Feb. 5, 1952 G. E. BARNHARDTSON 2,584,534

DROP HAMMER SAFETY DEVICE

Filed Nov. 20, 1946 3 Sheets-Sheet 1

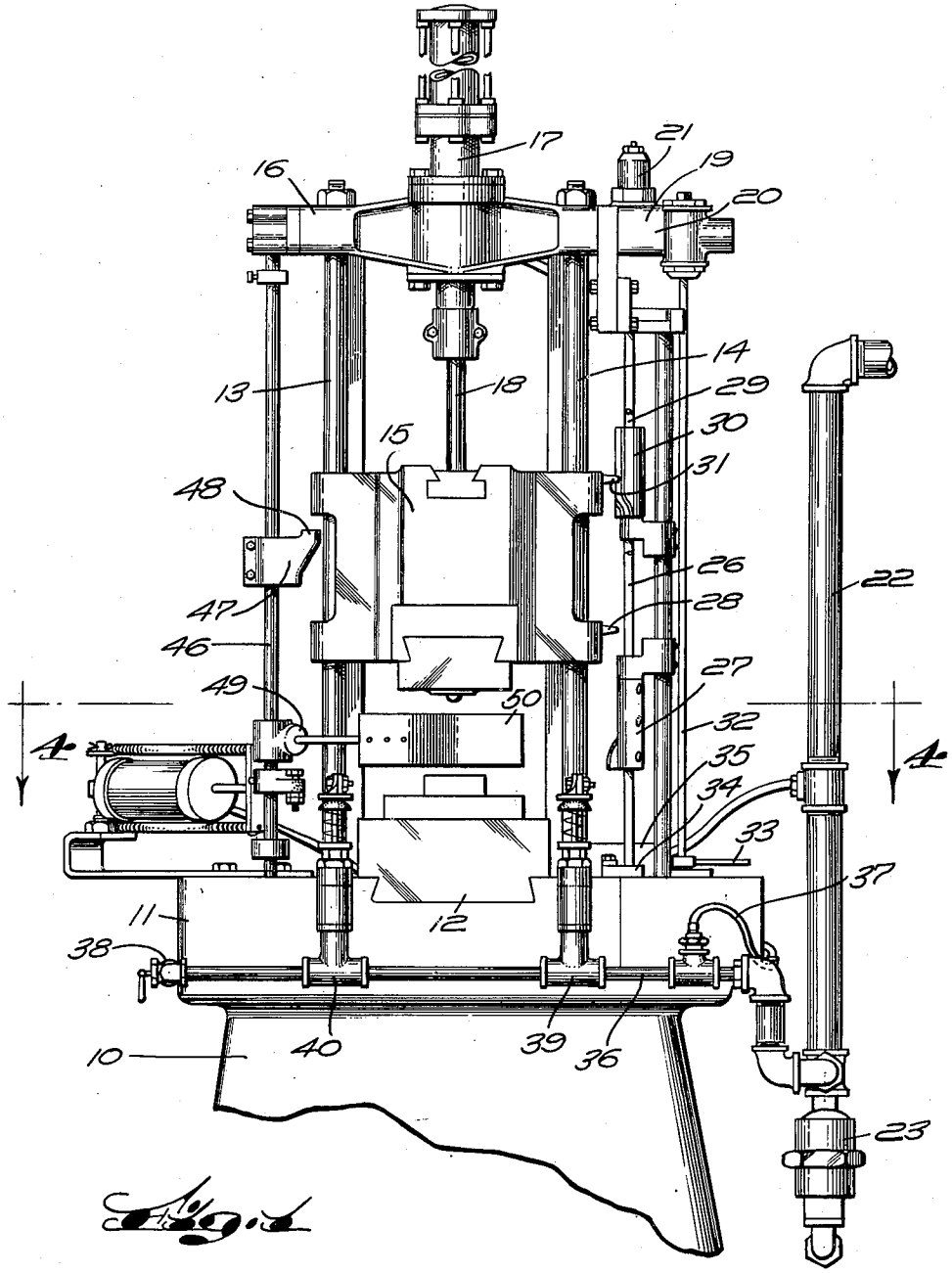


Fig. 1

