No. 756,738. PATENTED APR. 5, 1904.

A. J. TONGE, J. TONGE, JR. & E. EAVES.

HYDRAULIC PRESS FOR MINING PURPOSES.

APPLICATION FILED MAY 2, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

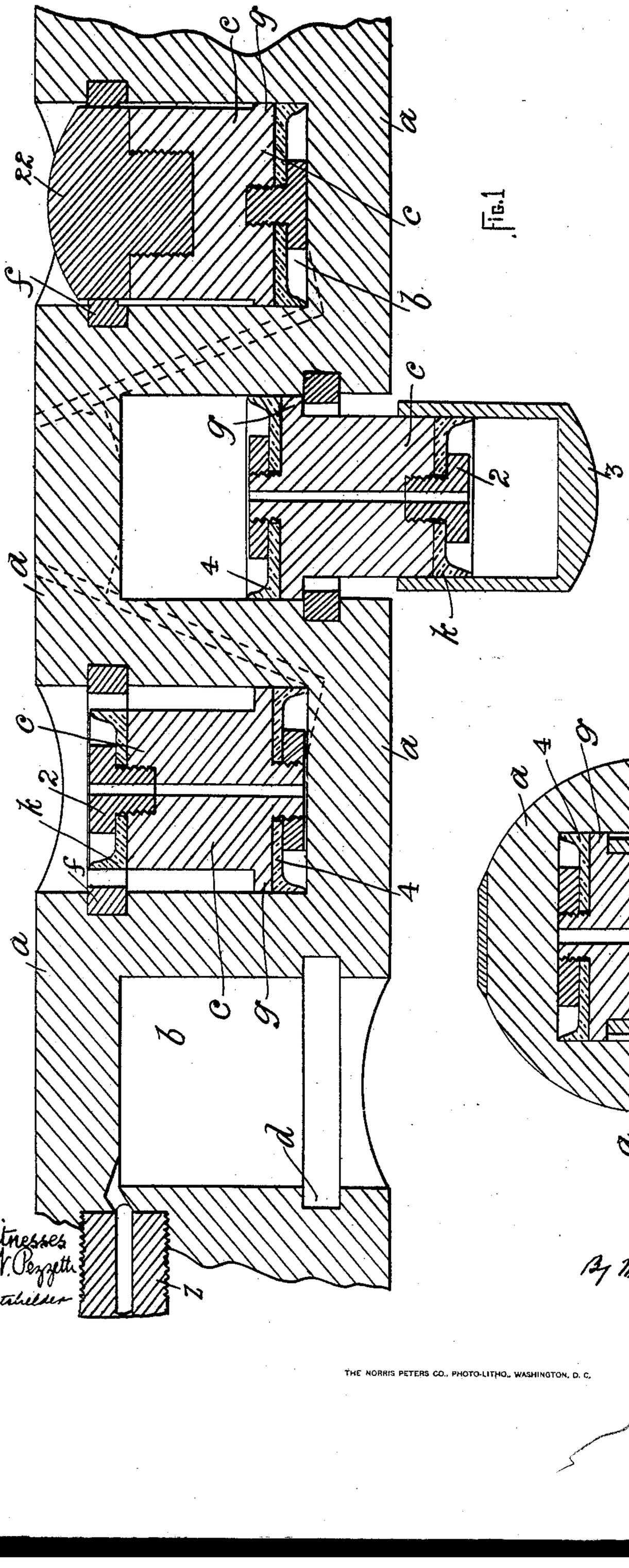

Fig. 1

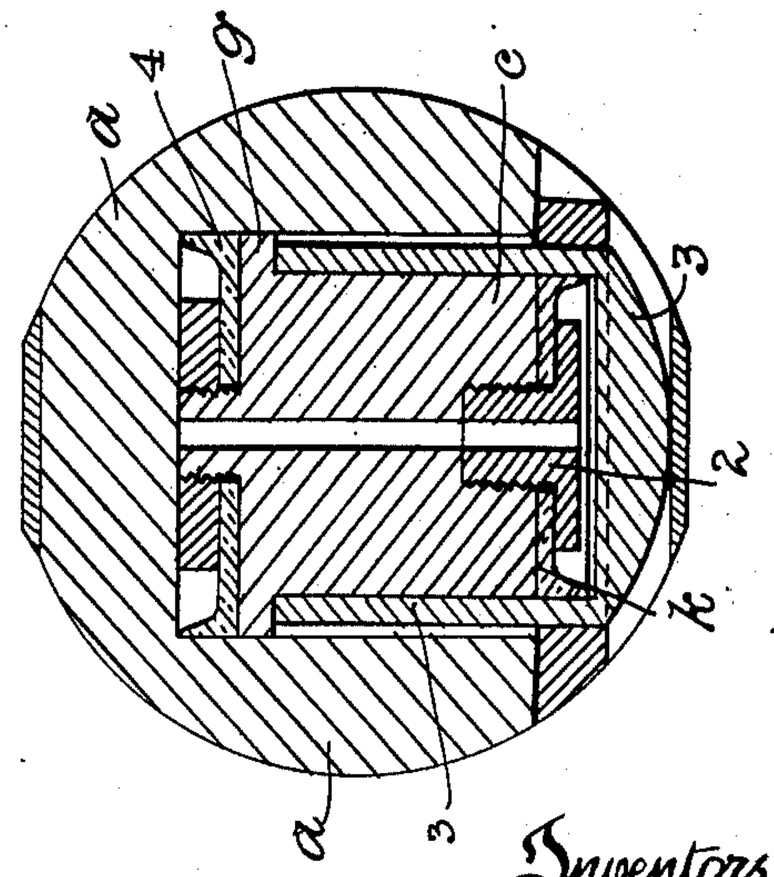

Fig. 2

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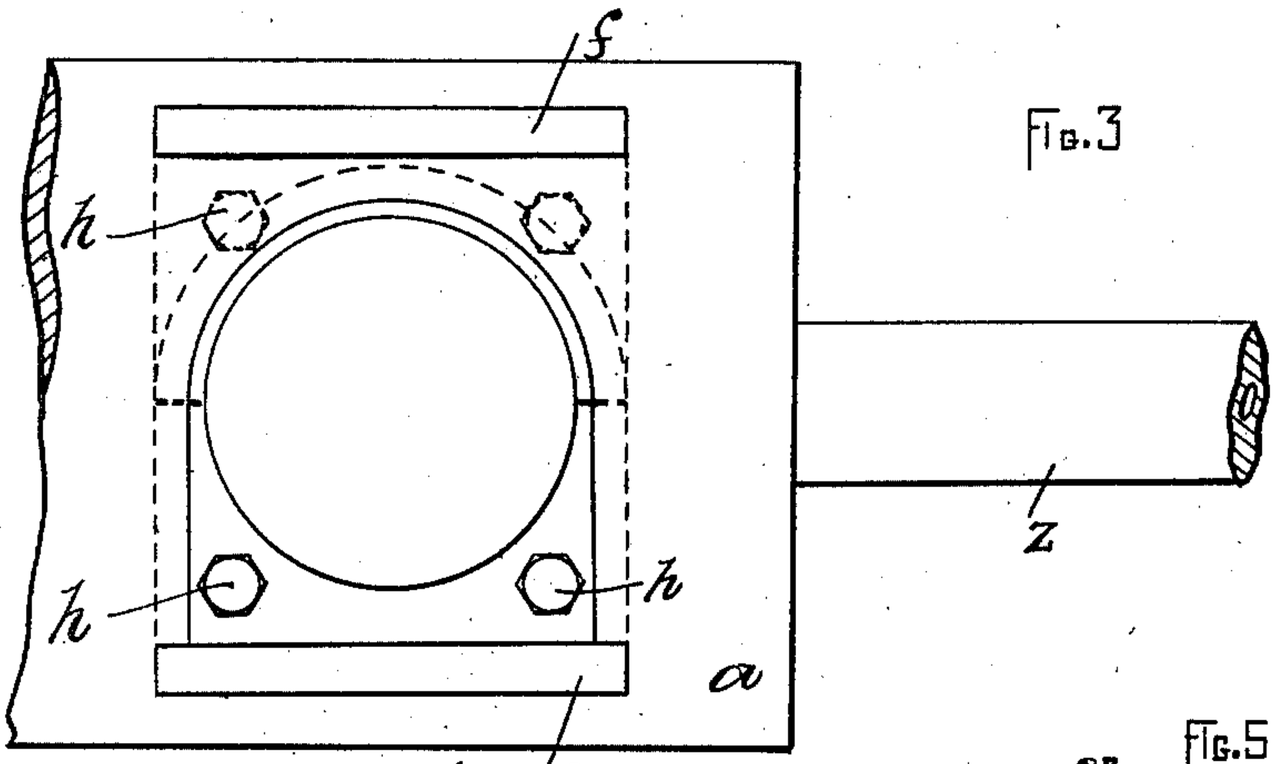


