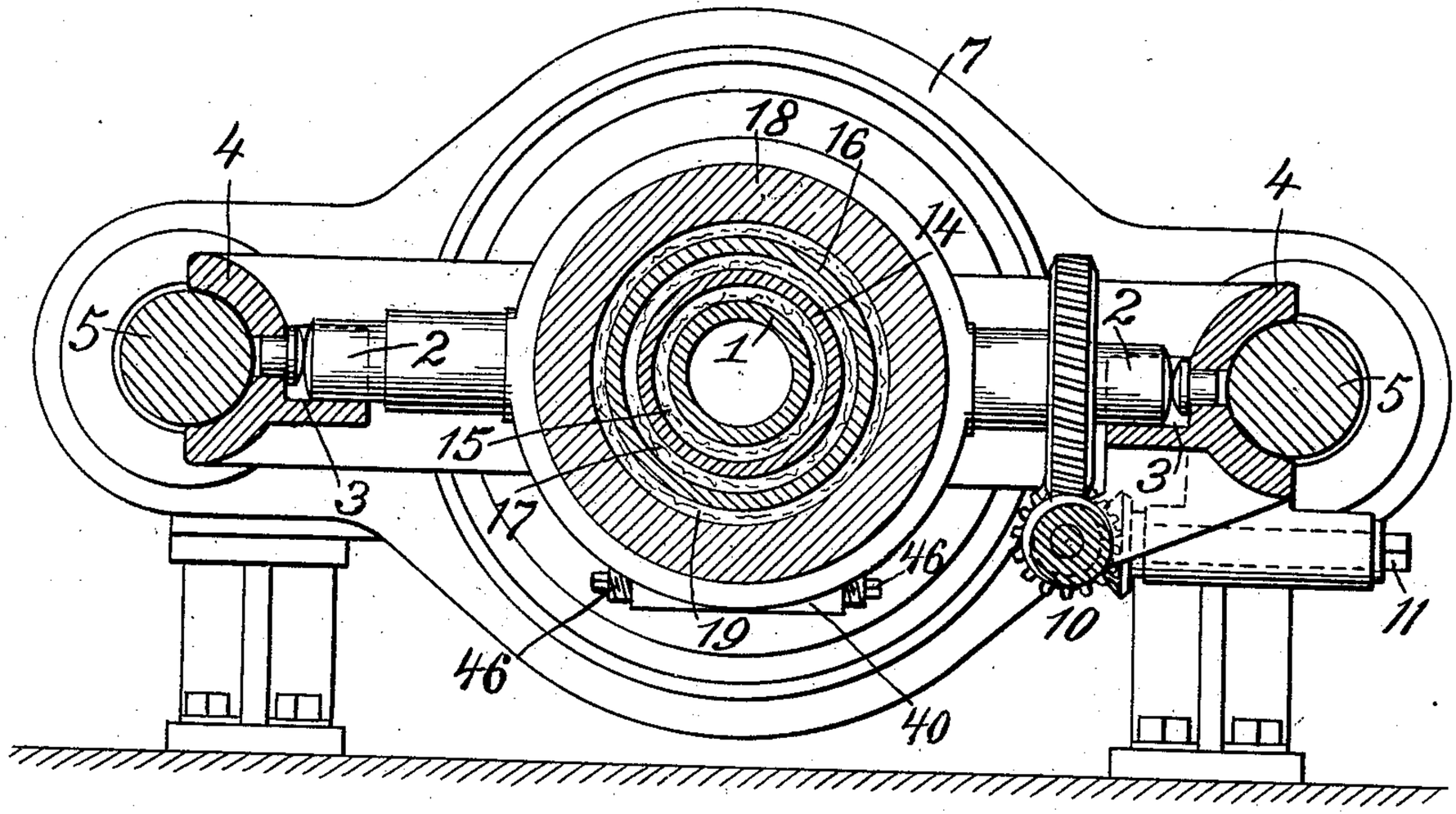


FIG. 4.

