(No Model.) 2 Sheets—Sheet 1.

F. J. COLE.

HYDRAULIC JACK.

No. 552,274. Patented Dec. 31, 1895.

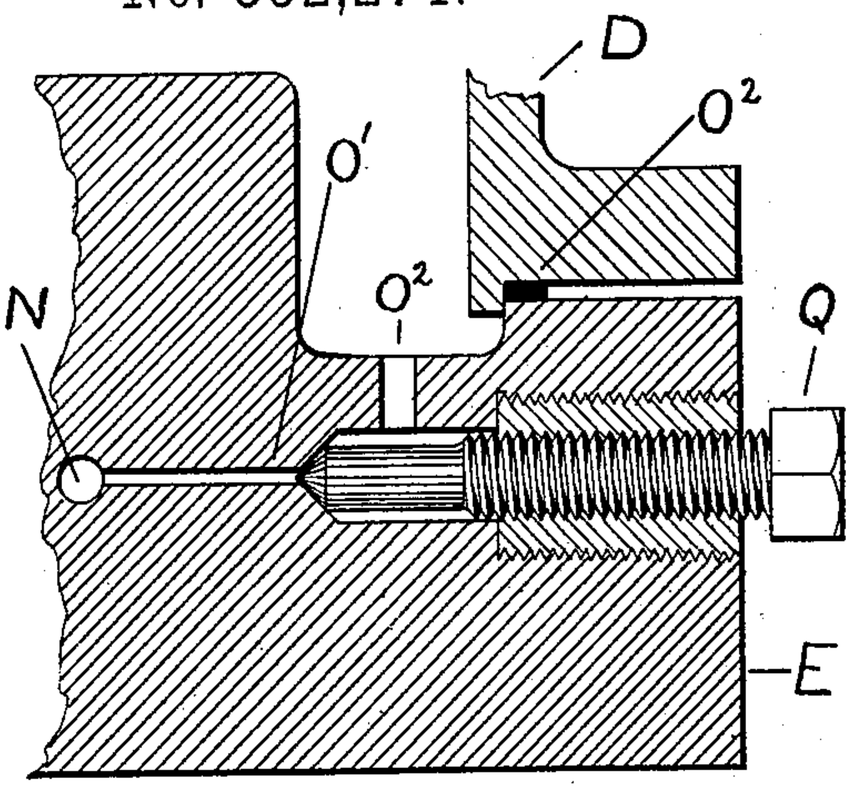

Fig 2.

Fig 1.

WITNESSES:

J. McAdams

Joseph W. Ramage.

INVENTOR,

Francis John Cole

(No Model.)

2 Sheets—Sheet 2.

F. J. COLE.

HYDRAULIC JACK.

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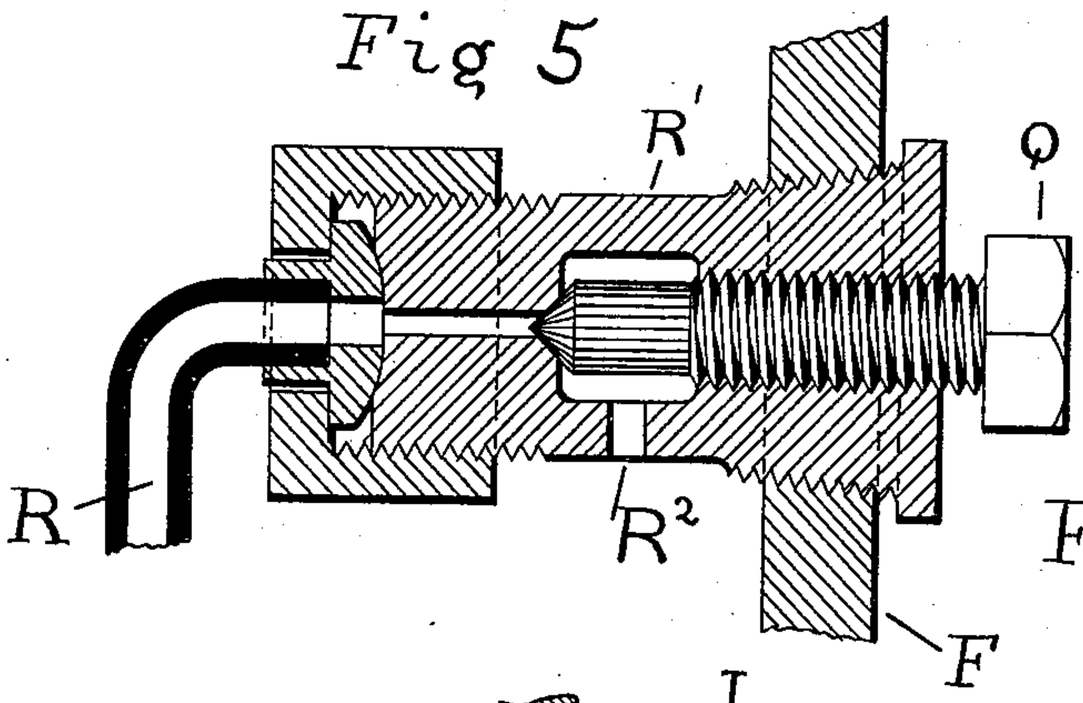
Fig 5