FIG. 3

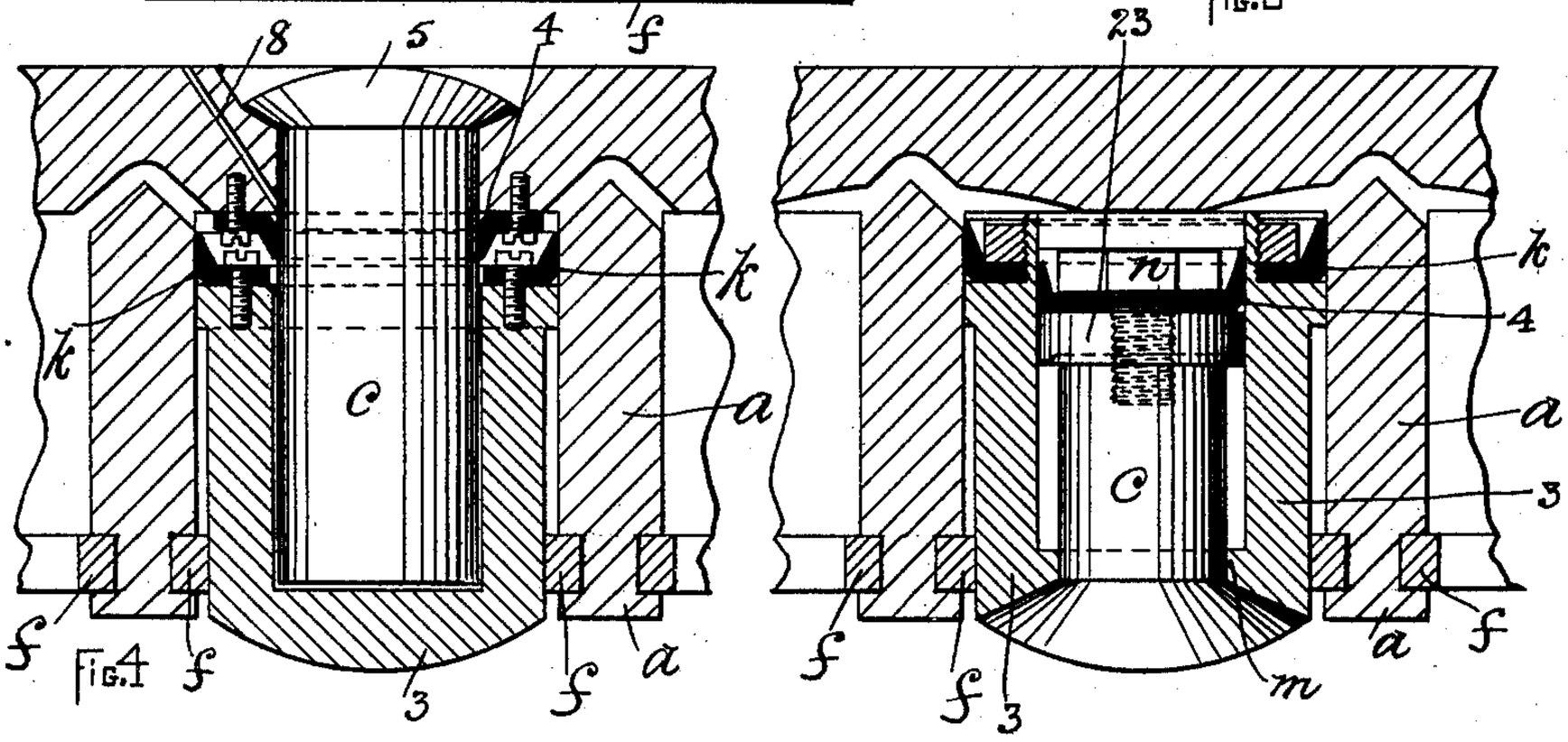


FIG. 4

FIG. 5

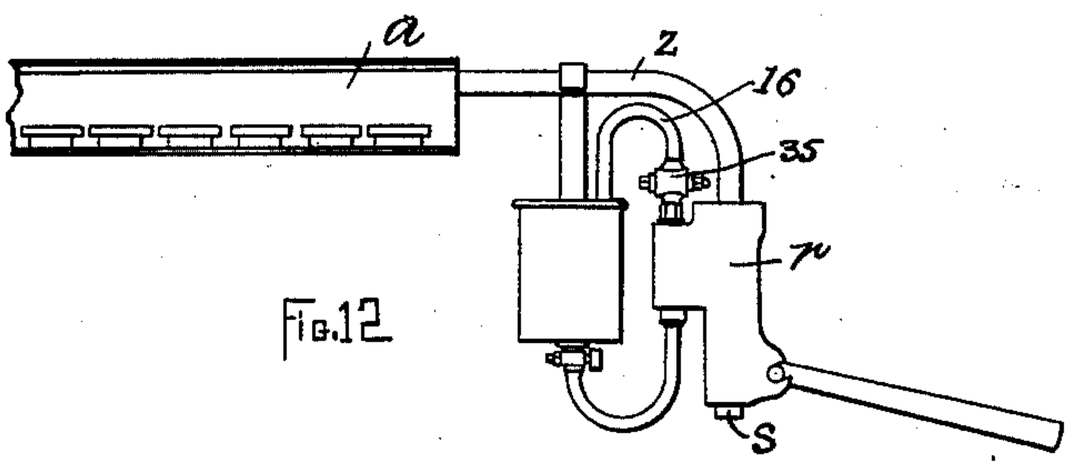
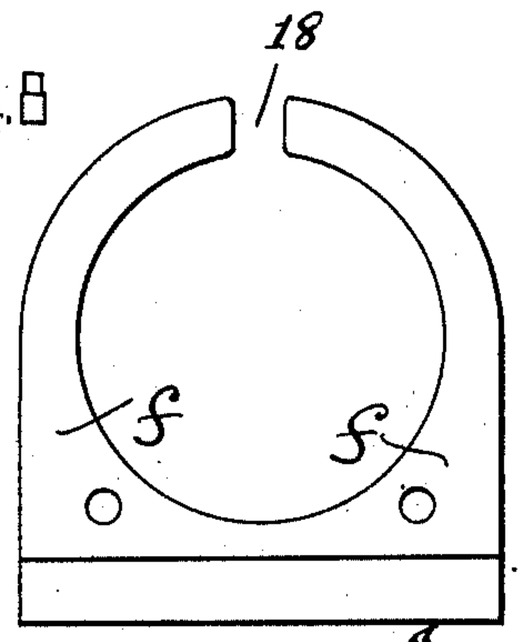