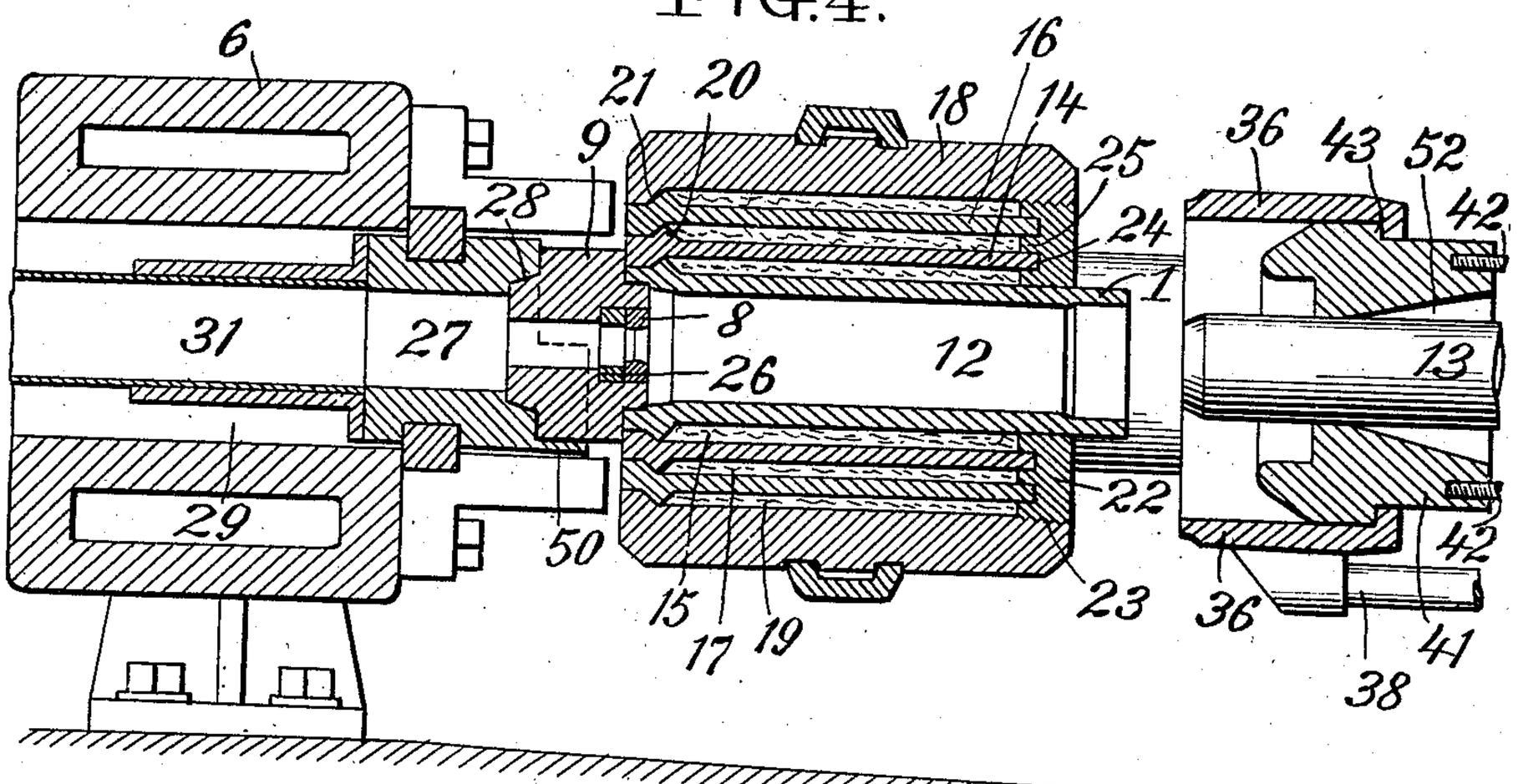
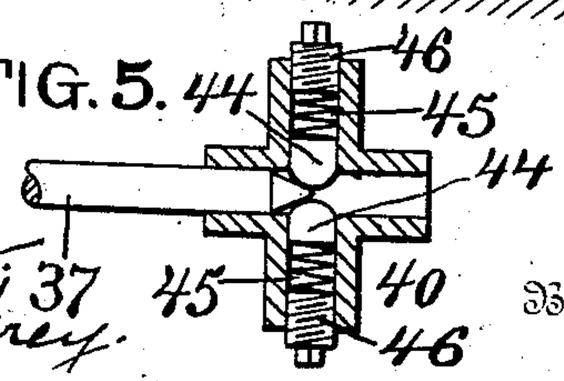


FIG. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM ALEXANDER WOOD, OF ANSONIA, CONNECTICUT, ASSIGNOR TO THE COE BRASS MANUFACTURING COMPANY, A CORPORATION OF CONNECTICUT.

APPARATUS FOR TREATING HEATED METAL UNDER PRESSURE.

No. 819,261. Specification of Letters Patent. Patented May 1, 1906.

Application filed July 25, 1905. Serial No. 271,233.

To all whom it may concern:

Be it known that I, WILLIAM ALEXANDER WOOD, a citizen of the United States, residing at Ansonia, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Apparatus for Treating Heated Metal Under Pressure, of which the following is a specification.

My invention relates generally to apparatus employed in the extrusion process of manufacturing solid or hollow wire, rods, bars, and the like.

The invention has special reference to the construction and mounting of that part of the apparatus known as the "pressure chamber or container," which serves to hold the body of heated metal while it is being acted upon by hydraulic or other pressure applied by means of a ram to force the same through a die.

