

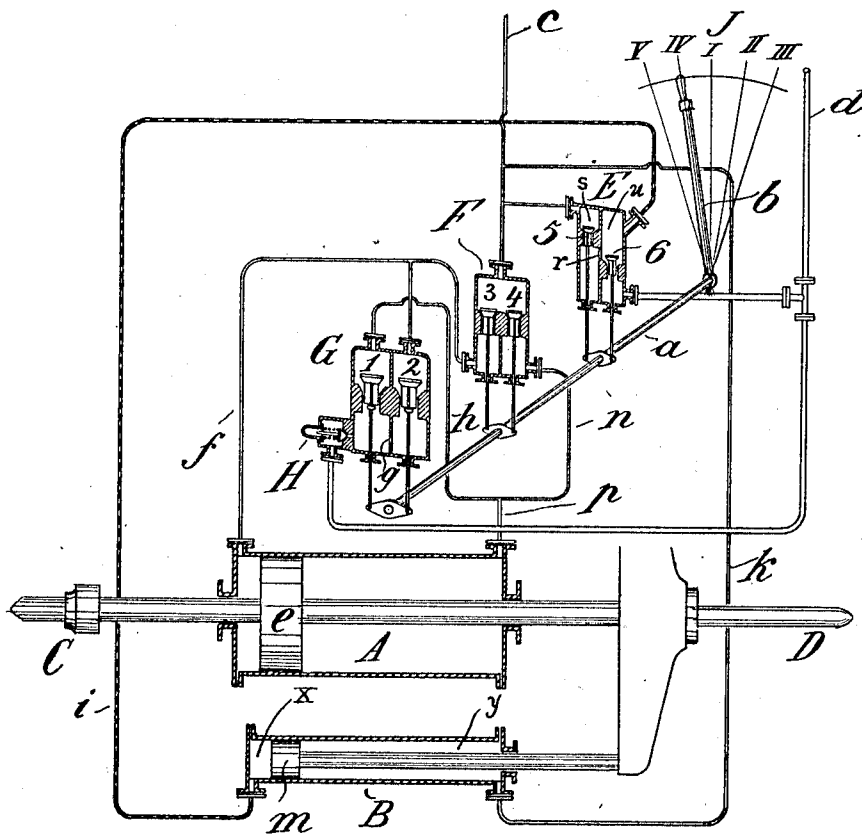
W. ASTFALCK.
HYDRAULIC PRESS.
APPLICATION FILED MAY 7, 1909.

1,020,176.

