

(No Model.)

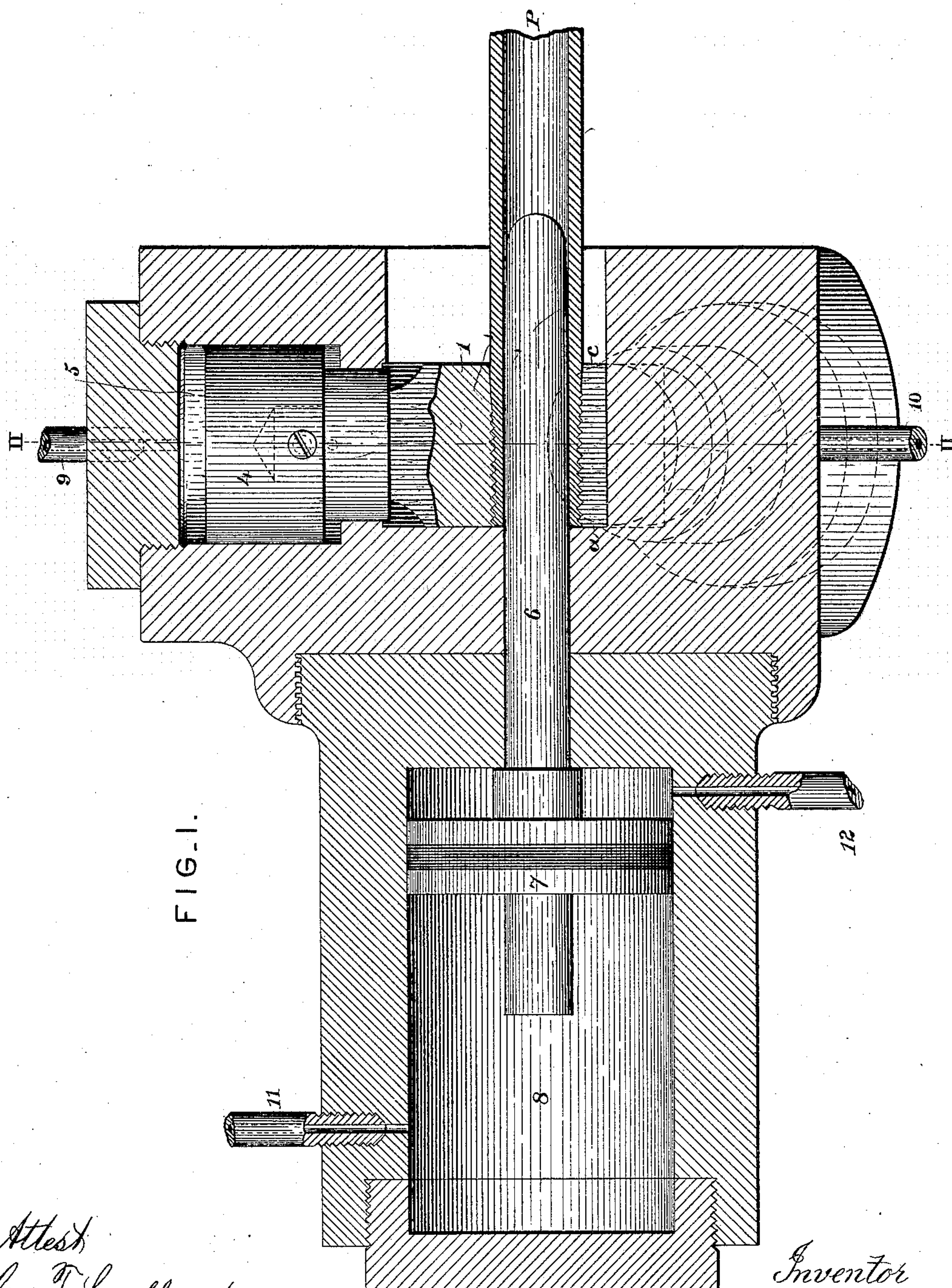
2 Sheets—Sheet 1.

A. H. EMERY.

CONSTRUCTION OF WROUGHT METAL PIPES OR TUBES.

No. 322,053.

Patented July 14, 1885.



