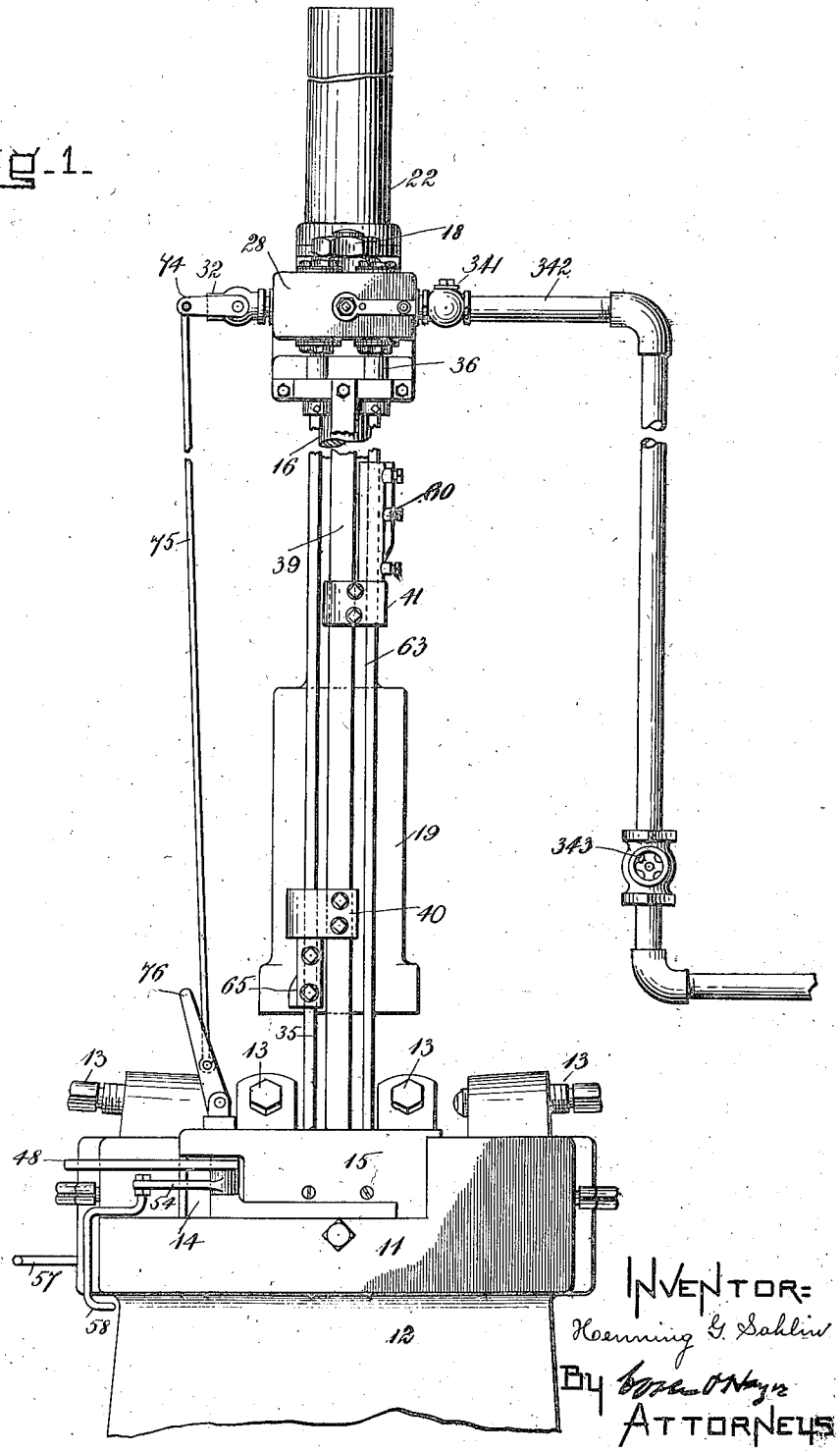
July 30, 1929. H. G. SAHLIN 1,722,506

DROP HAMMER

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Fig. 1.



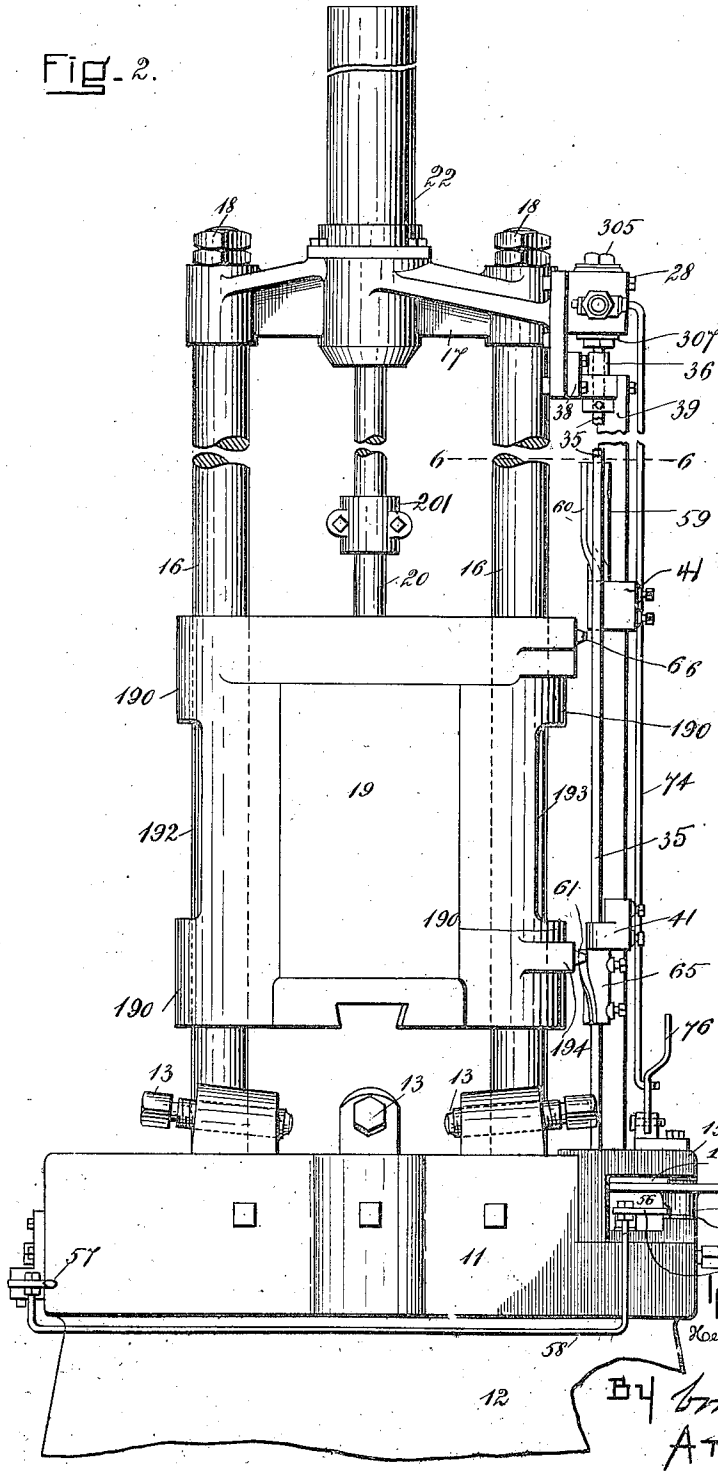
INVENTOR:
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DROP HAMMER