Patented Mar. 12, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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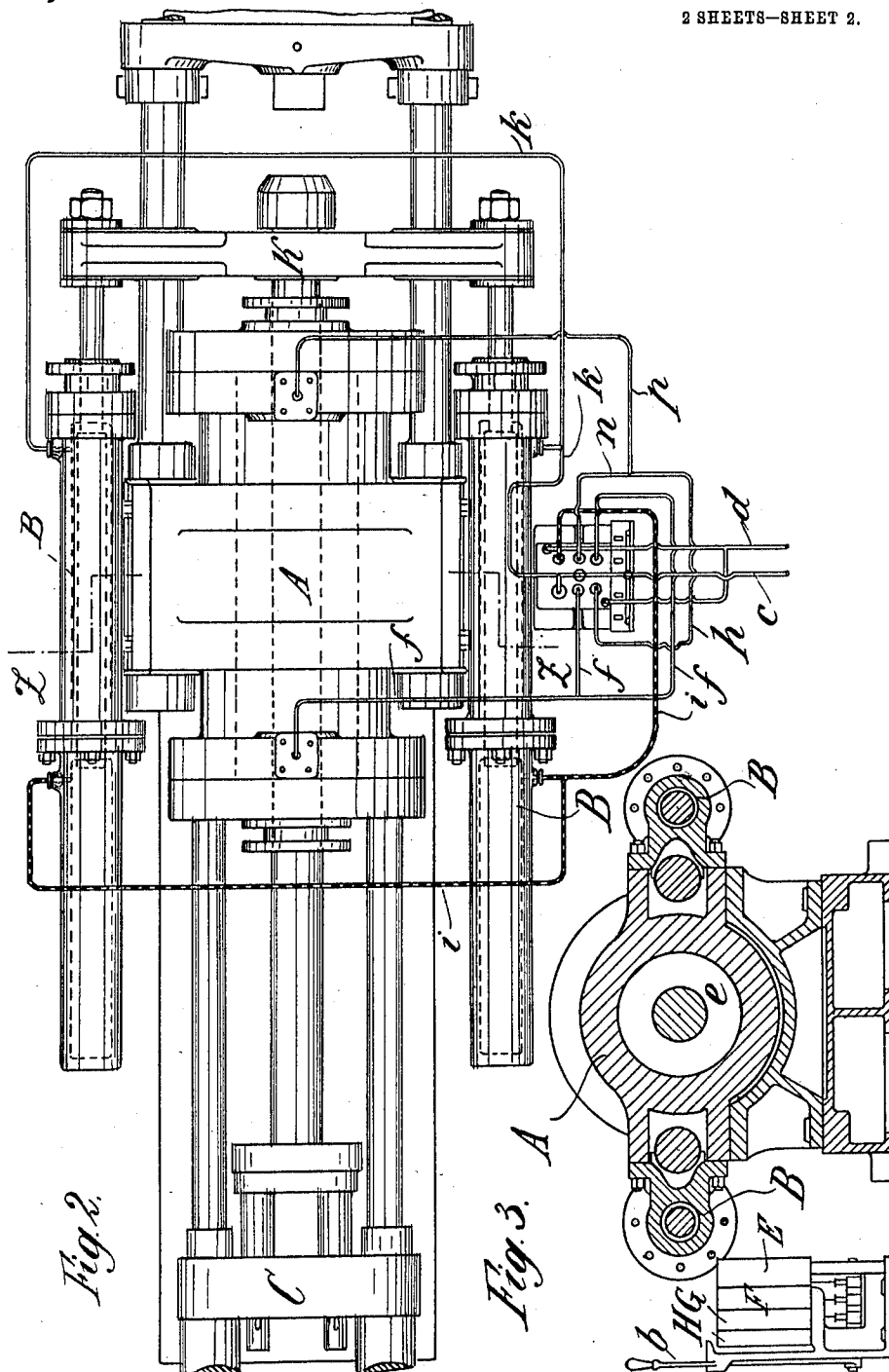
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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HYDRAULIC PRESS.

1,020,176.

Specification of Letters Patent.

Patented Mar. 12, 1912.

Application filed May 7, 1909. Serial No. 494,657.

To all whom it may concern:

Be it known that I, WILAND ASTFALCK, engineer, a subject of the German Emperor, and resident of No. 21 Schloss-strasse, Tegel, near Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a specification.

This invention relates to improvements in the apparatus described in the specifications of my previous Letters Patent Nos. 860958 and 871078, and consists in adapting such apparatus to double-acting presses, that is to say, to presses acting in two opposite directions, with a double acting pressure-cylinder. If the press has two single acting pressure-cylinders the construction shown in the aforesaid Letters Patents can be used, but not if a double-acting pressure-cylinder is to be used since in the latter case each cylinder-space must act alternately as a pump and a press. A separate circulating conduit and valve-controlling device are therefore required, as was also shown in the Patent 871078.

In the annexed drawing Figure 1 diagrammatically illustrates the arrangement of the several parts of a double-acting press of this kind. Fig. 2 shows an example of the press in plan-view; and Fig. 3 is a transverse sectional view of Fig. 2 on the line 2-2.

The illustrated press is a horizontal press.

In the drawing A is the pressure cylinder containing piston *e*, B an auxiliary cylinder containing piston *m*, E the controlling device for the latter, F the high pressure controlling device, G the filling (or circulating) controlling device and H the over-flow valve.

C and D are the tools or tool-holders.

There may of course be more than one cylinder B, connected by a cross-head K as in Fig. 2.

