No. 878,092.

PATENTED FEB. 4, 1908.

A. SCHWIEGER.

APPARATUS FOR MANUFACTURING METAL TUBES.

APPLICATION FILED OCT. 4, 1905.

3 SHEETS—SHEET 1

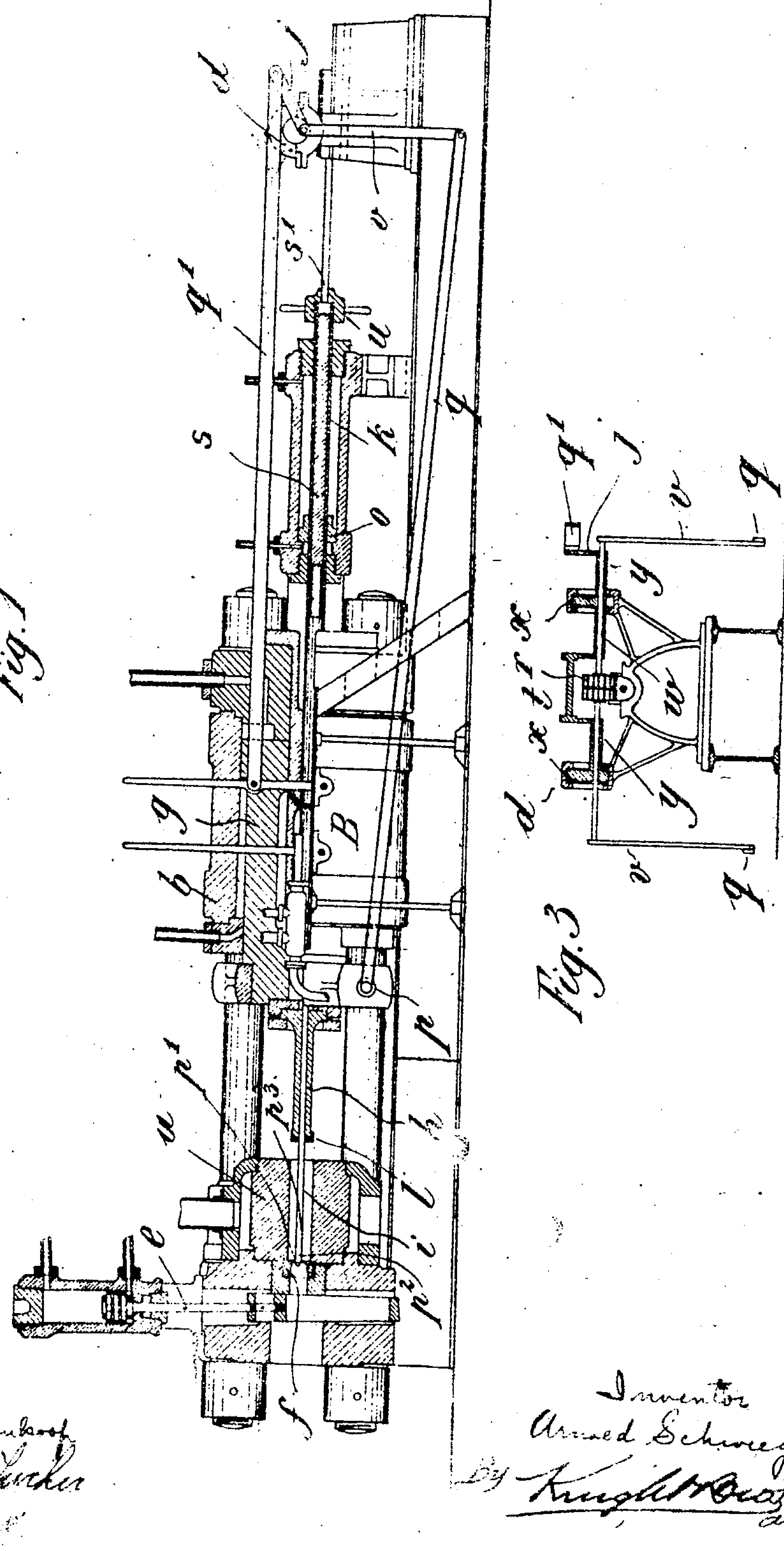

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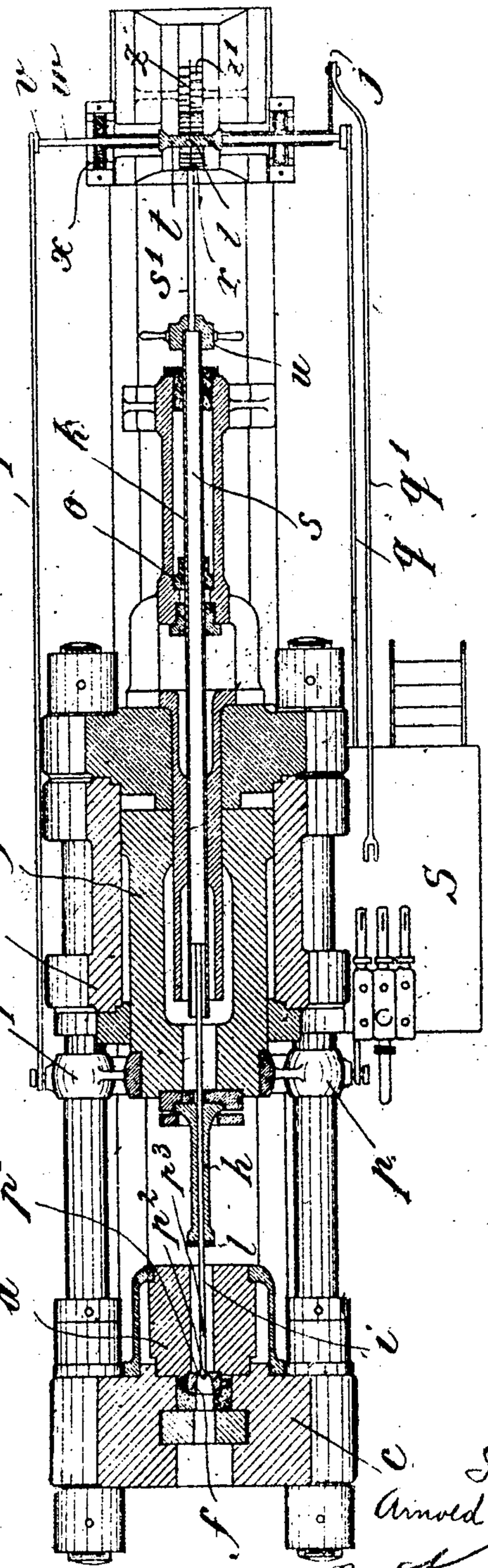
Fig. 2.