Filed Aug. 13, 1924 7 Sheets-Sheet 2

Fig. 2.



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DROP HAMMER

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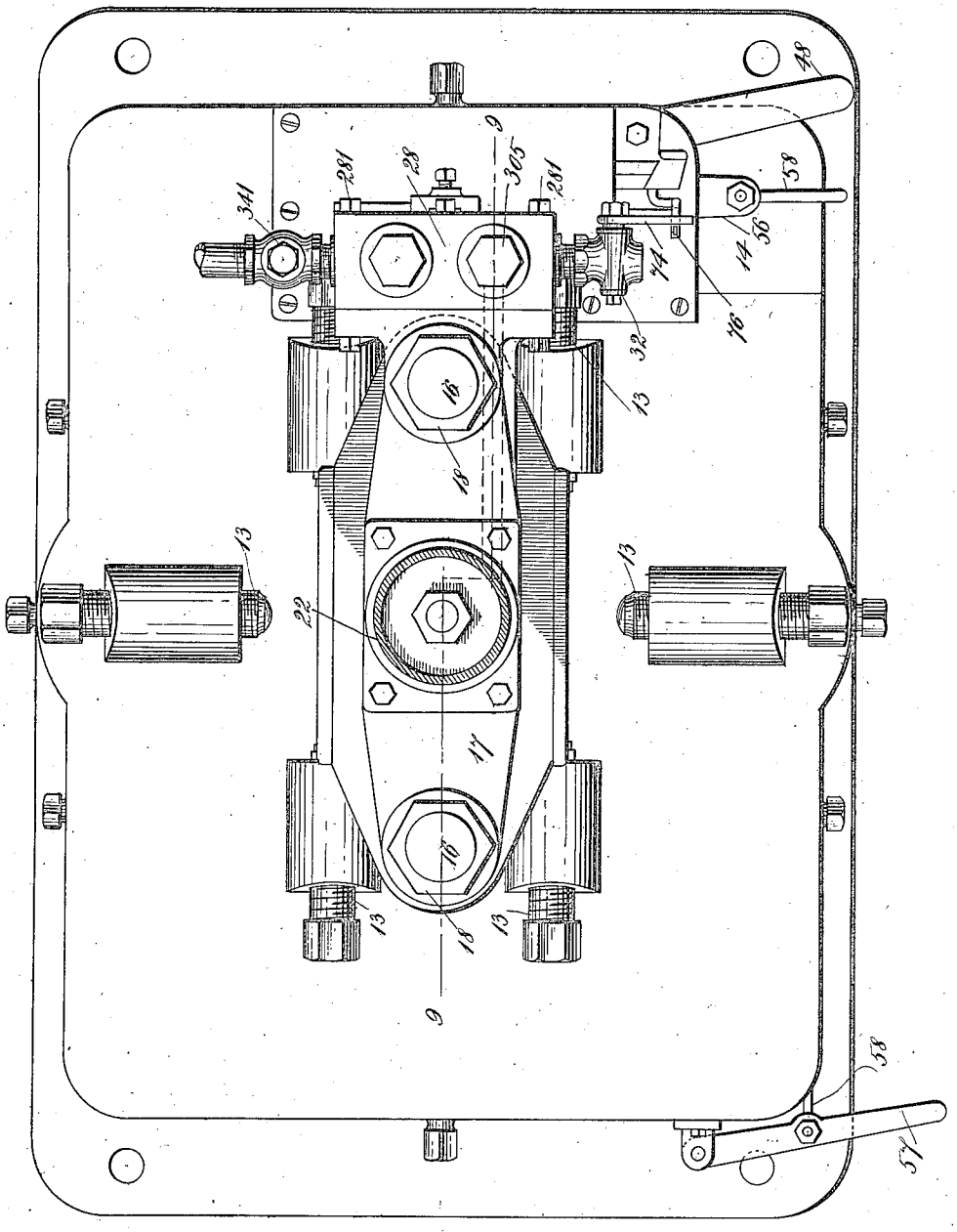


Fig. 3.

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DROP HAMMER

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Fig. 4.

