

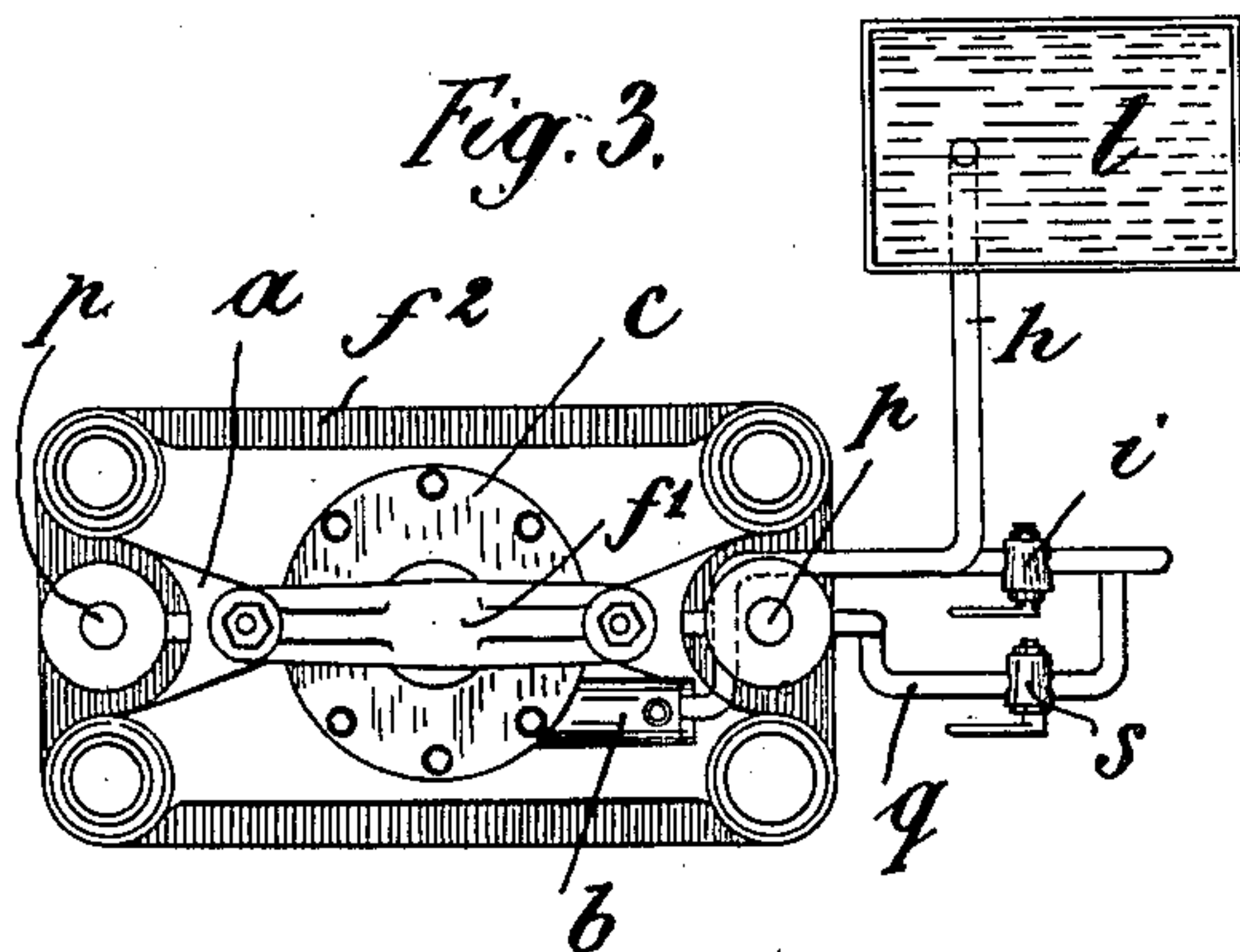
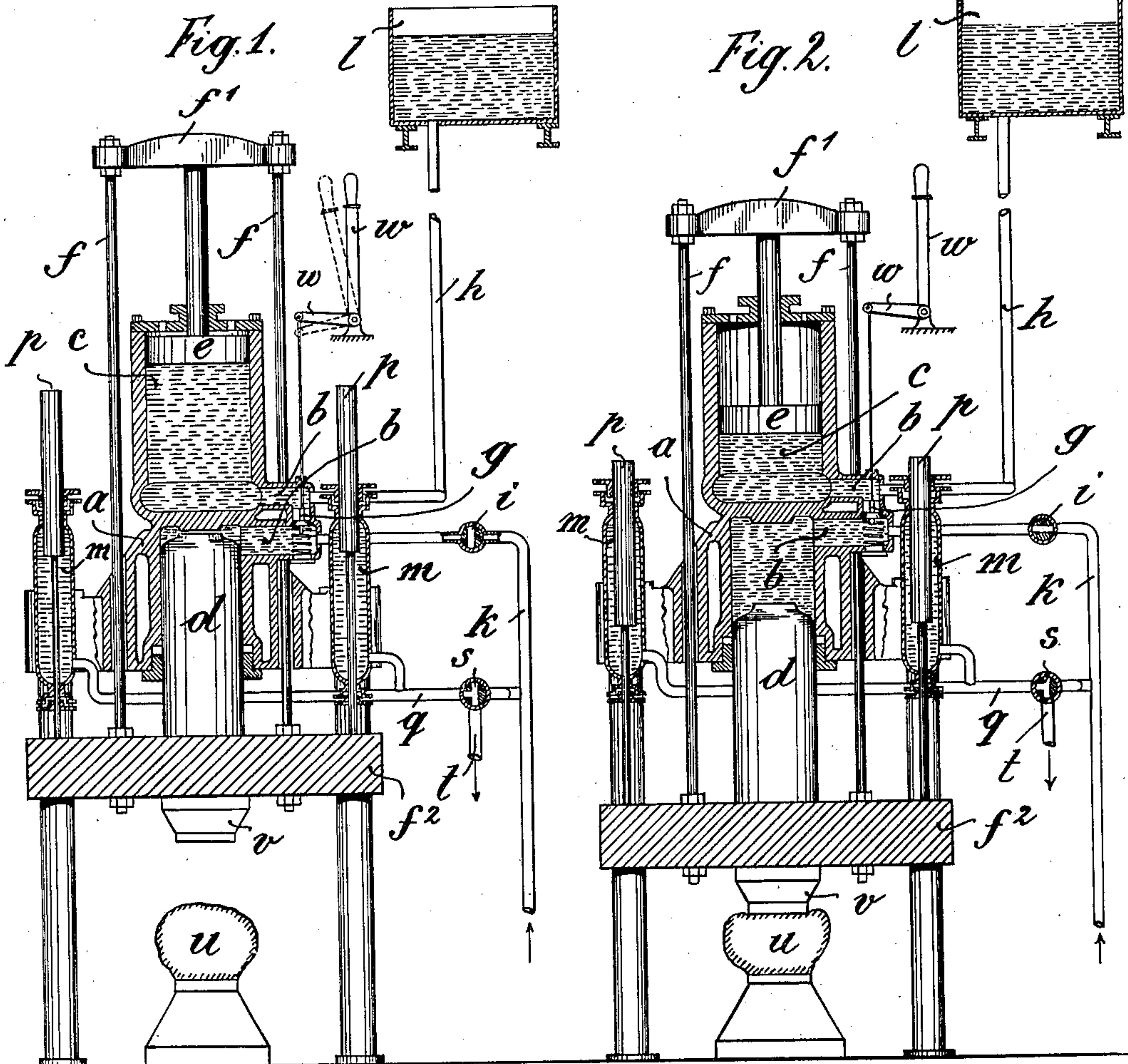
No. 860,958.