INVENTOR.
George E. Barnhardtson
BY
Nathaniel Frucht
Attorney

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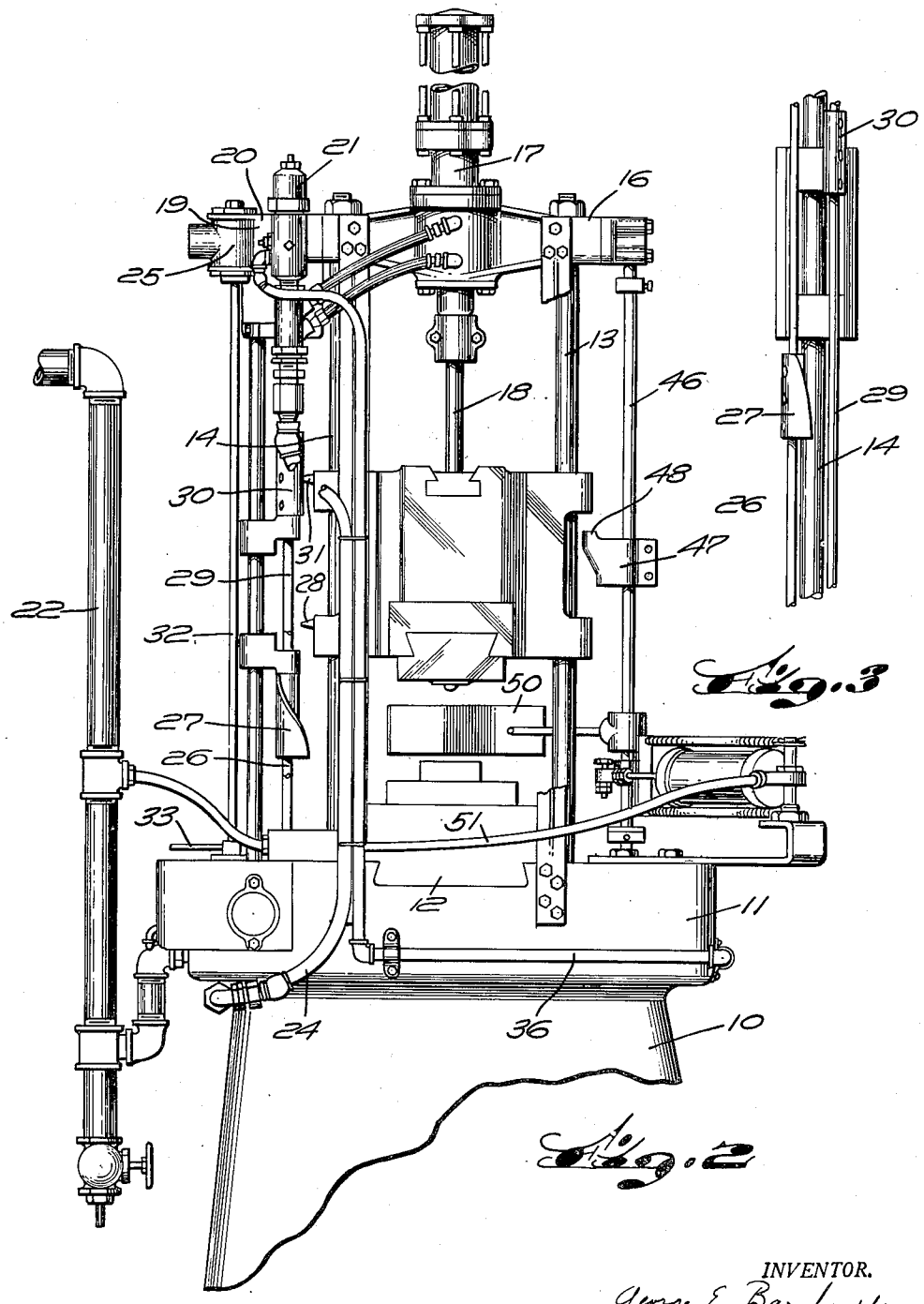