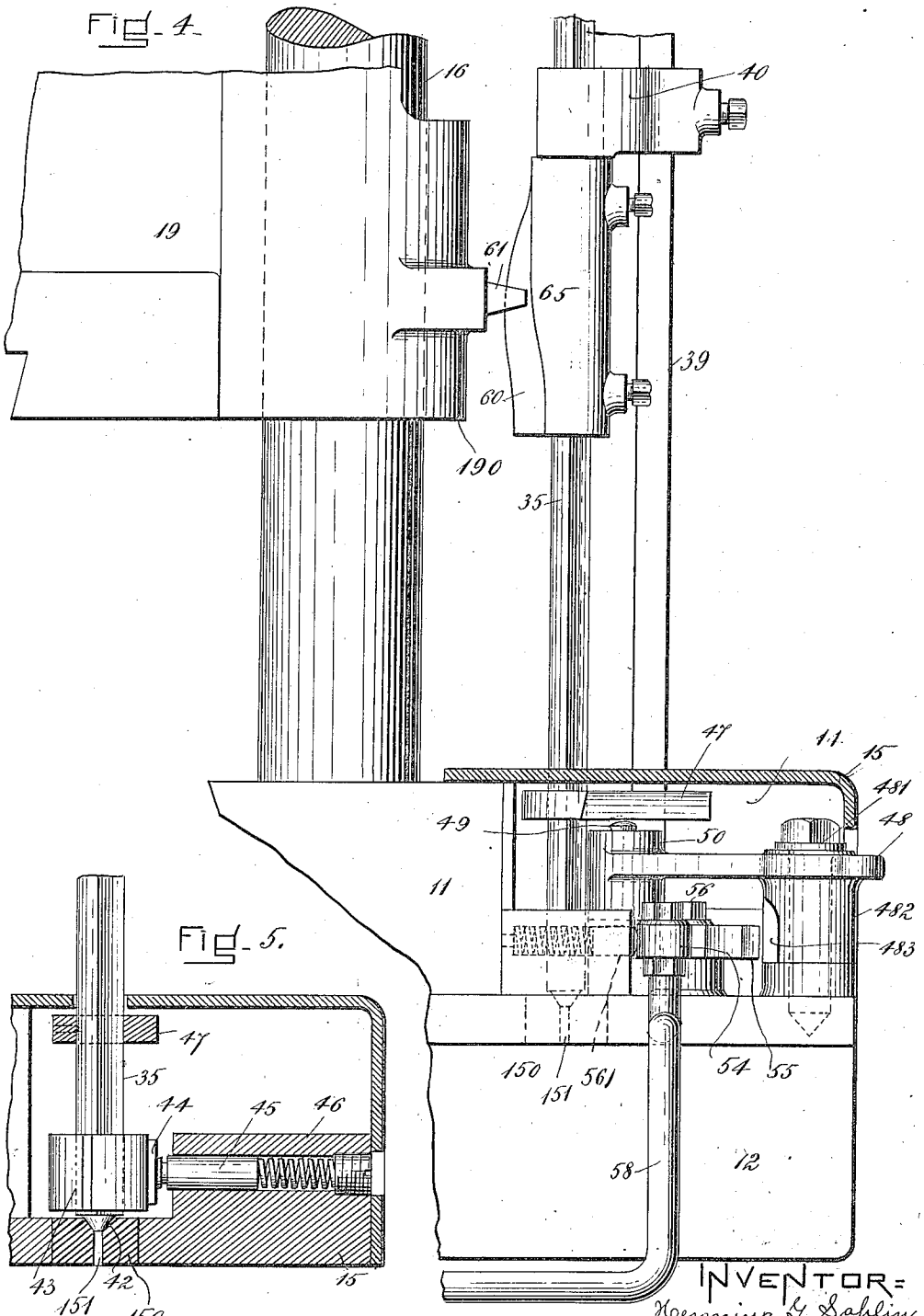


Fig. 5.

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July 30, 1929. H. G. SAHLIN 1,722,506

DROP HAMMER

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Fig. 6.

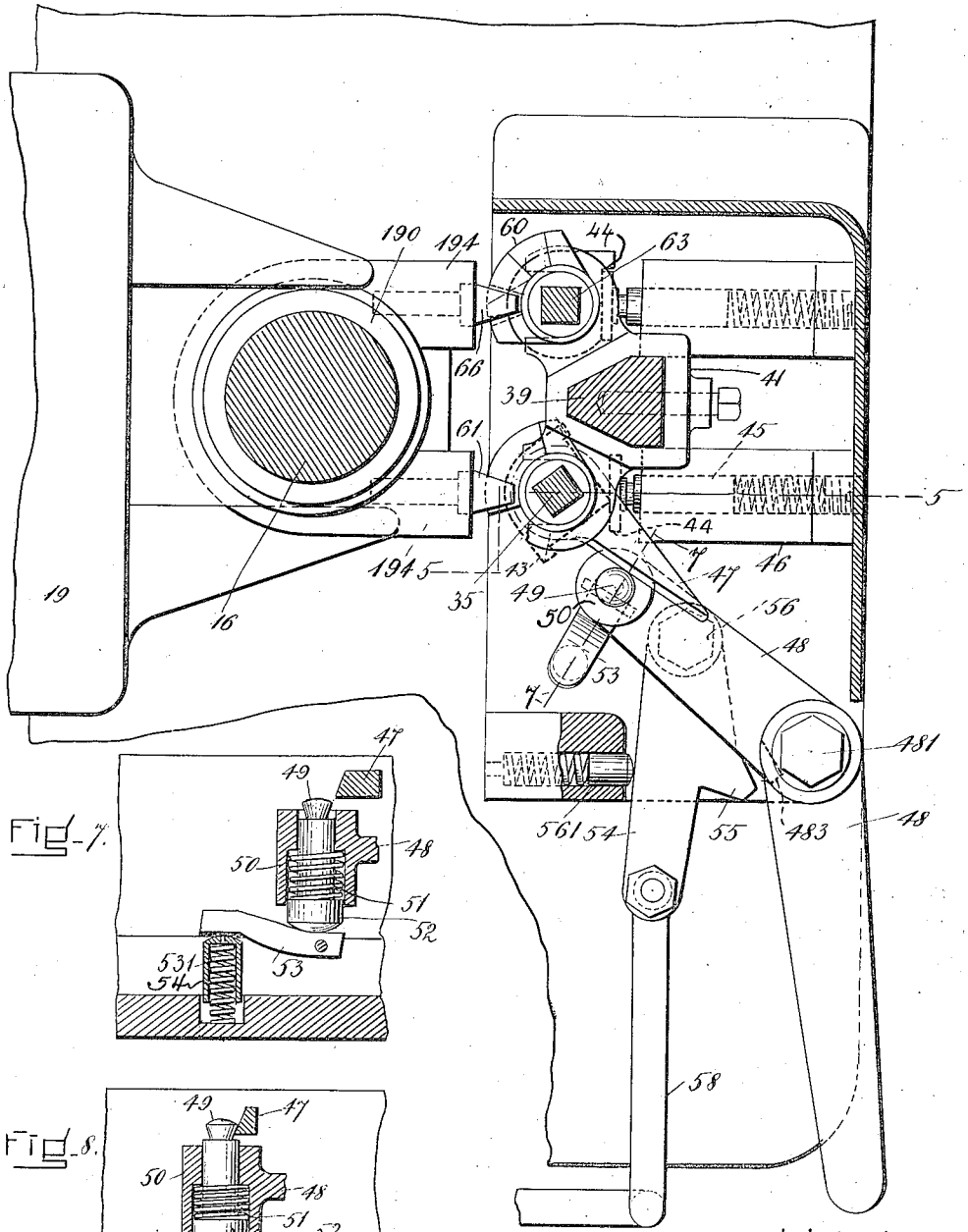
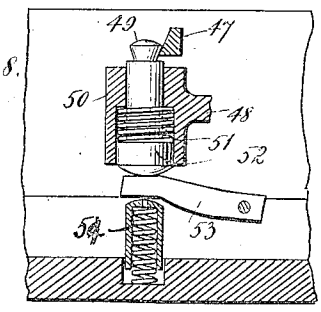