PATENTED JULY 23, 1907.

W. ASTFALCK.
HYDRAULIC PRESS.

APPLICATION FILED OCT. 19, 1906.

2 SHEETS—SHEET 1.



Witnesses
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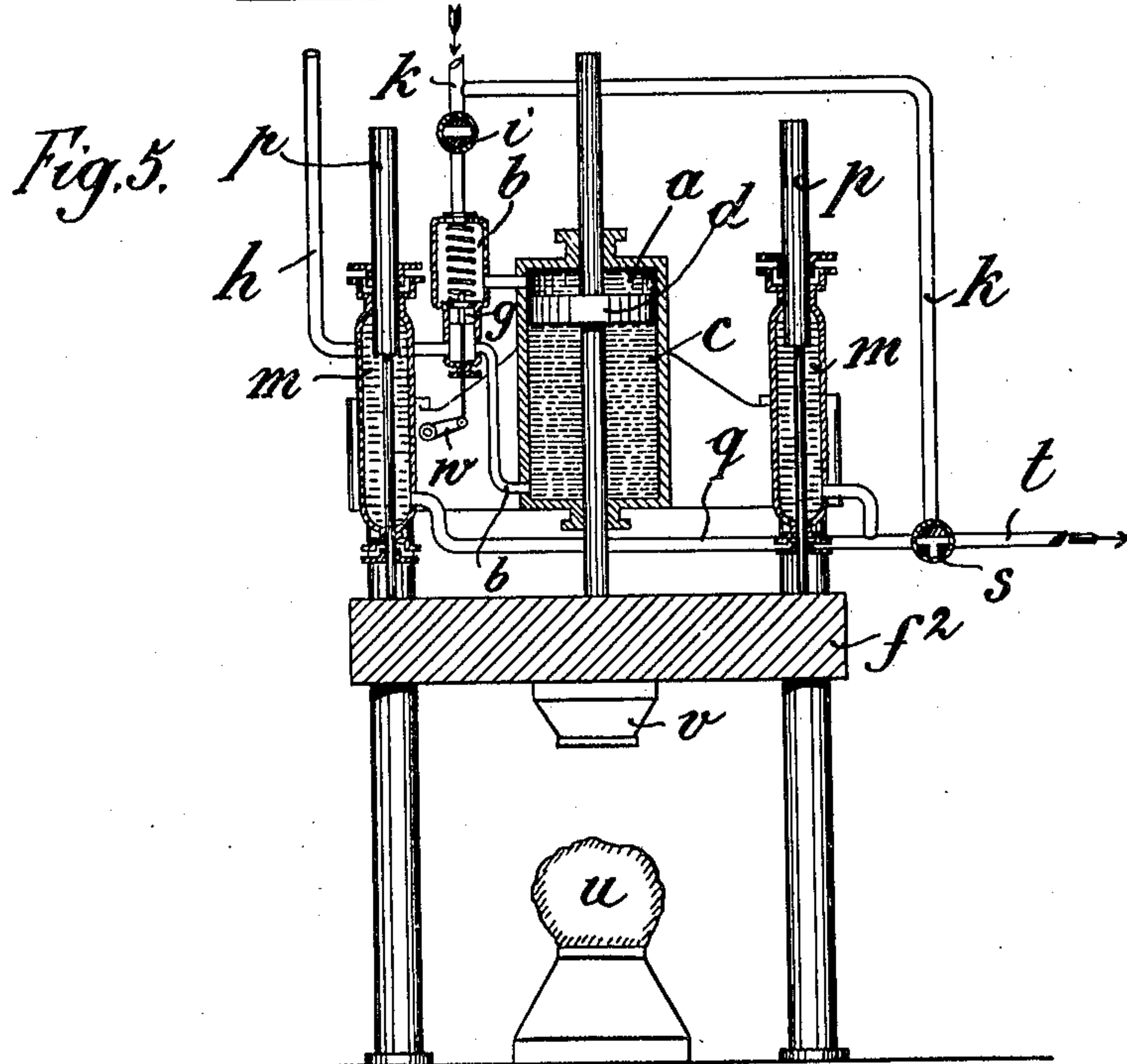
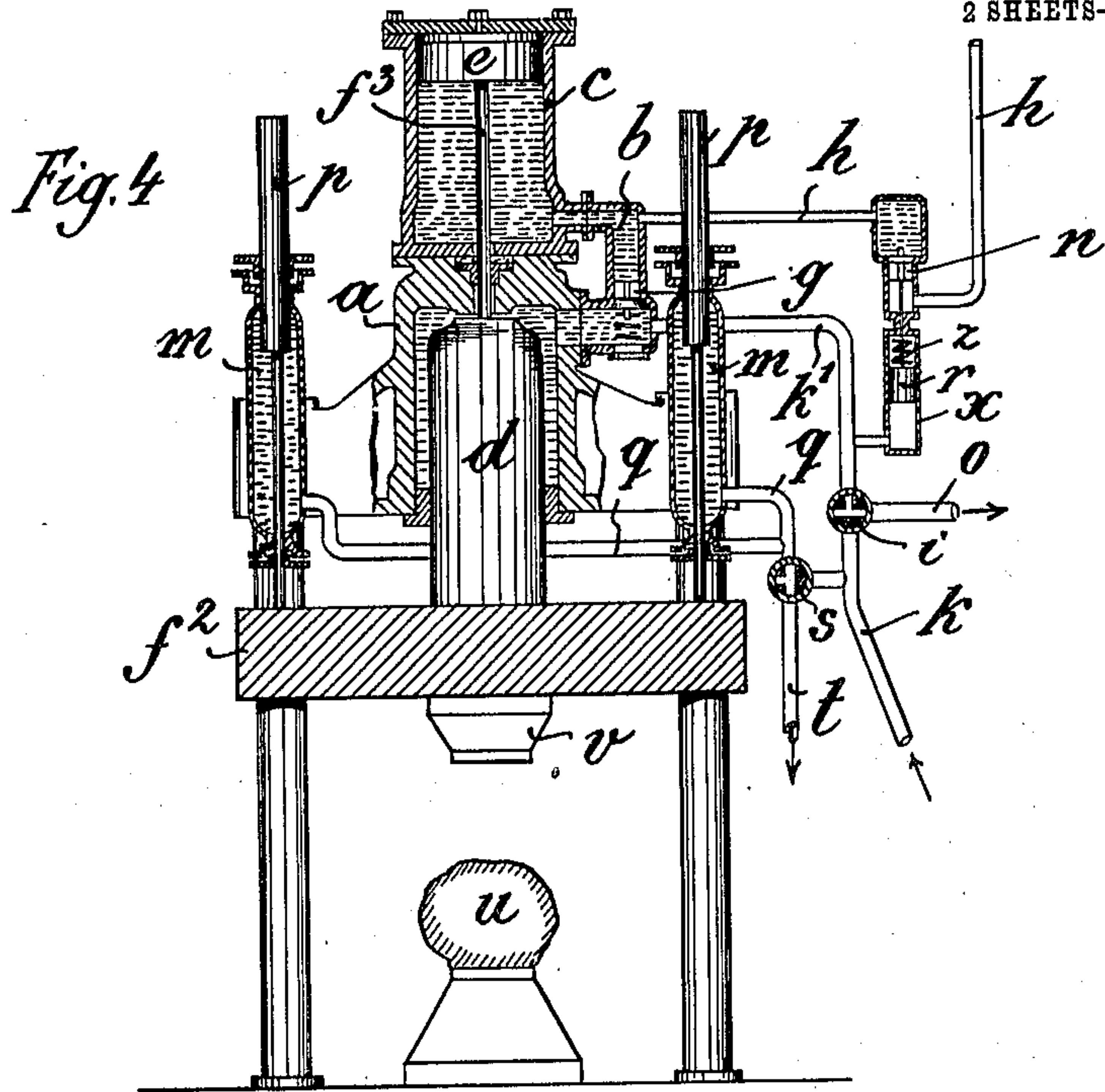
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILAND ASTFALCK, OF TEGEL, NEAR BERLIN, GERMANY.