FIG. 12

FIG. 8



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 11

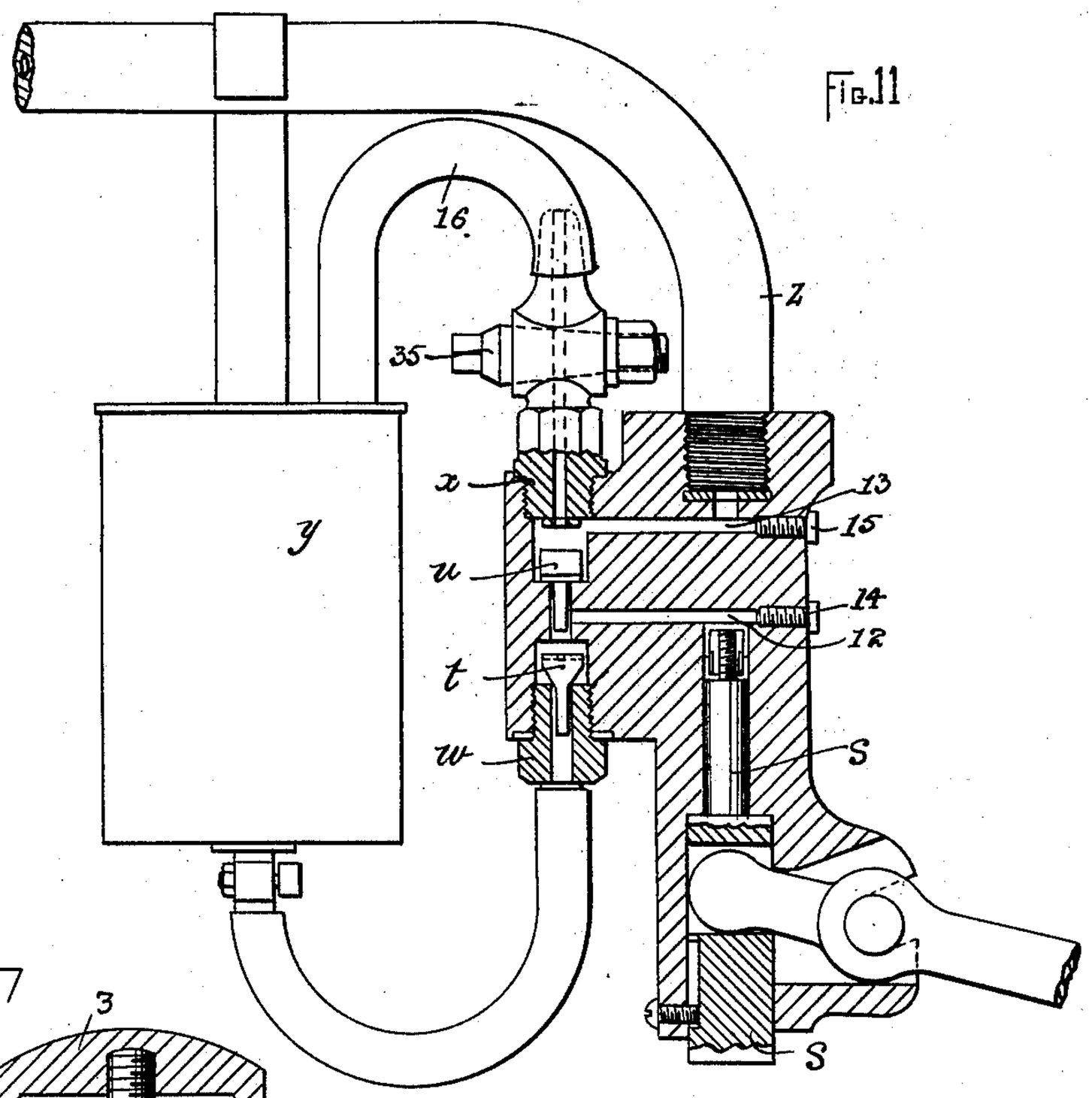


Fig. 7

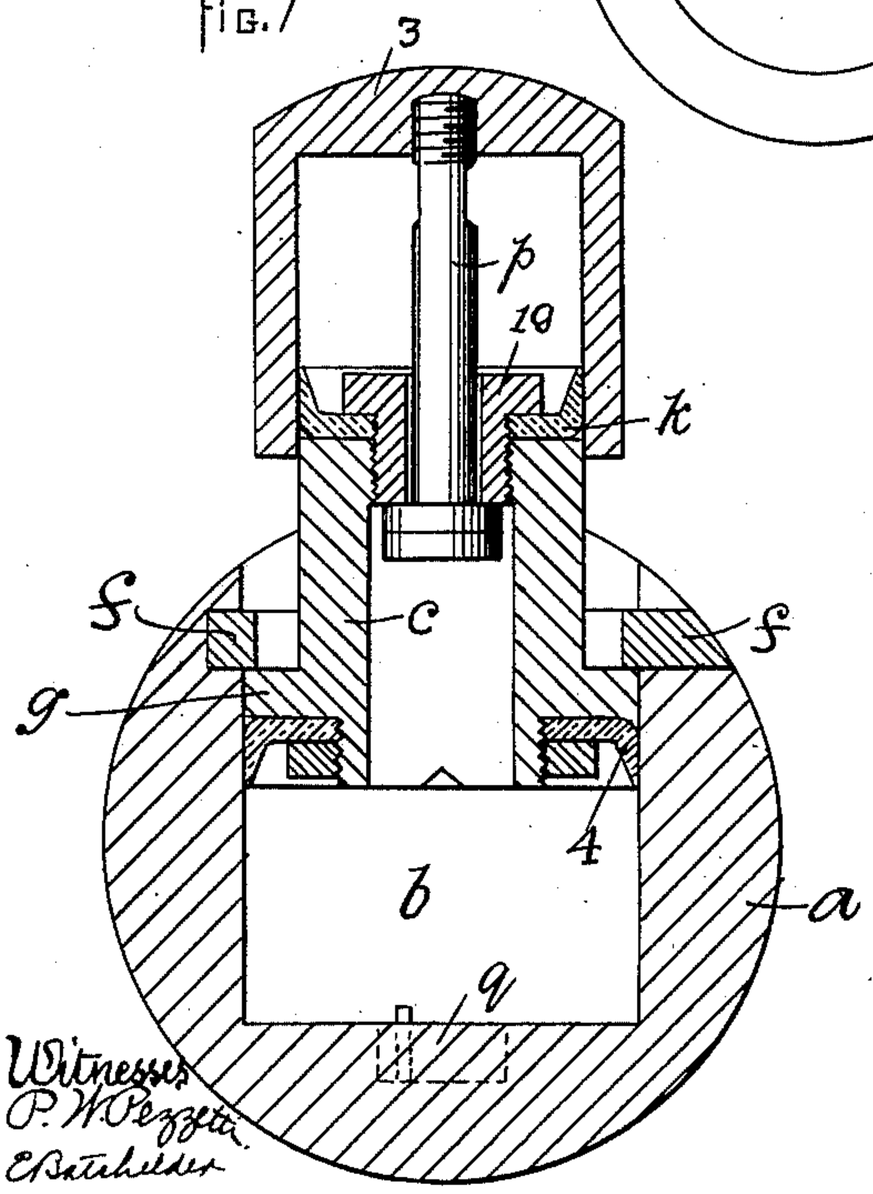