Fig. 7.

Fig. 8.



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July 30, 1929. H. G. SAHLIN 1,722,506

DROP HAMMER

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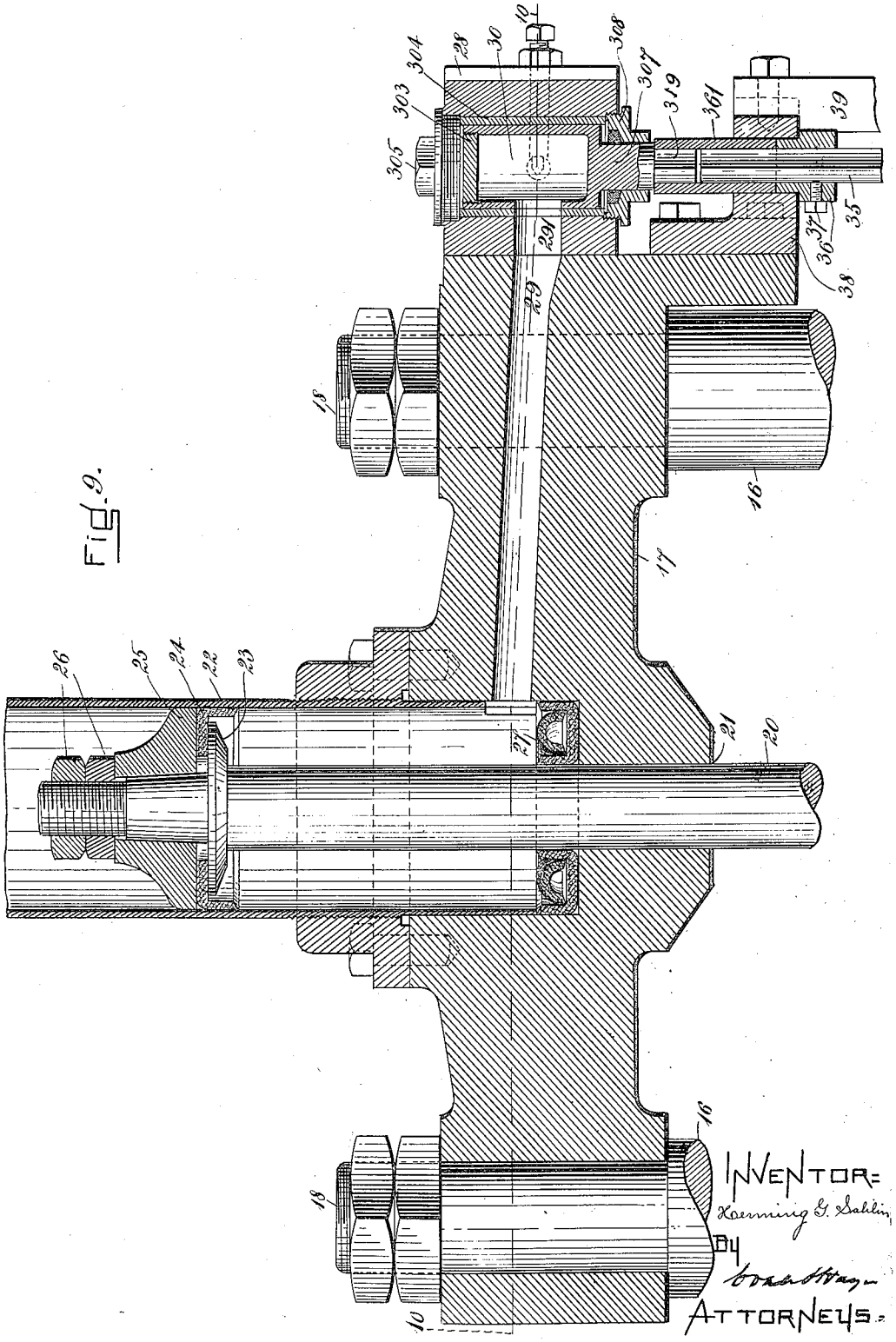


Fig. 9.

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July 30, 1929. H. G. SAHLIN 1,722,506