The controlling devices G, F and E each consist of two valves 1 and 2, 3 and 4, 5 and 6 respectively; and in the example shown these are operated by rod and lever mechanism *a*, *b* common to all.

J is the operating diagram relating to lever *b* in which the references I to V indicate the positions of the lever for stationary pressure-piston, preliminary pressure, and final pressing pressure, on left and right.

c is the pressure conduit and *d* the discharge.

The valves 1 to 6 (which may of course also be in the form of slides) assume for example the following positions:

I. Stationary pressure piston.	II. Preliminary pressure (right).	III. Pressing (right).	IV. Preliminary left.	V. Pressing left.	
1 open.	1 open.	1 open.	1 open.	1 closed.	60
2 do.	2 do.	2 closed.	2 do.	2 open.	
3 closed.	3 closed.	3 open.	3 closed.	3 closed.	
4 do.	4 do.	4 closed.	4 do.	4 open.	
5 do.	5 open.	5 open.	5 do.	5 closed.	65
6 do.	6 closed.	6 closed.	6 open.	6 open.	

If for example lever *b* is moved to position IV the water in the left hand space of cylinder B can flow through pipe *i* valve 6 to discharge *d*, and pressure water from conduits *c* and *k* can move piston *m* in the auxiliary cylinder B to the left, the pressure piston *e* taking part in the movement. The said piston *e* forces the water on the left hand side of cylinder A through pipe *f*, valve 2, port *g*, valve 1 and pipes *h* and *p* to the right hand side of cylinder A. If then the lever *b* is moved to position V the high pressure water continues to act on the right of auxiliary cylinder B but also flows through valve 4 and pipes *n*, *p* to the right hand side of cylinder A. The water forced by the piston *e* during the pressing operation passes through pipe *f*, valve 2, port *g* and overflow valve H to discharge *d*. The said valve H may be opened otherwise than by overflow water, for example positively similarly to the valves 1 and 2.

The positions II and III of the lever *b* serve for the opposite movement of the pressure piston. The lefthand side of cylinder A then acts as the pressure chamber and the right hand side as the discharging chamber.

If valve 6 is closed and valve 5 opened, as in positions I, II and III of the lever *b*, the pressure water flows from the pipe *c* into the valve chamber *s*, through the open valve 5, the port *r*, valve chamber *u*, and pipe *i*, into the cylinder space *x*. As pressure upon the left of piston *m* is greater than that upon its opposite side, the piston *m* will be forced to the right. The water standing in the space *y* will be forced through the pipe *k* into the pressure pipe *c*. Should lever *b* be so displaced that valve 5 is closed and valve 6 opened as shown in Fig. 1, then the water will flow from *x* through pipe *i*, valve chamber *u* and valve 6, into pipe *d*, and escape.

The pressure water now found in space *y* displaces the piston *m* toward the left.

Having now described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. The combination of a press cylinder having a piston, a piston rod extending on both sides of said piston and provided with a die at each end, an auxiliary cylinder having a piston, a piston rod of large cross section relative to the cylindrical diameter of said auxiliary cylinder piston to provide unequal pressure surface on the front and back surfaces of the pistons, means affording communication between the chambers to either side of the pistons in their respective cylinders, a source of supply and an outlet for the cylinders, and means constructed to permit of the two chambers of the press cylinder to act alternately as a pressure space and a compress said cylinders being horizontally disposed.

2. The combination of a press cylinder having a piston, a piston rod extending on both sides of said piston and provided with a die at each end, an auxiliary cylinder having a piston, a piston rod of large cross section relative to the cylindrical diameter of said auxiliary cylinder piston to provide unequal pressure surface on the front and back surfaces of the pistons, means affording communication between the chambers to either side of the pistons in their respective cylinders, a source of supply and an outlet for the cylinders, means constructed to permit of the two chambers of the auxiliary cylinder to act alternately as a preliminary compress, and means constructed to permit of the two chambers of the press cylinder to act alternately as a pressure space and a compress said cylinders being horizontally disposed.