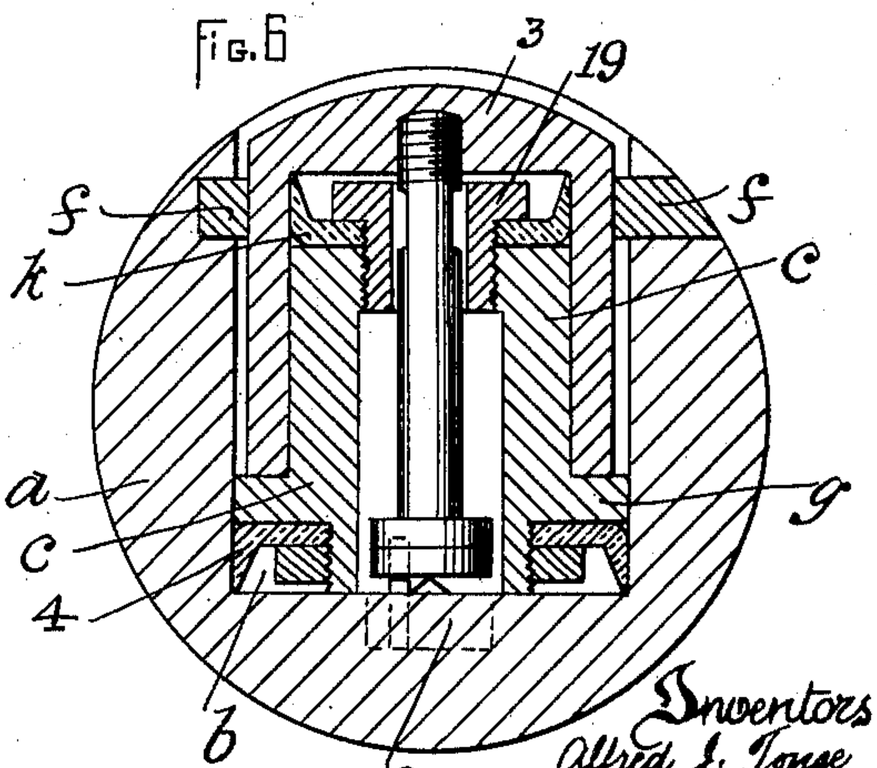


Fig. 6



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NO MODEL. 4 SHEETS—SHEET 4.