Attest
Geo. T. Smallwood
Geo. L. Wheelock

Inventor
A. H. Emery
By Knight Bros. attys

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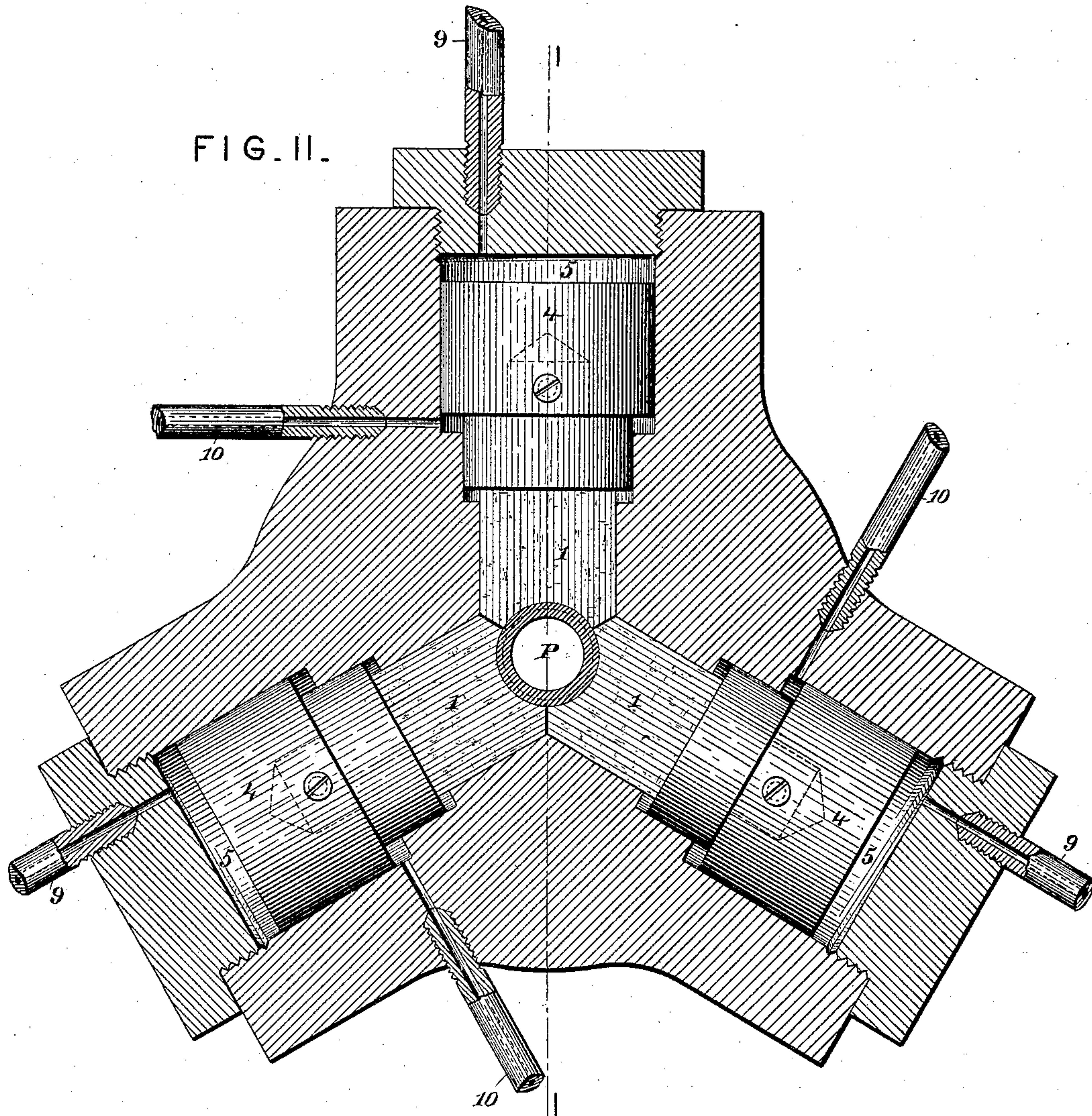
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UNITED STATES PATENT OFFICE.

ALBERT H. EMERY, OF STAMFORD, CONNECTICUT.

CONSTRUCTION OF WROUGHT-METAL PIPES OR TUBES.

SPECIFICATION forming part of Letters Patent No. 322,053, dated July 14, 1885.

Application filed July 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HAMILTON EMERY, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in the Construction of Wrought-Metal Pipes or Tubes, of which the following is a specification.

My invention relates to the construction of pipes or tubes of wrought metal with threaded ends for coupling the sections together or for attaching the pipes to any reservoir or apparatus with which they are to be connected.

The object of my invention is to give to the pipes a tensile strength in their threaded portions at least equal to that in the body of the pipe, so that the thread may not be a source of weakness, as in the pipes of ordinary construction, or may not necessitate the use of an increased section of metal in the threaded portion to obviate the weakening effect of the thread.

To this end my invention consists in condensing the metal throughout and beyond the threaded portion of the pipe, so as to impart increased tensile strength to the metal at this point and give to the threaded portion of the pipe a strength superior, or at least equal, to the unthreaded body of the pipe.