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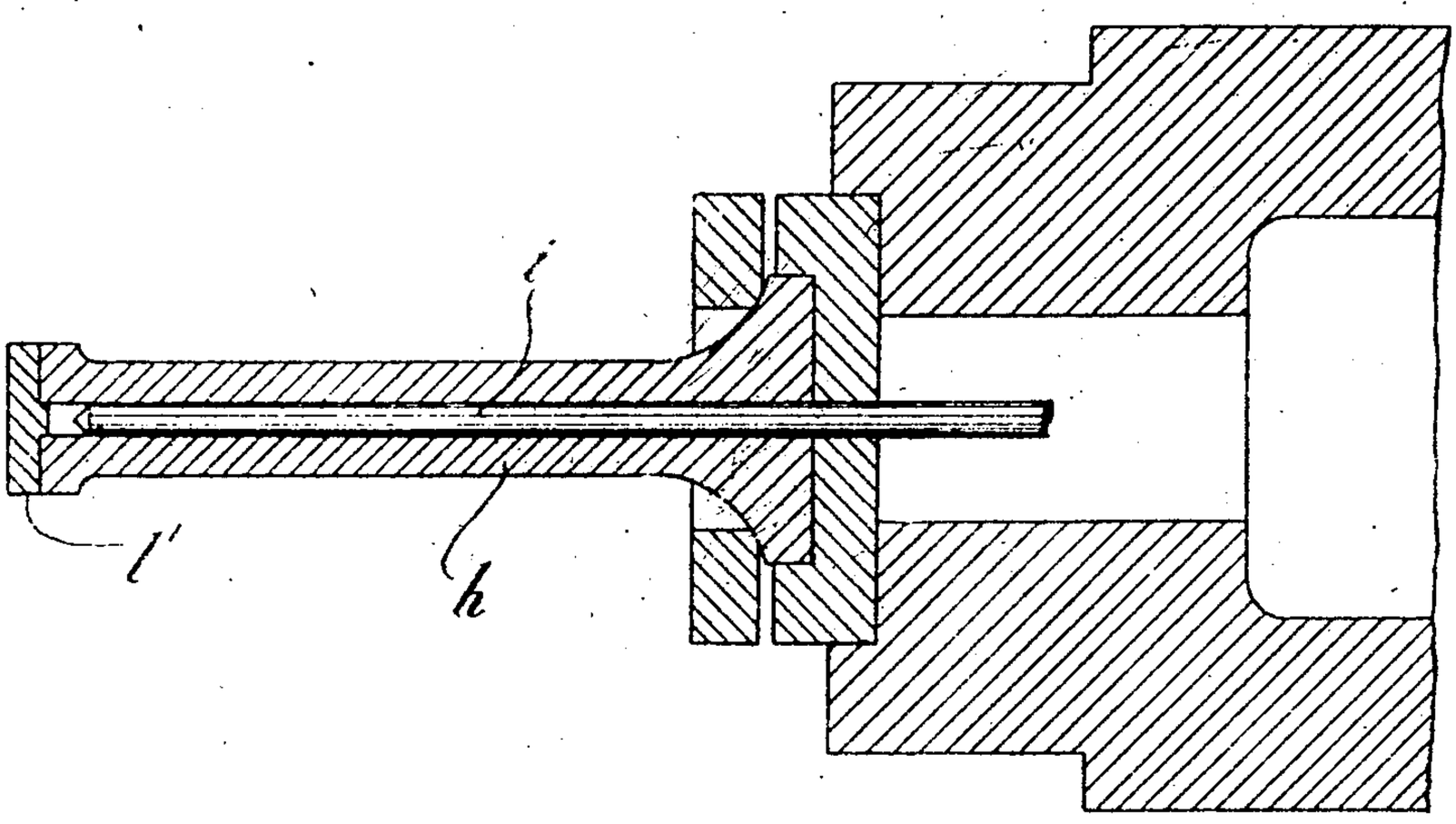
3 SHEETS—SHEET 3.

Fig 4.



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APPARATUS FOR MANUFACTURING METAL TUBES.

No. 878,002. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed October 4, 1905. Serial No. 281,347.

To all whom it may concern:

Be it known that I, ARNOLD SCHWIEGER, a subject of the German Emperor, and resident of Berlin, Germany, have invented certain new and useful Improvements in Apparatus for Manufacturing Metal Tubes, of which the following is a specification.

The present invention relates to a hydraulic press for manufacturing metal tubes and is an improvement on the press described in my co-pending application Serial No. 191,219, filed January 29, 1904.

In the present invention the mandrel which serves to perforate the metal bar is fastened to the mandrel-rod which passes through the hollow main piston and the auxiliary piston, in such a manner that, after having perforated the metal bar the mandrel is drawn back a little, and during the forward movement of the main piston it is moved forwards therewith in checked motion. This forward movement is effected by two racks at the rear prolongation of the mandrel-rod with whose alternately placed teeth engages a double toothed wheel, which is connected through levers with the draw-bars which move the cross head guide of the main press piston. After the tube has been pressed, the mandrel-rod and the mandrel can be drawn back, by the action of a weight or spring, into its normal position, after the driving mechanism for the racks has been put out of gear.

The press is illustrated in the accompanying drawings in which

Figure 1 is a longitudinal section through the press; Fig. 2 is a horizontal section, and Fig. 3 is a cross-section. Fig. 4 is a sectional view showing the press adapted for pressing massive bodies.

Similar letters refer to similar parts throughout the several views.

a is the pressure-cylinder mounted in the cross-head *c*; *f* is the matrix held fast in the cross-head *c* by a hydraulically moved slide *e*; *i* is the mandrel guided in the plunger *h*; *l* is the press-plate.