HYDRAULIC PRESS.

No. 860,958.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed October 19, 1906. Serial No. 339,704.

To all whom it may concern:

Be it known that I, WILAND ASTFALCK, a citizen of the German Empire, and a resident of Tegel, near Berlin, Germany, have invented certain new and useful
5 Improvements in Hydraulic Presses, of which the following is a specification.

This invention relates to an apparatus for filling and discharging the press cylinder or cylinders of hydraulic presses under pressure.

10 In my improved apparatus the feed water for the press cylinder is taken directly from a separate supply cylinder having a piston which is geared with the hydraulic piston, and when the pressing operation is completed the feed water is returned to the supply cylinder to be used over again. During the idle motion of the hydraulic piston the feed water will thus be forced by the piston of the supply cylinder into the press cylinder, which action may be assisted by a suction action of the hydraulic piston, and during the return move-
15 ment of the hydraulic piston the feed water is displaced by the same and sometimes drawn in by the supply piston.

In order to provide for losses of water arising, for instance, from leakage, the supply piston may have a
25 somewhat larger diameter and the supply cylinder be connected to a vessel for the water under pressure, so that the supply piston will displace or draw in more than the press cylinder is capable of receiving or discharging and the difference will be returned to or withdrawn from the said vessel under corresponding pressure.