FIG. 9

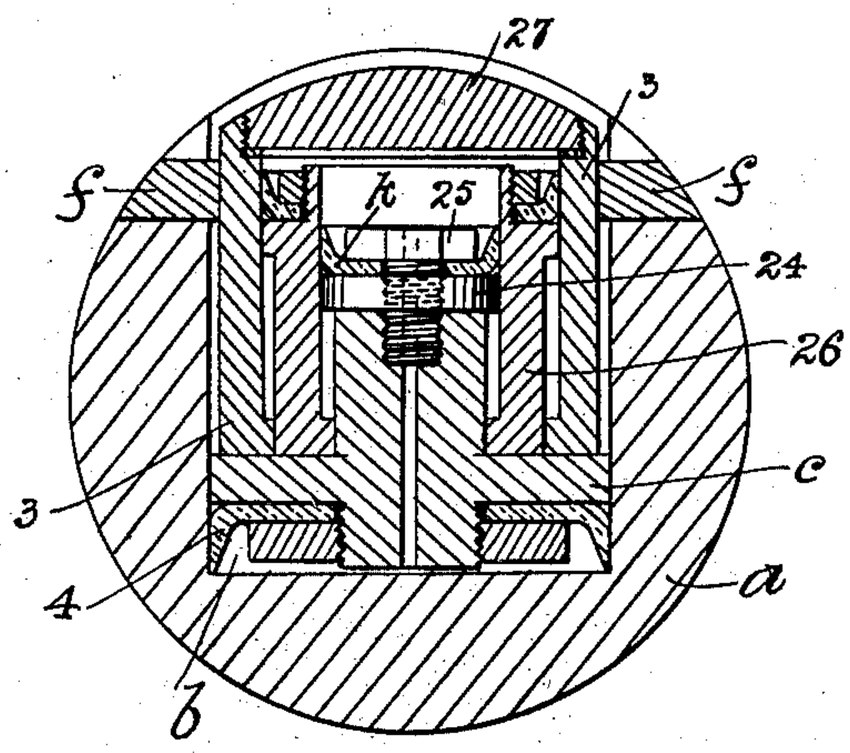
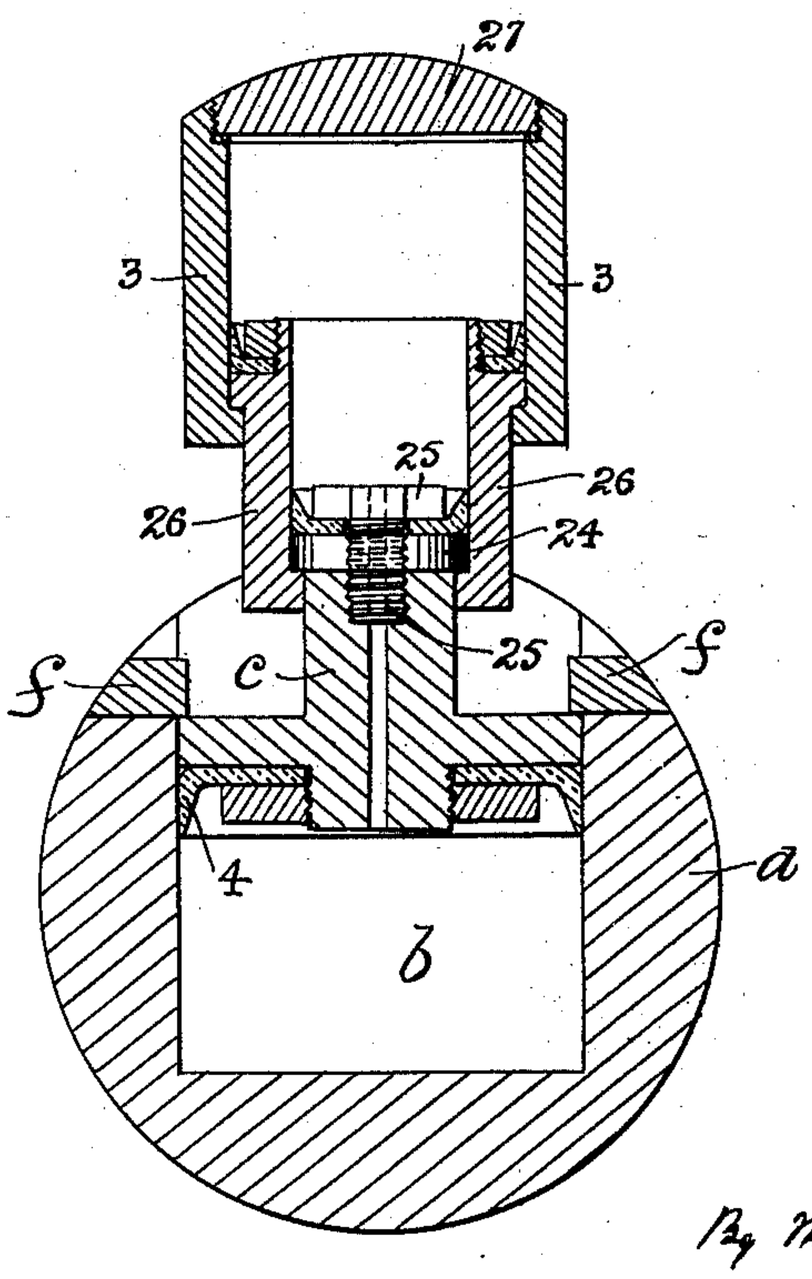


FIG. 10



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No. 756,738. Patented April 5, 1904.

UNITED STATES PATENT OFFICE.

ALFRED JOSEPH TONGE, OF CHEQUERBENT, NEAR BOLTON, JAMES TONGE, JR., OF WESTHOUGHTON, NEAR BOLTON, AND ELAM EAVES, OF STOCKPORT, ENGLAND.

HYDRAULIC PRESS FOR MINING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 756,738, dated April 5, 1904.