The invention is designed, primarily, to improve the construction of the container, the object being to give it greater heat and pressure resisting powers, with a view to lengthening the life of the same, which is ordinarily so limited as to involve considerable expense in making necessary renewals.

The invention also embraces certain improvements in the construction and arrangement of the machine or apparatus proper, the object being to produce an automatic cooperation of certain members or parts thereof, and thereby facilitate the operation of entering and discharging the metal from the container.

The accompanying drawings will serve to illustrate apparatus such as may be employed for carrying my invention into effect. I wish it understood, however, that I do not limit myself to the same, as various changes may be made therein or other forms of apparatus substituted therefor operating in substantially the same manner to produce practically the same result.

In the drawings, Figure 1 is a sectional plan view of the apparatus. Fig. 2 is a side elevation thereof. Fig. 3 is a transverse section on the line s^3 s^3 of Fig. 1. Fig. 4 is an enlarged sectional view on the line s^4 s^4 of Fig. 1, and Fig. 5 is a detail sectional view on the line s^5 s^5 of Fig. 2.

Referring now to the drawings, the container is shown in the form of a cylinder 1, which is provided with trunnions 2 2, mounted in bearings 3 3 of a carriage 4. Two or more sets of such bearings are provided in order that containers of different length may be employed. The carriage 4 is supported by parallel guide rods or ways 5 5, connecting the end frames 6 and 7, and is movable toward the right as viewed in Fig. 1 to carry the container clear of the die 8 and die-holder 9, which are mounted in the end frame 6. When thus adjusted, the container may be rotated by means of suitable gearing 10, operated by a hand-crank 11 until it assumes either an inclined or vertical position, as indicated by dotted lines in Fig. 2, with its open end presented to receive the billet or body of metal to be acted upon.

The container proper consists of the cylinder 1, which is given a length and diameter such as to provide interiorly thereof a chamber 12 of suitable dimensions to receive the billet or charge of metal and hold the same while it is being acted upon by the ram 13 of a hydraulic piston, the construction and operation of which will be later on described.

As a means of strengthening the cylinder and in order to prevent bulging or distortion thereof under the combined action of the heat and pressure to which it is subjected in use a reinforcing-covering is employed therefor. This covering consists, as shown, of a series of concentrically-disposed cylinders 14, 16, and 18 of pressure-resisting material, preferably of steel, which are arranged in alternating relation with a second series of cylinders 15, 17, and 19 of non-heat conducting material, such as hard-packed asbestos or the like. The metal cylinders are of greater length than the cylinders of asbestos and are united at their ends to completely inclose the latter in the intervening annular spaces formed between the same.

At the end of the container adjoining the die the several metal cylinders are given an increased thickness to fit closely one upon the other and are secured together to resist the end thrust of the ram by being provided with interlocking flanges and shoulders 20 and 21. The interlock is effective in one direction only in order that the cylinders may be readily disconnected for purposes of renewal, repair, &c. At the opposite end of the container a ring 22 encircles the inner cylinder and is screw-threaded into the outer cyl-

inder, as indicated at 23. The inner face of the ring is concentrically grooved or corrugated to provide annular seats 24 for the cylinders 14 and 16 and ribs or beads 25 between such seats, which enter between the several cylinders and exert pressure upon the interposed non-heat-conducting filling.

The inner cylinder at the end adjoining the ram projects beyond the ring 22 to completely inclose the charge of metal before it is acted upon, and the bore of such projecting portion of the cylinder is slightly enlarged to insure entry of the ram in the event of the container being slightly out of alinement.

The outer cylinder is given an increased thickness over the inner cylinders and contains a sufficient body of metal to enable it to effectually withstand the lateral pressure developed within the chamber 12.

The die-holder is shown in the form of a cylindrical block 9, which is counterbored at 26 to receive the die 8 and is shaped to enter the cylinder 1 and overlap the interlocked ends of one or more of the adjoining cylinders 14 16, &c. A second cylindrical block 27, counterbored to provide a seat 28 for the die-holder 9, is fitted in the central bore 29 of the end frame 6 and secured by means of two or more hydraulic locking devices 30 30, the operation of which may be controlled in any suitable manner. Forming a continuation of the block 27 there is a tube 31, extending some distance beyond the end frame as a support or carrier for the rod, bar, or tube as it comes through the die from the container.