The mandrel-rod *s* passes through the hollow piston rod *k* of the auxiliary press-piston *o*, which is guided centrally in the hollow main press-piston *g* of the main driving cylinder *b*. The mandrel-rod *s* is machined at its rear prolongations s^1 and rests with its shoulder against the bottom of the nut *u*, which is screwed upon the end of the hollow piston-rod *k*. To the prolongation s^1 are connected two rocks *z* and z^1 with alternately placed teeth, and these mesh with two alternately arranged toothed wheels *r*, rigidly keyed to the shaft *w*; to the ends of the shaft *w* are fastened two lateral arms *v*, which are moved by the draw-bars *q q* coupled to the lower cross-head guide *p* of the main press-piston.

The length of the arms *v* relatively to the radius of the wheels *r* is selected in such a manner that reduced motion is transmitted from the guide *p* through the bar *q* arm *v*, wheels *r* and racks *z* z^1 to the mandrel-rod *s* s^1 and mandrel *i*.

In order to be able to lift the toothed wheels out of the racks, there are arranged on the shaft *w*, in casings *d*, two perforated eccentrics *x* connected to each other by a bent shaft *t*. The horizontal legs *y* of the bent shaft are hollow, in order to receive the shaft *w* of the toothed wheels. At one end of the shaft *t* is arranged a crank-arm *j* moved by a draw-rod q^1, which is connected to a lever B journaled on the platform S. If the lever is turned forwards, that is to say to the left, the eccentrics, together with the shaft *w*, are turned in such a manner that the toothed wheels *r* are thrown out of gear with their racks.

In order to draw back the mandrel *i*, a weight (not shown in the drawings) may be caused to pull at the prolongation s^1, either through an angle-lever or through a rope running over a pulley. But this arrangement does not form a part of the invention, as the end of the racks may quite as well be connected to springs, which are tensioned by the forward movement of the mandrel-rod s s^1 and draw back the mandrel-rod when the piston *o* returns.

The mode of working is as follows. After the unperforated metal bar has been put into the pressure cylinder *a*, the driving device for the mandrel is uncoupled by means of the lever B in the above described manner. Hereupon the auxiliary press-piston *o* with the hollow piston rod *k* and the nut *u*, is driven forwards by hydraulic pressure, whereby the mandrel-rod *s*, the prolongation s^1, the racks *z*, *z* and the mandrel *i* are moved along with it, and the latter is forced through the metal bar for the purpose of perforating it. Thereupon the mandrel is made to return under the action of a weight, or spring, in the above described manner, to such an extent that its end p^1 projects a few milli-

meters into the matrix *f*. Finally the driving-device is thrown into gear by the lever B and the mandrel together with the main press-piston, is driven forwards, while the mandrel advances correspondingly and with checked motion relatively to the main press-piston, so that gradually and successively another part of the core, as for instance p^2 p^3 and so on, passes into the opening of the matrix, and in this way the tubes will be sure to be always of the same diameter and the mandrel will be worn out uniformly. When the pressing process is finished, the driving wheels *r* of the mandrel are again disconnected so that the mandrel can move backwards under the action of the said weight or spring.

If massive bodies are to be pressed, the mandrel-rod *s*, with the mandrel *i*, is drawn back so far that the point of the core is behind the face of the plunger *h*, whereupon an imperforate press-plate l^1, instead of the perforated plate *l*, is placed upon the plunger as shown in Fig. 4.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a hydraulic press the combination with the plunger and its driving piston, of a mandrel, means for moving the mandrel independently of the plunger and piston, and connection between the driving piston and the mandrel whereby the mandrel may be driven by the piston.

2. In a hydraulic press, the combination with the plunger and its driving piston, of a mandrel, means for moving the mandrel independently of the plunger and piston, and connection between the driving piston and the mandrel whereby the mandrel may be driven by the piston and at a speed different from that of the plunger.

3. In a hydraulic press, the combination with the pressure cylinder terminating in a matrix, of a plunger, a driving piston for the plunger, a mandrel, means for projecting the mandrel through the pressure cylinder into the matrix, and a connection between the driving piston and the mandrel whereby the mandrel is caused to advance in the matrix during the pressing operation.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARNOLD SCHWIEGER.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.