DROP HAMMER

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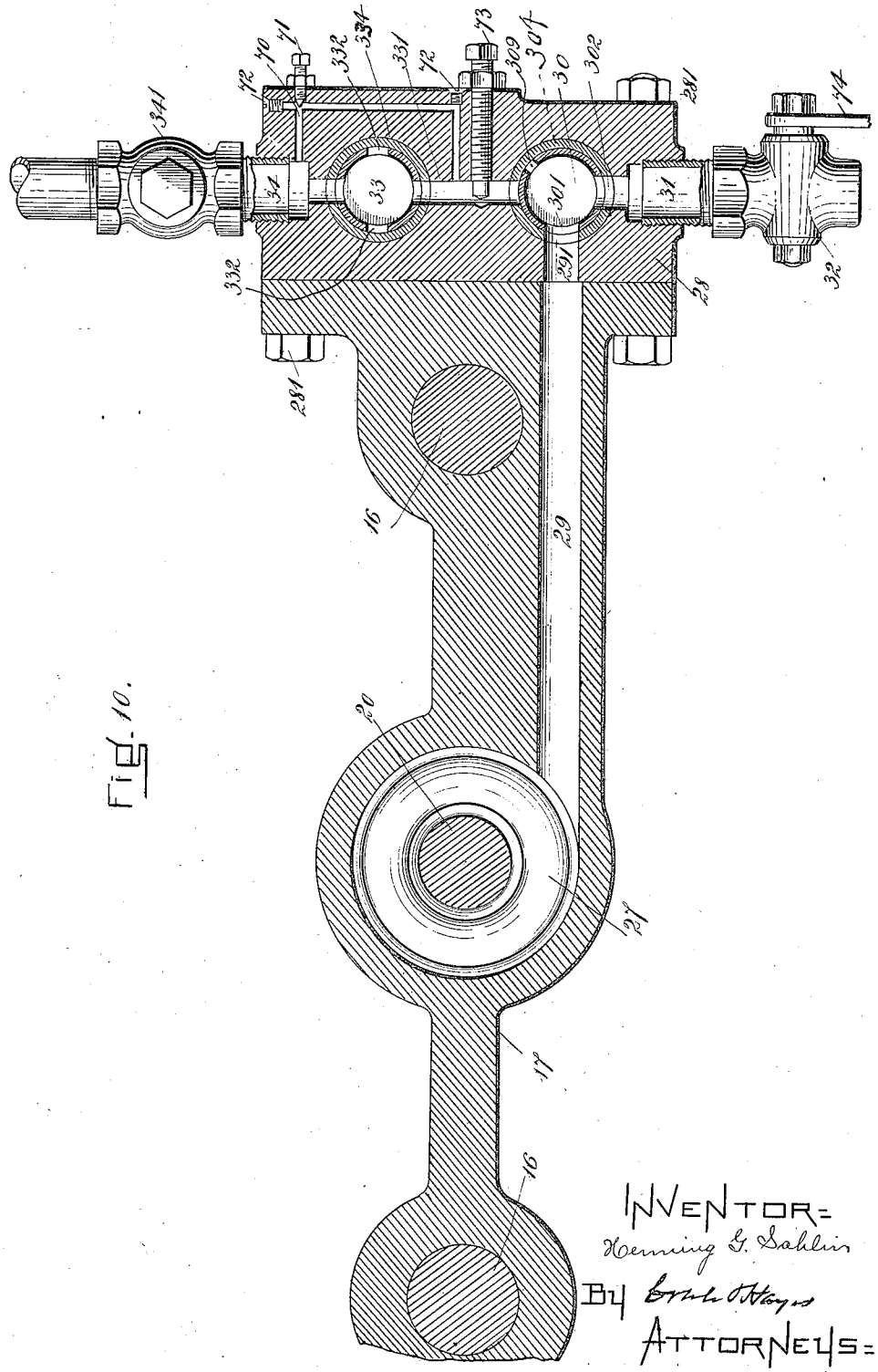


Fig. 10.

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Patented July 30, 1929. 1,722,506

UNITED STATES PATENT OFFICE.

HENNING G. SAHLIN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO PNEUMATIC DROP HAMMER COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

DROP HAMMER.

Application filed August 13, 1924. Serial No. 731,885.

The invention relates to hammers controlled by fluid pressure and especially those having a gravity drop.

Among the objects of the invention is to provide an improved mechanism for controlling the fluid pressure by which the hammer will operate with a very high degree of efficiency and at the same time safeguard the mechanism from undue jar or vibration as the hammer reciprocates; to provide an improved means by which the fluid pressure may be exhausted to permit of a quick and effective drop of the hammer, or be otherwise governed as occasion may require; and to provide means whereby the fluid pressure will be applied at the proper moment for more effectively lifting the hammer, and the lifting pressure be eased as the hammer approaches the limit of its upward or lifting stroke.

A further object of the invention is to provide safety means whereby both hands of the operator are occupied simultaneously for effecting a release of the hammer so that neither hand can reach beneath the hammer when it is falling.

The invention will be understood by reference to the drawings in which it is shown in its preferred form.

Fig. 1 is a side elevation.

Fig. 2 is a front elevation.

Fig. 3 is a plan of such a machine.

Fig. 4 is an enlarged side elevation of the bottom of the machine showing the means for connecting the operating valve to the compressed air supply to lift the hammer and also the hand levers for connecting said valve with the exhaust to allow the hammer to drop.

Fig. 5 is a section on line 5—5 of Fig. 6.

Fig. 6 is a horizontal section on line 6—6 of Fig. 2.

Figs. 7 and 8 are sections showing in two positions a latch to co-operate with the exhaust lever, Fig. 7 being a section on line 7—7 of Fig. 6.

Fig. 9 is a vertical section on line 9—9 of Fig. 3 showing the upper end of the hammer rod and its cylinder, and

Fig. 10 is a horizontal section on line 10—10 of Fig. 9.

11 is a base or table to which various parts of the machine are attached. It is supported as shown on a column 12. 13 are poppet screws by which the bottom die is clamped in place on the table. The table is recessed as at 14 to receive a base piece 15 which carries certain levers, etc., to be described.

Upstanding from the table 11 are two vertical guide rods 16, the upper ends of which are attached to a crosshead 17 by suitable nuts 18. Mounted to slide upon and between these rods is a hammer 19. The hammer is preferably provided with four sets of sleeves or bearings 190 through which the guide rods 16 pass, leaving cutaway portion 192 at either side.

20 is a lifting rod attached to the hammer in any suitable manner. This rod passes up through an opening 21 in the crosshead and carries a block 201 adjustable thereon to limit its upward stroke. On the crosshead 17, concentric with and above the opening 21 therein, is a cylinder 22 which co-operates with a piston 25 on the upper end of the lifting rod 20.

As shown the piston 25 comprises a washer 23 supported on the rod 20, for example by a suitable shoulder. Between this washer and the piston is carried a packing 24 which fits the inside of the cylinder 22, and nuts 26 screwed onto the top of the rod 20 hold these parts together. A packing 27 of any desired character prevents leakage between the rod 20 and the crosshead 17 at the opening 21.