3. The combination of a press cylinder having a piston, an auxiliary cylinder having a piston, a piston rod of large cross section relative to the cylindrical diameter of said auxiliary cylinder piston to provide unequal pressure surface on the front and back surfaces of the pistons, a conduit from a source of supply and an outlet for the cylinders, conduits affording communication between the chambers to either side of the pistons in their respective cylinders, valves in said conduits, and means for actuating said valves, said means effecting on a partial movement in one direction to bring the auxiliary cylinder into action as a preliminary compress and on continued movement in the same direction to bring the cylinder of the press piston into action as a compress, and on a like reverse movement thereof to effect the aforesaid cycle in opposite direction.

4. The combination of a press cylinder having a piston, a piston rod extending on

both sides of said piston and provided with a die at each end, an auxiliary cylinder having a piston, a piston rod of large cross section relative to the cylindrical diameter of said auxiliary cylinder piston to provide unequal pressure surface on the front and back surfaces of the pistons, means affording communication between the chambers to either side of the pistons in their respective cylinders, a source of supply and an outlet for the cylinders, means permitting of the two chambers of the auxiliary cylinder to act alternately as a preliminary compress, means permitting of the two chambers of the press cylinder to act finally and alternately as a pressure space and a compress, and selective means for controlling the supply of fluid to and from said cylinders, said cylinders being horizontally disposed.

5. The combination of a press cylinder having a piston, auxiliary cylinders having pistons, said auxiliary cylinder pistons having piston rods of large cross section relative to the cylindrical diameter of said pistons to provide unequal pressure surface on the front and back surfaces of the several pistons, conduits affording communication between the chambers to either side of the pistons in their respective cylinders, a conduit from a source of pressure supply and outlets for the cylinders, a plurality of valves in said conduits constructed to permit of the opposed chambers of the auxiliary cylinders to act alternately as a preliminary compress, and permitting of the chambers of the press cylinder to act finally and alternately as a pressure space and a compress, and manually operable selective means for actuating said valves.

6. The combination of a press cylinder having a piston, auxiliary cylinders having pistons, said auxiliary cylinder pistons having piston rods of large cross section relative to the cylindrical diameter of said pistons to provide unequal pressure surface on the front and back surfaces of the several pistons, conduits from a source of pressure supply and outlets for the cylinders, conduits affording communication between the chambers to either side of the pistons in their respective cylinders, a plurality of sets of valves arranged in pairs, and an operative mechanism common to all of said valves; said mechanism when moved in one direction adapted to actuate one pair of the valves and permit of fluid to enter one chamber of the auxiliary cylinder and bring the piston thereof into action as a preliminary compress, the further movement of said mechanism actuating another pair of the valves and permitting fluid to enter one side of the press cylinder and an increase of flow of fluid into said auxiliary cylinder and bring both pistons into action as a final compress, and the reverse movement of said ac-

tuating mechanism effecting a like operation in the cylinders in the reverse direction.

7. In a horizontal, hydraulic press, the combination with a press cylinder, having a double acting piston and a through going piston rod; of auxiliary cylinders having a piston and rod each; firm connections between said through going piston rod and said auxiliary piston rods; a housing containing two controlling valves for said auxiliary cylinders; and through communication between the outlet side of the first to the inlet side of the second of said valves; a second housing containing two controlling valves for said press cylinder; a third housing containing two controlling valves for the circulation, and intercommunication between the outlet sides of said circulation valves; an overflow valve at the outlet side of one of said circulation valves; necessary conduits for said cylinders and valves and an operative means common to all three pairs of controlling valves.

8. In a horizontal, hydraulic press, the combination with a press cylinder, having a double acting piston and a through going piston rod; of auxiliary cylinders having a piston and rod each; firm connections between said through going piston rod and said auxiliary piston rods; a housing containing two controlling valves for said auxiliary cylinders; and through communication between the outlet side of the first to the inlet side of the second of said valves; a second housing containing two controlling valves for said press cylinder; a third housing containing two controlling valves for the circulation, and intercommunication between the outlet sides of said circulation valves; an overflow valve at the outlet side of one of said circulation valves; necessary conduits for said cylinders and valves; operative means for said controlling valves comprising a shaft, a hand lever on the shaft, connecting rods from each of the valves to said shaft, said connecting rods adapted to simultaneously move in the direction to open the first valve and close the second one of each of said controlling valve pairs when said hand lever is turned in one direction, and to reverse said valve action when the hand lever is turned in the opposite direction.