My invention may be carried out in various ways. For the purpose of illustration I have represented in the accompanying drawings threaded dies used in connection with a mandrel and adapted to be operated by hydraulic machinery, by means of which dies and mandrel the condensation of the metal and the threading the pipe may be performed at one operation.

Figure I is a longitudinal section of the apparatus on the line I I, Fig. II, showing the hydraulic rams and the mandrel in elevation and the dies partly so. Fig. II is a transverse section of the same on the line I I I I, Fig. 1, showing the hydraulic rams and the dies in elevation.

1 1 1 represent a set of dies mounted radially in a suitable housing, 3, and having a slight motion imparted by hydraulic rams 4, working in cylinders 5. The faces of the dies are screw-threaded, as shown, in order to produce the desired screw-thread on the pipe P, and are so formed that in compressing the pipe a

maximum condensation may be imparted to the metal throughout the length of the screw-thread and beyond to a sufficient distance to avoid the formation of any defined line or plane of fracture. To this end the faces of the dies from *a* to *b* are made parallel, while from *b* to *c* they diverge very slightly, to an extent which in practice may be imperceptible to the eye, but in the drawings is exaggerated for the purpose of illustration, the object of this divergence being to cause the condensation of the metal to gradually decrease from the point *b* until the normal tensile strength is reached in that portion of the pipe which has not been treated. In order to impart this permanent condensation to the metal, the pipe must be in a cold state, or practically so. It is preferably cold; but if heated at all this must not be to a sufficient extent to impart free ductility to the metal or cause it to flow easily under the pressure of the dies, as in the ordinary process of forging or hot-swaging. To enable it to resist the pressure which is imparted to condense the metal, and preferably to form the thread at the same operation, the pipe P is supported within by a mandrel, 6, having a slightly-tapering end, the said mandrel being operated by a ram or plunger, 7, within a hydraulic cylinder, 8.

The forcing-pipes 9 of the several ram-cylinders 5 may be connected with a common pump and the retracting-pipes 10 with another pump.

11 represents the forcing-pipe, and 12 the retracting-pipe of the mandrel-ram 7 8.

My invention may be carried out by the use of this or analogous apparatus in various ways. For example, the mandrel 6 may first be forced into the pipe, completely filling the same, while the dies 1 are retracted, the said dies being then forced down to condense the metal and form the screw-thread. The dies are then retracted and the pressure repeated once or twice, the pipe being partly turned at each operation in order to prevent the formation of fins or irregularities in the thread. Or the dies may be pressed upon the pipe while the mandrel is withdrawn and the pipe unsupported on the inside, the tapering mandrel being subsequently forced in by the action of the hydraulic press 7 8, so as to expand the pipe within the dies, completing the formation of the thread

and the desired condensation of the metal. Or fixed dies may be used threaded on the interior, as already described with reference to the moving dies, the pipe being inserted between the said fixed dies and expanded into threads by the tapering mandrel 6, so as to condense the metal and thread the pipe end at the same operation. Afterward the mandrel is withdrawn and the pipe screwed out. Or the thread may be partially formed on the pipe by the customary cutting or chasing operation, and may be completed by the compression dies and mandrel in any of the modes already described. Or the pipe end may be condensed between smooth-faced dies, and the threads subsequently cut in the condensed portion.

Movement may be imparted to the mandrel by other power than by a hydraulic-press—for example, by a rack and pinion, screw, or levers, or other well-known equivalent mechanical means.

The dies 1 may, if preferred, be operated by lever, screw, or drop, instead of by hydraulic pressure. If only the threaded portion of the pipe were compressed, the termination of the compressed and condensed portion at the end of the thread would make a defined point of fracture; hence the heavy pressure is extended beyond the threaded portion into the body of the pipe, and gradually diminished till the un-

treated portion of the body is reached. The result of this treatment is that when such a pipe is subjected to a strain the untreated portion, having a lower limit of elasticity, will be the first to yield, while the threaded portion and that immediately adjoining it will be relieved of injurious strain.

I am aware that it is common to form screw-threads by swaging in hot metal, and that ferules and tubes have been drawn cold, and that the general principle of condensing metal by cold rolling or compression is old and well known.

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

A pipe or tube having threaded ends condensed by the compression of the metal while in a cold or moderately heated state, the said condensation extending throughout and beyond the length of the threaded portion, and gradually decreasing to a point where the normal density and tensile strength of the metal in the untreated body or main portion of the pipe are reached.

ALBERT H. EMERY.

Witnesses:

OCTAVIUS KNIGHT,
A. E. TRUMBULL.