One side of the crosshead 17 is differently shaped from the other side in order that it may carry, bolted thereto by bolts 281, the valve casing 28. In the crosshead is a passage 29 in the valve casing, which leads from the operating valve 30, with the interior of the cylinder 22, and through which passage the fluid, for example air, which is the source of power, may both be delivered to the cylinder to lift the hammer and be exhausted therefrom to allow the hammer to fall.

The operating valve 30 is a rotary valve and it is provided with two ports 301, 302, and a smaller opening 309. It is set into and turns in a suitable bushing 304. Within the valve casing 28 is a passage 31 leading to a lever-operated exhaust value 32, a second passage 331 connects the chamber of valve 30 with the chamber of a control valve 33 of similar type, and a third passage 34 connects the chamber of the control valve 33 with the source of compressed air through

an ordinary check valve cock 341 and pipe 342 and its valve 343. The ports 301 and 302 in valve 30 are arranged at an angle of 90 degrees from each other so that by turning the valve a quarter of a revolution air will be admitted to the cylinder 22 or be permitted to exhaust from it. As shown in Fig. 10 the valve 30 is set to allow air to escape from under the piston 24 and the hammer to fall. The passage 309 through the valve allows air to escape from it into the space between the valve and its bushing 305 to equalize the pressure around the valve. The valve 30 is cup-shaped (see Fig. 9), its top being closed by a screw plug 303, while the top of the bushing is closed by a screw closure 305. The stem 307 of the valve passes down through a gland 308 in which it may turn and the stem in angular, preferably square in cross section as at 319. 35 is its operating rod which is also squared in cross section and carries a collar 36 attached to the rod 35 by a set screw 37 which supports a sleeve 361, squared on its interior to fit both the rod 35 and the stem 319 thus serving as a coupling to tie the valve to the rod 35. The upper end of the rod 35 is steadied by the bracket 38 attached both to the crosshead 17 and to a supporting rod 39 mounted on the base 11. The supporting rod 39 also carries two adjustable stays 40, 41, through one of which, 40, the rod 35 passes. The lower end of the rod 35 is preferably conical so as to turn with as little friction as possible, and is supported in a conical bearing in a perforated bushing 150 set into the casing 15 (see Fig. 5). The perforation 151 at the bottom of the bearing allows for drainage of oil. Mounted on the rod 35 is a locking member 43 which is flat on two adjacent sides to co-operate with a flat plate 44 on the end of a spring-controlled pin 45 sent into a block 46 on the base piece 15. This yielding plate while it holds the rod from turning under ordinary circumstances, allows it to be turned under the requirements of the machine, and if the rod 35 has been turned part way will complete its movement as will be understood.

Above the locking member 43 there is mounted on the rod 35 an arm 47 (see Fig. 6). 48 is a hand lever pivoted at 481 which carries a spring-controlled engaging pin 49 which under certain conditions enables the lever 48 to move the arm 47 and turn the rod 35 to release the air from under the piston 25. For this purpose the lever 48 carries a hub 50 within which the pin slides, the pin having an enlarged head 52 between which and a shoulder in the hub 50 is contained a spring 51 which tends to keep the pin normally in withdrawn position. The head 52 of the pin 49 rests on the upper surface of a cam lever 53, one end of which is pinned to the base piece 15 while its other end rests on a spring-controlled support 54 (see Figs. 7 and 8). As shown this arm 53 is bent cam-like so that as the hand lever is turned the position of the pin 49 is changed under the influence of the spring 51 so that it may or may not engage the arm 47.

In the operation of the machine as will later be explained the hammer 19 is lifted from a lowered position or reset in the following manner: Assuming the valve 30 to be in open communication with the exhaust as shown in Fig. 10, the valve must be turned to close the exhaust and bring its opening 302 into register with the passage 291 and its opening 301 into register with the passage 331 which leads from the intake in order to supply compressed air from the source through the valve 341 to raise the piston 24 and hammer 19. Turning the valve 30 from the position shown in Fig. 10 to its intake position is accomplished by the hammer in falling. For this purpose there is clamped to the rod 35 a cam 65 having a suitable spiral cam surface. This cam is adjustable on the rod 35. On a projection 194 from the hammer 19 is mounted a suitably shaped pin 61 which as the hammer falls engages the cam surface on cam 65 and as the pin 61 passes down in a straight line it turns the cam 65 and this, supplemented by co-operating members 43 and 44, will turn the rod 35 90 degrees so that the valve 30 is turned from its exhaust to its intake position.

The valve 33 in form and arrangement is substantially like the valve 30. It is provided with a bushing 334 within which it turns. It has also openings 332 in it for the same purpose as the opening 304 is provided in the valve 30. It has also ports by which, when the valve is open, communication is obtained through the chamber of the valve between the passage 34 and passage 331, and these ports will become closed on turning the valve slightly. The valve is mounted on a rod 63 corresponding with the mounting of the valve 30 on the rod 35 and is supported free to turn in the same manner as is the rod 35. 41 is a stay supporting the rod 63 from the supporting rod 69. Arranged upon the rod 63 is a grooved cam 60 with which there co-operates a pin 66 on a projection 194 from the hammer near its upper end. The pin 66 strikes the cam 60 both on the rise and on the fall of the hammer. On the rise of the hammer the pin 66, engaging the groove in the cam, will turn the rod 63 sufficiently to close the air-controlled valve 33 and reversely will open the control valve 33 as the hammer drops. The valve 33 is locked in open position by a locking member 43 on the rod 63, and which member 43 is engaged by a spring-controlled plate 44, both similar to the members 43 and 44 assisting in positioning the valve 30. The member 43, however, on the rod 63 has

but one flat surface as the rod and valve 33 controlled by it is only rotated slightly by its operating cam 60.

There is provided a by-pass 70 around the valve 33 connecting the passage 34 with the passage 331 so that when the valve 33 is closed and the valve 30 is open communication will be had through this by-pass by which compressed air will pass to the cylinder 27. The passage through the by-pass 70 is controlled by a regulating screw 71. 72, 72 are screws to close openings into the passage of the by-pass for cleaning or other purposes. 73 is an adjusting screw to control the size of the passage 331.

The exhaust valve 32 is provided with an operating lever 74 by which it may be opened or closed or partially closed. This lever, in turn, is operated through a connecting rod 75 from a hand lever 76 pivotally mounted on the base piece 15.