9. In a horizontal, hydraulic press, the combination with a press cylinder, having a double acting piston and a through going piston rod; of auxiliary cylinders having a piston and rod each; firm connections between said through going piston rod and said auxiliary piston rods; a housing containing two controlling valves for said auxiliary cylinders; and through communication between the outlet side of the first to the inlet side of the second of said valves; a second housing containing two controlling valves for said press cylinder; a third

housing containing two controlling valves for the circulation, and inter-communication between the outlet sides of said circulation valves; an overflow valve at the outlet side of one of said circulation valves; operative means common to all three pairs of controlling valves; conduits from a source of supply to the inlet side of the controlling valves for the press cylinder, from same source to the inlet side of the first one of the controlling valves for the auxiliary cylinders, and from the same source to the low pressure end of said auxiliary cylinders; conduits from the high pressure end of the auxiliary cylinders to the inlet side of the second one of the controlling valves for the auxiliary cylinders and a discharge conduit from the outlet side of said second one of the controlling valves for the auxiliary cylinders; a discharge conduit from the overflow valve; a conduit from the end of the press cylinder that corresponds to the low pressure end of the auxiliary cylinders, connecting on the one hand with the outlet end of the second one of the controlling valves for said press cylinder, and on the other hand with the inlet side of the first one of the controlling valves for the circulation; and finally a conduit from the opposite end of said press cylinder, connecting on the one hand with the inlet side of the second one of said controlling valves for the circulation, and on the other hand with the outlet end of the first one of said controlling valves for the press cylinder.

10. In a horizontal, hydraulic press, the combination with a press cylinder, having a double acting piston and a through going piston rod; of auxiliary cylinders having a piston and rod each; firm connections between said through going piston rod and said auxiliary piston rods; a housing containing two controlling valves for said auxiliary cylinders; and through communication between the outlet side of the first to the inlet side of the second of said valves; a second housing containing two controlling valves for said press cylinder; a third housing containing two controlling valves for the circulation, and inter-communication between the outlet sides of said circulation valves; an overflow valve at the outlet side of one of said circulation valves; operative means for said controlling valves comprising a shaft, a hand lever on the shaft connecting rods from each of the valves to said shaft, said connecting rods adapted to simultaneously move in the direction to open the first valve and close the second one of each of said controlling valve pairs when said hand lever is turned in one direction, and to reverse said valve action when the hand lever is turned in the opposite direction; conduits from a source of supply to the inlet side of the controlling valves for the press cylinder,

from same source to the inlet side of the first
one of the controlling valves for the auxil-
iary cylinders, and from the same source to
the low pressure end of said auxiliary cyl-
inders; conduits from the high pressure end
of the auxiliary cylinders to the inlet side of
the second one of the controlling valves for
the auxiliary cylinders and a discharge con-
duit from the outlet side of said second one
of the controlling valves for the auxiliary
cylinders; a discharge conduit from the over-
flow valve; a conduit from the end of the
press cylinder that corresponds to the low
pressure end of the auxiliary cylinders, con-
necting on the one hand with the outlet end
of the second one of the controlling valves
for said press cylinder, and on the other

hand with the inlet side of the first one of
the controlling valves for the circulation;
and finally a conduit from the opposite end
of said press cylinder, connecting on the one
hand with the inlet side of the second one
of said controlling valves for the circula-
tion, and on the other hand with the outlet
end of the first one of said controlling valves
for the press cylinder.

The foregoing specification signed at Ber-
lin, Germany, this fourth day of March,
1909.

WILAND ASTFALCK.

In presence of—
HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."