The respective cutting-off members may act automatically or be operated positively each for itself and partly by mechanical means and partly by a liquid
35 pressure medium, or however all the cutting-off members may be operated positively from one source, if desired. The construction and operation of the controlling members have therefore no bearing on the gist of the present invention.

40 The accompanying drawing shows by way of example some constructional forms of a hydraulic press with the hereindescribed improvement.

Figures 1 and 2 are longitudinal sections of such a press in two different working positions. Fig. 3 is a
45 plan and Figs. 4 and 5 are longitudinal sections of two other forms of construction.

Similar letters refer to similar parts throughout the several views.

According to the construction shown in Figs. 1 to 3,
50 the hydraulic press cylinder *a* communicates through a channel *b* with a superposed supply cylinder *c*. Both pistons *d* and *e* are connected by rods *f*, secured to the traverse or yoke *f'* of the piston *e* on the one hand and

to the press plate *f*² of the piston *d* on the other. There is arranged in the channel *b* an outwardly positively
55 operated valve *g* which opens towards the hydraulic press cylinder. Further, a pipe *h* leading to the vessel *l* for the water under pressure branches from the channel on the one hand and on the other hand a high pressure pipe *k* adapted to be closed by a controlling mem-
60 ber *i*. The return or upward movement of the parts *f*¹ *f*² with the two pistons *e* *d* is effected by the return cylinders *m*, the pistons *p* moving therein being connected to the press plate *f*². Both return-cylinders communicate on the one hand with the high pressure
65 pipe *k* through a pipe *q* and a controlling member *s* and on the other hand with the discharge pipe *t*. If the controlling member *s* is in the position as indicated in Fig. 1 and consequently the pipe *q* in communication with the pipe *t*, the water can then pass out of the
70 return-cylinders and the press piston with the supply piston and the rods can perform its downward movement, as the gravity of these parts is sufficient for producing the said motion. The downward movement of these parts takes place to such an extent as is permitted
75 by the compactness of the work *u* to be acted on by the press-ram *v*. Fig. 2 shows this position. During this downward movement, the piston *e* acts as plunger and forces the fluid contained in the cylinder *c* through the channel *b* and the opened valve *g* into the press cylinder
80 *a*. The valve *g* is opened for instance by a hand lever *w*. If the piston *e* is larger than the piston *d*, the surplus of the fluid then escapes through the pipe *h* into the vessel *l*. During this action, the high pressure pipe *k* must, of course, be closed by the controlling member
85 *i*. When the filling of the press cylinder is finished, the controlling member *i* will be opened (Fig. 2) but the controlling member *g* previously closed; the controlling member *s* remains open. The water under pressure fed through the pipe *k* and entering the press cylinder *a* is
90 now effective and forces the press piston *d* downwards to such an extent that the desired pressure of the work or blank *u* takes place. The supply piston *e* also takes part in the movement of the press piston; the water displaced from the cylinder *c* may however enter the
95 vessel *l*.

When the pressing operation is finished, the controlling member *i* will assume the position indicated in Fig. 1, the controlling member *g* will be opened and the controlling member *s* so adjusted that the water under
100 high pressure can pass through the pipe *q* into the return-cylinder *m* so as to move the return-piston *p* with the press ram and supply piston *e* upwards. The water displaced by the press piston enters the cylinder *c*. As however the piston *e* leaves more space than this
105 fluid can occupy, the wanting fluid may be supplied

from the vessel *l*. If a separate vessel is not provided, the pistons *d*, *e* should then have the same diameter in order that the displaced fluid will exactly conform with that supplied. For practical reasons, a rising pipe *h* will however always be provided, in which a liquid column of a certain pressure is contained so as to counterbalance the unavoidable differences in the quantities or volumes of water.