Mounted in the line with the container there is a hydraulic cylinder 32, which is exteriorly shouldered to fit an annular seat 33, formed in the end frame 7. The ram 13, forming a continuation of the hollow piston 34 of the cylinder 32, is centered relatively to the container by guides 35 and 36, which are connected through a rod 37. One end 38 of the rod is secured to the guide 36, and the opposite end 39 thereof is held in a device 40 upon the guide 35, which yields to a pressure slightly in excess of that necessary to move the carriage along on the rods or ways of the machine. The guide 35 is secured to and movable with the piston, and the guide 36 is formed centrally of the carriage 4. Movable in the guide 36 there is a sleeve 41, which serves as a support for the ram 13 and is connected through a series of bolts or headed rods 42 to have a limited back-and-forth movement with the piston. The sleeve is shouldered in the cylindrical guide, as indicated at 43, to impart such motion in one direction to the carriage 4 to effect the withdrawal of the container when the latter is to be swung upward to receive the charge, as above described.

The device 40 consists of two pins 44 44, oppositely arranged and movable in guides under the action of springs 45 45, the tension of which may be varied by means of screws 46 46. The pins are normally held by the springs in the position shown in detail in Fig. 5—that is to say, pressed together in the rear of the rod 37.

The headed ends of the bolts 42 have a free back-and-forth movement in guideways 47, provided in the piston, and are operatively connected to receive motion therefrom by apertured plates 48 48, which are secured upon the outer end of the piston and closely encircle the bolts proper.

Assuming the various parts of the machine to be in the position shown in Fig. 1, the operation is briefly as follows: As fluid under pressure is admitted to the cylinder through port 49 the piston moves forward and motion is transmitted from the same through the device 40 and rod 37 to the carriage 4, causing the container to abut and seat solidly against the die-holder, and thereupon the device 40 yields and is carried forward upon the rod 37 by the guide 35. Under the continued advance of the piston the ram acts upon the billet in the container until the metal has been extruded through the die, and when nothing remains in the container except the waste end of the billet the flow of fluid in the cylinder is discontinued to relieve the pressure upon the die-holder. Fluid is then admitted into the inner end of the cylinders of the locking devices 30 30 and acts upon the pistons to withdraw the engaging ends thereof from the recesses in the block 27. Pressure is again applied to effect a further advance of the piston, and the ram thereof, acting upon the waste end of the billet in the container, carries the latter forward, together with the die-holder and block 27, until the motion of the container is checked by the abutment 50. Thereafter the continued forward movement of the ram ejects the waste end of the billet from the container and at the same time forces the die and die-holder through the end frame. The article thus produced is then removed, and after the piston is returned to its normal position the die and die-holder are reset in the machine by hand. During the forward travel of the piston as above described the headed ends of the bolts 42 enter the hollow body thereof, and as the taper 51 on the ram seats in the conical bore 52 of the sleeve 41 the latter is carried forward in the guide 36 upon the carriage and moves with the ram throughout the remainder of its stroke. The operator then opens the valve 53, and as the fluid is exhausted from the cylinder through the port 54 the piston is returned to normal position by weights (not shown) acting through chains 55, passing over sheaves (not shown) and attached to eyebolts 56 upon the guide 35. During the return stroke of the piston as the parts assume the position shown in Fig. 1—that is to say, with the heads of the

bolts 42 in contact with the plates 48 and the shoulders 43 of the ram-support 41 and its guide 36 in engagement—the carriage 4 will be drawn away from the end frame 6 until the container clears the same sufficiently to permit it to be swung up for the insertion of another billet preparatory to the next operation.

Having thus described my invention, I claim—

1. An extrusion-machine comprising a supporting-frame, a container and die mounted in the frame, a coöperating ram movable independently of the container, and means for transmitting motion from the ram to the container.

2. An extrusion-machine comprising a supporting-frame, a container and die mounted in the frame, a coöperating ram, and means for giving the container the motion of the ram throughout a portion only of the stroke thereof.

3. An extrusion-machine comprising a supporting-frame, a container and die mounted in the frame, means for rotating the container, a coöperating ram, and means for giving the container the motion of the ram throughout a portion only of the stroke thereof.

4. An extrusion-machine comprising a supporting-frame, a carriage movable in the frame, a container mounted in the carriage, a coöperating ram, and a connection independent of the container for transmitting motion from the ram to the carriage.

5. An extrusion-machine comprising a supporting-frame, a carriage movable in the frame, a container mounted in the carriage, a coöperating ram, and a connection for transmitting motion from the ram to the carriage, said connection being such as to yield to pressure in excess of that required to advance the carriage in the frame.

6. An extrusion-machine comprising a die, a frame providing a seat for the die, a carriage movable in the frame, a container supported by the carriage, a coöperating ram movable relatively to the container, and a connection for transmitting motion from the ram to the carriage.

7. An extrusion-machine, comprising a frame, a die mounted therein, hydraulic locking means for the die, a carriage movable in the frame, a container mounted in the carriage, and a hydraulically-reciprocated ram movable through the container.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM ALEXANDER WOOD.

Witnesses:

JAMES ROBERT COE,

E. C. WHEELER.