Fig. 3

Fig. 2

INVENTOR.
George E. Barnhardtson
BY
Nathaniel Frucht
Attorney

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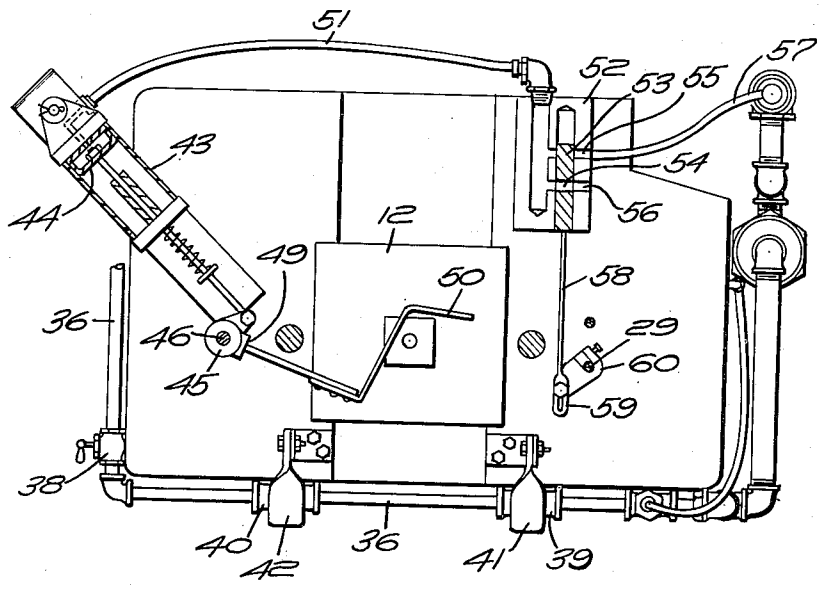


Fig. 4

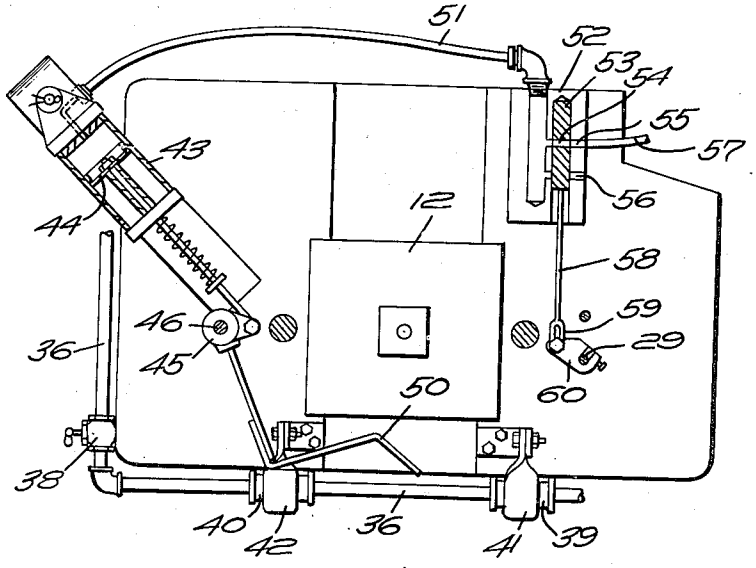


Fig. 5

INVENTOR.
George E. Barnhardtson
BY
Nathaniel Frucht
Attorney

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DROP HAMMER SAFETY DEVICE

George E. Barnhardtson, North Providence, R. I.

Application November 20, 1946, Serial No. 711,093

5 Claims. (Cl. 192—129)

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The present invention relates to drop hammer machines operated by hydraulic pressure, and has particular reference to a safety device for use with pneumatic lift gravity drop hammers, power presses, foot presses and the like.

The principal object of the invention is to provide a pneumatic safety device which prevents inadvertent release of the hammer head, and in addition operates a guard for throwing out the hands of the operator before the hammer head descends.

Another object of the invention is to provide a simple arrangement for a safety device which may be readily applied to existing installations of pneumatic drop hammers, power presses, foot presses and the like.

Still another object of the invention is to provide a safety device which is hydraulically operated in prior timed relation to the release of the hammer head, so that the safety provisions are operative until the hammer head is released.