Means are provided to lock the handle lever 48 so that the operator will be obliged to use both hands simultaneously to cause the dropping of the hammer and thus can never get one of his hands crushed under the hammer. For this purpose the hub 481 of the lever 48 is notched as at 483. A lock lever 54 carrying a dog 55 is pivoted to the base 11 at 56, these parts being so located that the dog 55 will engage the notch 483 and lock the hand lever when it is in its inactive or disengaged position and the valve 30 is in position to close the exhaust and hold compressed air in the cylinder 22, and thus hold up the hammer. The lever 54 is normally projected toward the hub 481 by means of a spring pressed pin 561 so as to lock the lever 48 automatically when the lever is in its inactive or disengaging position. The lock lever is operated from the handle 57 at the further side of the machine by means of a connecting rod 58, which is suitably bent and secured to the end of the lever 54.

The general operation is as follows: It will first be assumed that the hammer is at the top of its stroke in position to fall, being there held by the fluid pressure entering the cylinder 22 beneath the piston. The operating valve 30 will then be open, being closed from the exhaust. The control valve 33 will then be closed, air entering to hold up the hammer by way of the by-pass 70. The operating lever 48 will then be turned to a position where the pin 49 borne by it will be in position to have engagement with the lever 47, substantially as shown in Fig. 8. The lever 48 will then be held from being turned by the dog 55 on the lever 54. For now releasing the hammer to drop by gravity the dog 55 is first moved into a disengaging position with relation to the lever 48 and there held. This is done by one hand of the operator turning the lever 57 and holding it in its turned position. The lever 48 is now turned, whereupon its pin 49 bearing against the arm 47 will turn the operating valve 30 in an anti-clockwise direction. The bearing of the pin 49 against the arm 47 will continue until the turning movement has so far progressed that the spring-pressed plate 44 is about to complete the turning of the valve 30, whereupon the pin 49 will have moved into a disengaging position with relation to the arm 47 substantially as shown in Fig. 7. After the lever 48 has completed its turning operation, which is completed by the spring-pressed plate 44, the lever 48 is turned back to its initial position where the pin 49 thereon will be in a position to engage the lever 47 in the next turning operation substantially as shown in Fig. 8. Then the lever 57 is turned back, thereby releasing the spring-pressed dog 55 to have interlocking engagement with the lever 48 for holding it in place. The spring-pressed plate 44 having completed the turning of the valve 30, the valve will have been moved into a position where it will shut off the fluid pressure entering by way of the passage 331 and will be open to the exhaust its port 301 then registering with the passage 291 and its port 302 registering with the exhaust passage 31 substantially as shown in Fig. 10. Thereupon, the pressure being cut off from the chamber of the cylinder and the chamber then having open communication with the exhaust, the hammer will be allowed to drop by gravity and will have a substantially free unimpeded drop if the valve 32 controlling the exhaust passage is wide open, the fluid pressure contained within the cylinder beneath the piston then having a free escape. As occasion may require, the drop of the hammer may be more or less impeded and the blow imparted by it softened to a greater or less degree by a partial opening only of the exhaust valve 32 which then permits of a gradual escape of the pressure from the cylinder as distinguished from a free escape when the exhaust valve is fully opened. The impedance of the hammer will depend upon the amount that the exhaust valve is opened. As the hammer falls the pin 66 on its engaging the cam 60 will turn the control valve 33 into an open position substantially as shown in Fig. 10 whereby the entering fluid pressure may pass through the chamber of the valve. As the hammer approaches the limit of its drop the pin 61 thereon engaging the cam 65 will turn the operating valve 30 in a clockwise direction, thereby closing the exhaust and positioning its ports whereby the fluid pressure entering by way of the open control valve 33 will pass directly to the cylinder for lifting the hammer. In other words, as the hammer reaches the limit of its drop it is immediately lifted on the bound thereof and

prevented from chattering. As the hammer rises and begins to approach the limit of its upward stroke the pin 66 thereon engaging the cam 60 will turn the control valve 33 sufficiently to prevent the fluid pressure or air then passing to the cylinder from passing through this valve the pressure then being directed to pass to the cylinder through the by-pass 70. That is, the last part of the upward stroke of the hammer is caused both by expansion of air and by air admitted through the by-pass, and accordingly the upward stroke of the hammer will be stopped gently before it can cause damage to the machine and the block 201 on the stem 20 engaging the crosshead 17, which limits the upward stroke of the hammer, will be brought into easy contact with the crosshead. The hammer will then be maintained by the fluid pressure in its elevated position until released to drop the same as before.

While the machine as shown has been constructed and used with compressed air and is particularly adapted for that use it is evident to one skilled in the art that any other fluid under pressure may be used in place of compressed air. It is evident also that variations of the construction of this machine may be made without departing from the spirit of the invention.

What I claim as my invention is:

1. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to escape from the cylinder to free the hammer, a rotatable operating valve located in said connections, means for turning the valve to release fluid pressure from the cylinder whereby the hammer will be allowed to drop, means arranged to be operated by the hammer while dropping to reset said valve whereby fluid pressure may be delivered again to the cylinder for lifting the hammer, a control valve assisting in the control of the fluid pressure passing to the operating valve and cylinder, and means for operating the control valve by the hammer.

2. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to escape from the cylinder to free the hammer, a rotatable operating valve located in said connection, means for turning the valve to release fluid pressure from the cylinder whereby the hammer will be allowed to drop, means arranged to be operated by the hammer while dropping to reset said valve whereby fluid pressure may be delivered again to the cylinder for lifting the hammer, a second valve assisting in the control of the fluid pressure passing to the operating valve and cylinder, and means whereby the second valve will be operated by the hammer in rising to close it and in falling to open it.

3. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, a rotary valve arranged in said connections assisting in the introduction of fluid pressure into the cylinder for lifting the hammer and when turned permitting of the escape of fluid pressure from the cylinder preliminary to the drop of the hammer, manually-controlled means including a lever for turning said valve to release fluid pressure from the cylinder, releasable locking means for normally preventing the turning of said lever, and a manual release for said locking means separate from said operating arm of the lever whereby both the operating arm of the lever and said release for the locking means must be moved simultaneously to permit of the turning of said valve for releasing the fluid pressure from the cylinder as aforesaid.

4. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, a rotary valve arranged in said connections assisting in the introduction of fluid pressure into the cylinder for lifting the hammer and when turned permitting of the escape of fluid pressure from the cylinder preliminary to the drop of the hammer, manually-controlled means including an operating arm for turning said valve to release fluid pressure from the cylinder, means for engaging and moving said arm comprising a lever, a spring-controlled, vertically-movable pin mounted on the lever to be moved therewith and occupy a normal disengaging position with relation to said arm, a yielding cam lever for engaging and positioning said pin to have bearing engagement against said arm for turning it as said lever is turned and afterward said pin during the turning of the arm be permitted to resume its normal

disengaging position with relation to the arm, and means independent of said lever for completing the turning of said arm.

5. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, an operating valve in said connections for directing the fluid pressure admitted to it to the cylinder for lifting the hammer, a control valve adapted to control the supply of fluid pressure admitted to the operating valve, and means whereby the hammer as it rises will operate the control valve to cut off more or less of the supply of fluid pressure from the operating valve and in falling will operate the control valve to supply fluid pressure to the operating valve and will also operate the operating valve to supply fluid pressure to the cylinder.

6. In a machine of the type described having a hammer and a fluid pressure system for lifting it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising fluid pressure inlet and exhaust connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to allow the hammer to drop, an operating valve arranged in said connections for directing the fluid pressure to the cylinder or allowing the pressure to exhaust therefrom, manually-operated means to open said valve to the exhaust and allow fluid pressure to exhaust therethrough from the cylinder whereby the hammer will be allowed to fall, means operable by the hammer in falling for closing said valve from the exhaust and opening it to the passage of fluid pressure therethrough whereby said hammer will be lifted, means for controlling the feed of fluid pressure to said operating valve, and means operable by the hammer as it falls and is lifted to operate said last-named means.

7. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, an operating valve arranged in said connections for directing the fluid pressure to the cylinder or allowing the pressure to exhaust therefrom, means for positioning the operating valve to release fluid pressure from the cylinder for allowing the hammer to drop, means arranged to be operated by the hammer while dropping to position said operating valve whereby fluid pressure will be directed to the cylinder for lifting the hammer, and means located between the air supply and said operating valve whereby fluid pressure may be wholly or partially cut off from said operating valve during the lifting of the hammer, said means comprising a control valve, means engaged by the hammer to open and close the control valve, and a by-pass around the control valve whereby a relatively small amount of fluid pressure may at all times pass around the control valve and supply fluid pressure to the cylinder when the operating valve is positioned for directing fluid pressure thereto.

8. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, an operating valve and a control valve located in said connections, said operating valve being adapted and arranged for directing the fluid pressure to the cylinder or allowing the fluid pressure to exhaust therefrom, the control valve being adapted and arranged for directing the fluid pressure to the operating valve, means for positioning the operating valve to release fluid pressure from the cylinder for allowing the hammer to drop, means arranged to be operated by the hammer as it approaches the limit of its downward stroke for positioning said operating valve for directing fluid pressure to the cylinder for lifting the hammer, means for closing said control valve located to be operated by the hammer as approach is made to the limit of its upward stroke and to open the control valve near the beginning of its downward stroke, a by-pass around said control valve whereby a limited amount of fluid pressure will always pass to said operating valve, and means for adjusting the size of said by-pass whereby the amount of fluid passing through it may be regulated.

9. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, separate valves located in said connections, one an operating valve for admitting fluid pres-

sure to the cylinder and the other a control valve for admitting fluid pressure to the operating valve, means for operating said control valve operable by the movement of the hammer to feed fluid pressure to the operating valve during the drop of the hammer and to cut off the main supply of fluid pressure from the operating valve as said hammer is reaching the limit of its upward stroke, means also operated by the movement of the hammer in falling to operate said operating valve whereby fluid pressure may be admitted to the cylinder for lifting the hammer when the hammer is approaching the limit of its downward stroke, and a by-pass around said control valve whereby a small portion of the fluid pressure supply will at all times be fed to said operating valve.

10. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, separate valves arranged in said connections one an operating valve for directing the fluid pressure to the cylinder or allowing the pressure to exhaust therefrom, the other a control valve for controlling the admission of fluid pressure to the operating valve and cylinder, means for positioning the operating valve to release fluid pressure from the cylinder, means arranged to be operated by the hammer while dropping to position said operating valve whereby fluid pressure may be directed to the cylinder for lifting the hammer, and means whereby said control valve will be operated by operation of the hammer in rising for controlling the fluid pressure to diminish the speed of the hammer as it approaches the limit of its upward stroke.

11. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, said connections comprising in part a by-pass, separate valves arranged in said connections, one an operating valve for directing the fluid pressure to the cylinder or allowing the pressure to exhaust therefrom, the other a control valve for controlling the operating valve and cylinder and around which control valve said by-pass extends, means for positioning the operating valve to release fluid pressure from the cylinder, means arranged to be operated by the hammer while near the bottom of its falling stroke to position said operating valve whereby fluid pressure will be directed to the cylinder for lifting the hammer, and means arranged to be operated by the hammer as it approaches the limit of its upward stroke to close said control valve whereby the fluid pressure will then pass to the operating valve only through said by-pass.

12. In a machine of the type described having a hammer and a fluid pressure system for operating it including a piston connected to the hammer and a cylinder in which the piston operates, the combination comprising connections to supply fluid pressure to the cylinder for lifting the hammer and for allowing fluid pressure to exhaust from the cylinder to free the hammer, said connections comprising in part a by-pass, separate valves arranged in said connections, one an operating valve for directing the fluid pressure to the cylinder or allowing the pressure to exhaust therefrom, the other a control valve for controlling the admission of fluid pressure to the operating valve and cylinder and around which control valve said by-pass extends, means for positioning the operating valve to release fluid pressure from the cylinder, means arranged to be operated by the hammer while dropping to position said operating valve whereby fluid pressure will be directed to the cylinder for lifting the hammer, and means whereby said control valve will be closed by operation of the hammer during its upward stroke and will be opened by operation of the hammer during its downward stroke.

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