Application filed May 2, 1903. Serial No. 155,259. (No model.)

To all whom it may concern:

Be it known that we, ALFRED JOSEPH TONGE, of Chequerbent, near Bolton, JAMES TONGE, Jr., of Westhoughton, near Bolton, county of Lancaster, and ELAM EAVES, of 96 Chatham street, Stockport, county of Chester, England, all subjects of the King of Great Britain, have invented certain new and useful Improvements in Hydraulic Presses for Mining Purposes, of which the following description is a specification.

The class or type of hydraulic presses and pumps to which our invention more particularly relates is that for use in the "breaking down" of coal or the like after same has been undermined or otherwise previously prepared; and our said invention consists in so constructing said presses and pumps that they are enabled to perform the functions desired of them efficiently and to withstand the extreme pressures and forces to which they are subjected, while all or any of their operating parts are within easy access of the user to facilitate displacement for repairs or otherwise, as may be found necessary. To attain this object, we follow the method of constructing the several parts, as hereinafter described, and as illustrated by the accompanying sheets of drawings, wherein—

Figure 1 is a sectional side elevation of a portion of a bar or cylinder, showing four cavities in which pistons may be placed, one of said cavities being shown empty, the next with one part of a piston in it, and the other two with complete pistons in them, shown in sections hereinafter explained. Fig. 2 is a sectional end elevation of the cylinder with the piston it contains also in section. Fig. 3 is a bottom plan view of the modification illustrated in Fig. 4, the piston being omitted. Figs. 4 and 5 are longitudinal sections of portions of a cylinder, illustrating two forms of duplex pistons therein and the method of constructing same. Figs. 6 and 7 are transverse sectional views showing a modified form of duplex piston as within and extending from the cylinder, respectively. Fig. 8 is a drawing in detail of a part hereinafter described. Figs. 9 and 10 are sectional end elevations similar to Figs. 6 and 7, respectively, but are illustrative of our invention carried out in connection with three pistons in each cylinder. In Fig. 9 the pistons are within their cylinder, and in Fig. 10 they are shown as extending therefrom. Fig. 11 is a sectional side elevation of a pump constructed in accordance with our invention for use in connection with the devices illustrated by the other figures and is drawn to a reduced scale. Fig. 12 is an elevation, drawn to a much smaller scale, showing the pump and cylinder connected together.

Similar letters and figures of reference indicate similar parts throughout the several views.

The main body or cylindrical part *a*, in which are made the series of openings *b* for receiving the piston *c*, is of the old and well-known type of press having a series of pistons operated by water or other liquid being forced from one to another until the whole series have acted, as is well understood.

In accordance with our invention in order that each piston *c* may be secured within its cylinder independently of any of its neighboring pistons we form a groove *d* (shown in the empty opening to the left in Fig. 1) in the cylinder part *a* to surround the upper part of same, so that we may insert within it a sliding piece *f*, which has an opening to allow the smaller part of said piston to pass freely through it, while it acts as a stop-piece when the rear and enlarged end *g* thereof comes in contact with it. This sliding piece *f* we secure in position by the set-screws *h*.

To enable us to slide the piece *f* into its position for retaining the piston *c*, we make this latter so that when it is placed in position within its cylinder it is short enough (see piston to the left in Fig. 1) to allow the slide *f* to pass over it, on which its jointing-leather *k* is secured to it by the screw 2 to form a water-tight joint for the outer piston 3, which takes over it. In this manner we have a duplex piston that may be readily displaced for repairs or otherwise whenever desired, or we may employ the sliding piece *f* in conjunction

with a single piston *c*, as shown to the right on Fig. 1, in which case the outer end 22 is detachable and is screwed to the body part *c* after the same and its slide *f* have been placed in position. When we use such single pistons *c*, we may arrange them to act or extend from their cylinder *a* in a direction diametrically opposite the others or duplex pistons, in relation to which they preferably occupy alternate positions, although not shown so in the drawings. In this manner the pressure of the combined pistons is extended and exerted through a considerably-increased space.

As a modification in the formation of the pistons to those described above we follow the method of construction shown by Figs. 4 and 5, in which our simple forms are retained. In Fig. 4 the solid piston *c* takes into and operates within the hollow piston 3, which has its water-tight jointing-leather *k* secured to it to form its own joint, while the jointing-leather 4 is secured to the walls of the cylinder *a* to form the water-tight joint for the piston *c*. The piston *c* has its outer end 5 considerably larger than its body part in order to enable it to present as large a surface to the plate or substance it is pressing against as is possible. As will be seen, these pistons operate or move in opposite directions to each other, the slide *f* on one side acting as a stop-piece for the piston 3, while the opening 8 allows the water to escape, and so arrests the motion of the piston *c* when it has moved sufficiently far outward to uncover said opening 8. This arrangement and formation of the pistons *c* and 3 enables them to extend and operate through a considerable space from and beyond the cylinder *a*, and to enable the use of the slides *f* these latter are in this case made in two parts or in halves and slid into position from the opposite sides of the pistons, as shown in full and broken lines, Fig. 3. The other pistons illustrated by Fig. 5 are of a similar construction to those shown by Fig. 4, but are arranged to operate in one and the same direction, the slide *f* acting as a stop-piece for the piston 3 when it has reached the extent of its movements outwardly, while the inwardly-projecting flange *m* on said piston 3 acts as a stop-piece for the piston *c*. The inner end 23 of the piston *c* is made of increased size and is secured to the body part by its screw *n*.