With the above and other objects and advantageous features in view, the invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

In the drawings:

Fig. 1 is a front elevation of a standard drop hammer installation in which the novel safety device is incorporated, parts being broken away;

Fig. 2 is a side view of Fig. 1;

Fig. 3 is a detail view showing the spiral controls for the hammer operation;

Fig. 4 is a detail section on the line 4—4 of Fig. 1, showing the safety parts in safety position; and

Fig. 5 is a view similar to Fig. 4, showing the safety parts in hammer release position.

It has been found desirable to provide a safety device for a drop hammer, which positively locks the hammer in raised position until both hands of the operator are away from the anvil and are engaged in pressing dual valve controls to release the hammer head, whereupon the safety lock is released and a hand guard sweep is simultaneously moved across the face of the anvil. To this end I provide a control mechanism which may be attached to a drop hammer or press of standard type to function in timed relation to the hammer operation.

Referring to the drawings which illustrate a standard type pneumatic lift gravity drop hammer to which the invention has been applied. The drop hammer 10 includes an anvil 11 on which a die block 12 is removably supported; vertical supporting columns 13, 14 are mounted on the anvil to slidably carry the drop head 15, and a yoke 16 is mounted on the upper end of the columns 13, 14 to carry a pneumatic lift cylinder 17 which is bolted to the central portion of the yoke and has a central lift rod 18 which is connected at its upper end to the cylinder piston, not shown, and at its lower end to the drop head 15.

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The control of pressure air to and from the lift cylinder 17 is accomplished through a valve housing 19 which includes an operating control valve 20, and an inflow valve 21. Air under pressure is supplied to the valve housing 19 from a main pressure air conduit 22 through a reducing valve 23 and a main conduit 24, and passes through the operating control valve 20 and the inflow valve 21 and through a passage in the yoke 16 to the lift side of the piston in the lift cylinder 15. Air is exhausted from the cylinder 17 through an exhaust passage in the yoke which leads through the operating control valve 20 and an adjustable bleed valve 25 to atmosphere.

The operating control valve 20 is mechanically actuated by a rotatably mounted vertical rod 26, see Fig. 1, which has a spiral cam 27 secured at its lower portion with which a pin 28 at the lower end of the drop head 15 cooperates. The inflow valve 21 is mechanically controlled by a rotatably mounted vertical rod 29 which has a spiral cam 30 secured at its upper portion for cooperation with a pin 31 at the upper end of the drop head 15.

When the drop head 15 is in its up position the inflow valve 21 is shut to the flow of pressure air, but a by-pass, not shown, in the valve housing, permits air under pressure to enter the lift cylinder and keep the drop head up. When the drop head drops the upper head pin 31 turns the cam 30 and the rod 29 to set the inflow valve 21 in open position, whereby pressure air may enter the lift cylinder through the operating control valve 20 when the lower head pin 28 turns the cam 27 and the rod 26. The drop head is released when the control valve is opened to exhaust, as hereinafter explained, the speed of drop being controlled by the bleed valve 25, which may be manually set by turning a vertical control rod 32 by means of a handle 33.

The control valve is turned to exhaust position by a hydraulic trip 34 which is in a housing 35 at the right of the anvil, the pressure air for actuating the trip passing from the cylinder air supply through a conduit 36 which extends around the anvil, and has a connection 37 leading into the housing 35; a manually operable shut-off valve 38 is mounted in the line and two spring pressed hand valves 39, 40 are also in the line and are adapted to be manually depressed through hinged plates 41, 42, whereby both hands of the operator must be applied to release the drop head.

Referring now to Figs. 4 and 5, a safety cylinder 43 is mounted at one side on the anvil and has a spring pressed plunger 44 which is lever connected to a hub 45 keyed to a rotatable vertical rod 46. A lock element 47 is keyed to the rod 46 and is adapted to position a lock finger 48 in the path of downward movement of the drop head to lock the drop head in its up position, the hub 45 having an extension 49 to which an anvil sweep 50 is connected. The plunger 44 is actuated by pressure air from a conduit 51 which passes through a valve housing 52 in which a recipro-