In the construction according to Fig. 4, the two pistons *d*, *e* are directly connected by a rod *f*³ arranged within the cylinders *a*, *c*. If a simple back pressure valve is used instead of the controlled valve *g*, the controlling member *i* should then be provided with a branch pipe *o* and a valve *n* inserted in the rising pipe *h*, said valve *n* being regulated during the pressing operation so as to enable a discharge of the water displaced by the piston *e* in the cylinder *c*. This valve *n* may be of such a construction that it will open automatically during the upward stroke of the piston *e*, but be opened and kept open during the pressing operation by a piston *r* arranged in the cylinder *x* communicating with the high pressure pipe. If in this form of construction the press piston *d* is moved downwards, the piston *e* will then force the water contained in *c* through the valve *g* into the cylinder *a*. If the press piston is moved upwards, the controlling member *i* should then be previously adjusted in such a manner that the pipe *k*¹ communicates with the pipe *o* and the water displaced by the press piston may be discharged through *o*. The piston *e* however simultaneously draws a fresh quantity of water from the rising pipe *h* through the valve *n*, which automatically closes under the action of a spring *z*.

In the form of construction according to Fig. 5, one single cylinder is provided which acts on the side *c* as a supply cylinder and on the side *a* as a press cylinder. Consequently, there is but one piston provided. The two cylinder halves likewise communicate with each other through a channel and pipe *b* respectively. There is also inserted in this channel a valve *g* adapted to be regulated outwardly by means of lever mechanism *w*. Moreover, the press shows the same peculiar features as the other forms of constructions.

If the press ram moves downwards, the piston forces the water contained in *c* through the opened valve *g* to *a*. Any loss of water will be replaced by the rising pipe *h*. If the chamber *a* is filled up, *g* will be closed and the controlling member *i* opened, so that the fluid can pass to *a* in order to be effective there. The water displaced from *c* during the pressing operation enters the rising pipe *h*.

I do not herein claim specifically the embodiment shown in Fig. 5 as the same forms the subject matter of a divisional application, Serial No. 368,476, filed April 16, 1907.

What I claim as my invention and desire to secure by United States Letters Patent is—

1. The combination with the press chamber, the supply chamber, and the means providing communication between said chambers, of means reciprocating in said chambers and exerting pressure on the fluid in the chambers alternately during its reciprocation to cause the fluid to pass under pressure alternately from one of said chambers to the other.

2. The combination of the press chamber, the supply chamber, the means providing communication between said chambers, the reciprocating supply and press pistons connected to move in unison and coöperating to cause the fluid to alternately pass under pressure from one of said chambers to the other when the pistons move to and from pressing position, and means for supplying pressure to the fluid to act on the driving face of the press piston when the pistons have reached pressing position.

3. In an apparatus of the character described, the combination with the press-cylinder and the press-piston working therein, of a supply cylinder, means providing communication between the press-cylinder and the supply cylinder, a supply piston working in the supply cylinder, means connecting the supply piston to the press-piston to cause them to move in unison whereby the down-stroke of the press-piston causes the supply-piston to force fluid under pressure from the supply cylinder to the press-cylinder and the up-stroke of the press-piston forces the fluid back to the supply-cylinder, and means for supplying pressure to the fluid in the press-cylinder when the press-piston has reached pressing position.

4. In an apparatus of the character described, the combination with the press-cylinder and the press-piston working therein, of a supply cylinder having a piston, means providing communication between the press-cylinder and the supply cylinder, connection between the press-piston and the supply piston whereby the down-stroke of the press-piston causes fluid to pass under pressure from the supply cylinder to the press-cylinder and the up-stroke of the press-piston causes the fluid to flow back to the supply cylinder, and means for supplying pressure to the fluid in the press-cylinder when the press-piston has reached pressing position.

5. In an apparatus of the character described, the combination with the press-cylinder and the press-piston working therein, of a supply cylinder of a diameter different from that of the press-cylinder, means providing communication between the press-cylinder and the supply cylinder, a supply piston working in the supply cylinder, means connecting the supply-piston to the press-piston to cause the pistons to move in unison whereby the down-stroke of the press-piston causes the supply piston to force fluid under pressure from the supply cylinder to the press-cylinder and the up-stroke of the press-piston forces fluid from the press-cylinder to the supply cylinder, means for receiving from or supplying to the cylinders the excess or shortage of fluid caused by the difference in diameter of the cylinders, and means for supplying pressure to the fluid in the press-cylinder when the press-piston has reached pressing position.

The foregoing specification signed at Berlin this sixth day of October 1906.

WILAND ASTFALCK.

In presence of—
WOLDEMAR HAUPT.
HENRY HASPER.