When desirable, we make use of a stop-piece for the outer piston 3, as shown by Figs. 6 and 7, and this consists of the bolt *p*, which passes through, so that its head operates within the inner piston *c*, the packing-leathers *k* and 4 being secured as shown. In fixing the parts thus constructed the bolt *p* is placed within the piston *c* and made to extend through the opening therein, which is of such shape as to suit that of the bolt *p*, which is formed to pass freely through it in a longitudinal direction, but which is prevented from rotating therein. The piston *c* is then mounted in the cylinder *a*, and the outer piston 3 is screwed onto the outer and extending end of the bolt *p*, or the bolt *p* may be held against rotation by a hole being made eccentrically in its head to take over a pin mounted to enter same on the bolt's head being inserted into the recess *q*. (Shown in broken lines, Figs. 6 and 7.) In this case the sliding plate *f* may be used as a stop-piece for the piston *c*, since by having a slot 18 formed in its advancing edge (see Fig. 8) it may slide over and allow the bolt *p* to pass through it, so that it may finally be placed in its groove in the cylinder *a*, or by first placing the piston *c* in position, then sliding the plate *f* into position, and afterward inserting the bolt *p* and fixing it in position by inserting the screw 19 the outer piston 3 may be finally put into position. In this manner the slot 18 in the plate *f* is not required.

In carrying out our method of construction in connection with three pistons arranged to operate in each opening *b* we make use of our slide *f*, divided into halves, as shown by and described in connection with Fig. 3, and the inner piston *c* has its end 24 secured by the screw 25, which holds it and its leather *k*. Thus after placing the outer piston 3 over the additional piston 26 and mounting the two thus arranged over the inner piston *c* we then screw the parts 24 and 25 into position on this piston *c* and afterward cover the outer end of the piston 3 by the screwed cap 27. We then place the whole into the opening *b* and secure them therein by the plate *f*, as above described.

In constructing the pump *r* to operate in conjunction with the presses above described we make the body part for receiving the plunger or piston *s* and the valves *t* and *u* all in one piece of metal, so that the possibilities of leakage are reduced to a minimum.

The valves *t* and *u* are of easy access through the openings covered by the screwed jointing-pieces *w* and *x*, so that any repairs or renewals thereof may be readily carried out. The passages from the supply-tank *y* through the valve *t*, onto the plunger *s* through the valve *u*, and forward to the presses through the pipe *z* are arranged as shown by Fig. 11, and to form the horizontal parts 12 and 13 of said passage we bore through the body part of the pump and then fill the openings by screwed plugs 14 and 15. The other parts of the passages in which the seatings of the valves *t u* are formed are also of such shape as to facilitate their formation in the most accurate and efficient manner.

By mounting a tap or valve 35 in the part above the valve *u* and fixing a pipe 16 to lead therefrom into the tank *y* on the completion of the pumping operations to force out the pistons of the press this tap 15 may be opened to allow the water to flow back into the said tank *y*.

Having now particularly described and ascertained the nature of our said invention and in what manner the same has to be performed, we declare that what we claim is—

1. A hydraulic press comprising a body having a series of cylinders, pistons operatively mounted in said cylinders, means for forcing fluid to operate said pistons, and pieces slidingly mounted in said cylinders and adapted to limit the outward movement of said pistons.

2. A hydraulic press comprising a body provided with cylinders, pistons working in said cylinders and formed of a plurality of members operating within and upon each other, means for forcing fluid to operate said pistons, and a stop-plate slidingly mounted within a groove in the walls of each cylinder and adapted to limit the outward movement of said pistons.

3. A hydraulic press comprising a body provided with oppositely-arranged cylinders, pistons mounted in said cylinders and pieces slidingly mounted in said cylinders and adapted to limit the outward movement of said pistons.

4. A hydraulic press comprising a body provided with cylinders, pistons arranged to operate in said cylinders, stop-plates formed in sections and slidingly mounted in said cylinders, and means for supplying fluid under pressure to said cylinders.

5. A hydraulic press comprising a body provided with cylinders, pistons mounted in said cylinders, said pistons having heads of increased size, means for supplying fluid under pressure to said pistons, and removable plates adapted to limit the movement of said pistons.

6. A hydraulic press comprising a body provided with cylinders, pistons mounted in said cylinders and formed of a plurality of members, a plate slidingly mounted in each cylinder and adapted to limit the outward movement of one member of said pistons, means for limiting the outward movement of the other members of said pistons, and means for supplying fluid under pressure to said cylinders.

7. A hydraulic press comprising a body provided with cylinders, triple pistons mounted in said cylinders, removable plates adapted to limit the movement of said pistons, and means for supplying fluid under pressure to said pistons.

In testimony whereof we have affixed our signatures in presence of two witnesses.

ALFRED JOSEPH TONGE.
JAMES TONGE, JUNIOR.
ELAM EAVES.

Witnesses:
JOHN WHITEHEAD,
SAMUEL HEY.