cable valve 53 slides, the valve having a slot 54 to selectively open an inlet passage 55 and an exhaust passage 56, the inlet passage receiving pressure air through a connection 57. The valve 53 has a hinged valve rod 58 which has a slotted end 59, and a hub 60 is keyed to the control rod 29 and has an adjustable end bolt connection which extends through the slotted valve rod end 59 to obtain a predetermined timed operation of the valve 53 with respect to the movement of the control valve to exhaust position. When the rod 29 is turned by the drop head pin 31 on its upstroke the valve 53 is moved to open the exhaust passage 56 and thus causes locking movement of the lock element 47. When the trip is actuated by manually pressing the valves 49, 40 to open position, the rod 29 turns, the valve 53 is opened to entry of pressure air which shifts the lock element 47 out of the path of downward movement of the drop head and at the same time sweeps the anvil sweep 50 across the face of the anvil, and the control valve is simultaneously turned to exhaust, whereby the drop hammer drops, the lock element being mounted at a distance from the drop head to provide sufficient clearance between the drop head and the lock finger. When the drop head is lifted, the control rod moves to shift the valve 53 and the lock element moves to assume its normal lock position in the path of downward movement of the drop head.

The above described safety arrangement is thus simple in construction and effective in operation, and may be readily adapted to standard drop hammers and presses.

Although I have described a specific constructional embodiment of my invention, it is obvious that changes in the size, shape, and arrangement of the parts may be made to suit different types and styles of drop hammers and presses, without departing from the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. A safety device for a drop hammer having an anvil, a drop head, and mechanism for lifting and for releasing the drop head, comprising a lock element normally positioned in the path of downward movement of the drop head for preventing said downward movement and an anvil sweep adapted to move across the face of the anvil, and manually operative means for initiating downward movement of the drop head for shifting the lock element out of the path of the drop head and for moving the anvil sweep across the face of the anvil, and means operative upon lifting movement of the drop head for shifting the lock element back into the path of the drop head and for moving the anvil sweep back to its original position.

2. A safety device for a drop hammer having an anvil, a drop head, and pressure actuated mechanism for lifting and for releasing the drop head, comprising a lock element normally positioned in the path of downward movement of the drop head for preventing said downward movement, and manually operative means for initiating downward movement of the drop head for shifting the lock element out of the path of the drop head, and means operative upon lifting movement of the drop head for shifting the lock element back into the path of the drop head, said means including a cylinder having a pressure actuated piston and mechanism connecting the piston to the lock element.

3. A safety device for a drop hammer having an anvil, a drop head, and a pressure actuated mechanism for lifting and for releasing the drop head, comprising a lock element normally positioned in the path of downward movement of the drop head for preventing said downward movement and an anvil sweep adapted to move across the face of the anvil, and manually operative means for initiating downward movement of the drop head for shifting the lock element out of the path of the drop head and for moving the anvil sweep across the face of the anvil, and means operative upon lifting movement of the drop head for shifting the lock element back into the path of the drop head and for moving the anvil sweep back to its original position, said means including a cylinder having a pressure actuated piston and mechanism connecting the piston to the lock element and the anvil sweep.

4. A safety device for a drop hammer having an anvil, a drop head, and pressure actuated mechanism for lifting and for releasing the drop head, comprising a lock element normally positioned in the path of downward movement of the drop head for preventing said downward movement, and manually operative means for initiating downward movement of the drop head for shifting the lock element out of the path of the drop head, and means operative upon lifting movement of the drop head for shifting the lock element back into the path of the drop head, said means including a cylinder having a pressure actuated piston, and a control valve operated by the drop head, and mechanism connecting the piston to the lock element.

5. A safety device for a drop hammer having an anvil, a drop head, and a pressure actuated mechanism for lifting and for releasing the drop head, comprising a lock element normally positioned in the path of downward movement of the drop head for preventing said downward movement and an anvil sweep adapted to move across the face of the anvil, and manually operative means for initiating downward movement of the drop head for shifting the lock element out of the path of the drop head and for moving the anvil sweep across the face of the anvil, and means operative upon lifting movement of the drop head for shifting the lock element back into the path of the drop head and for moving the anvil sweep back to its original position, said means including a cylinder having a pressure actuated piston, a control valve operated by the drop head, and mechanism connecting the piston to the lock element and the anvil sweep.

GEORGE E. BARNHARDTSON.

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