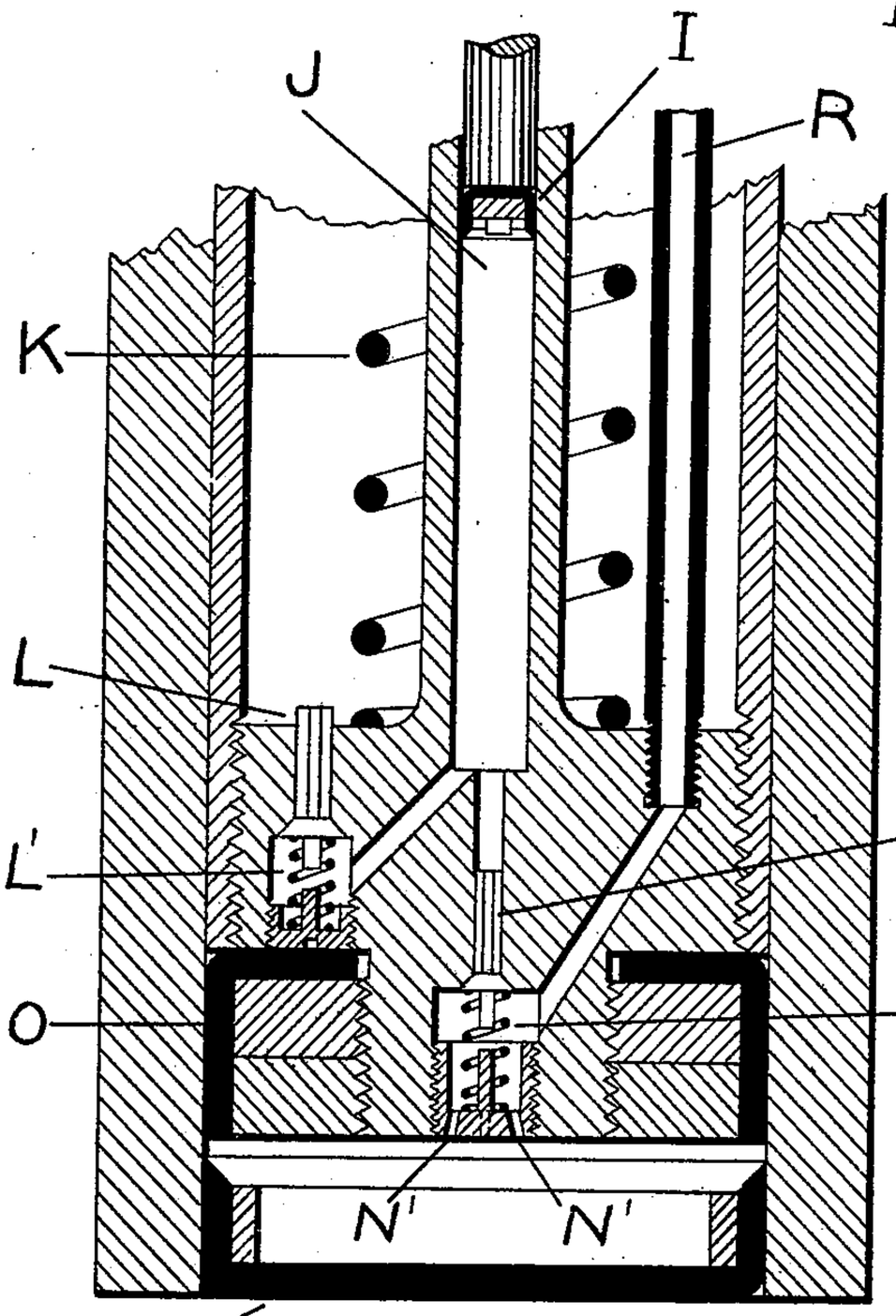


Fig 4

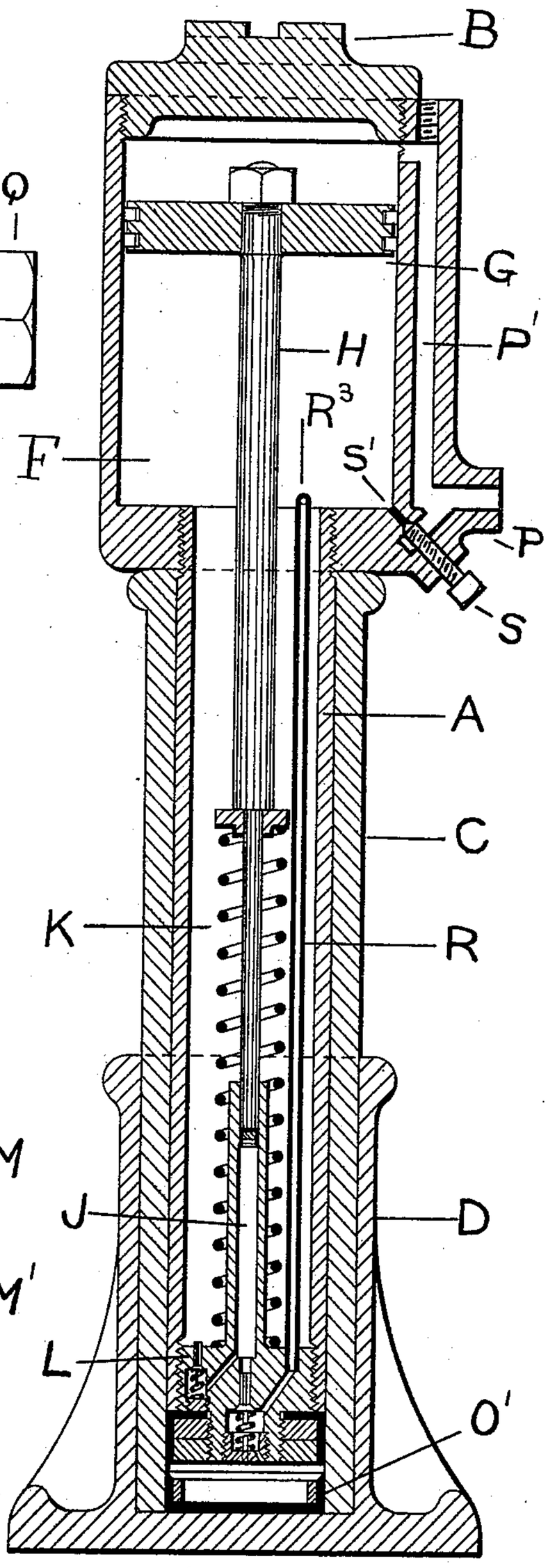


Fig 3

WITNESSES:

J. W. Adams

Joseph B. Ramage.

INVENTOR.

Francis John Cole

UNITED STATES PATENT OFFICE.

FRANCIS JOHN COLE, OF BALTIMORE, MARYLAND.

HYDRAULIC JACK.

SPECIFICATION forming part of Letters Patent No. 552,274, dated December 31, 1895.

Application filed April 29, 1895. Serial No. 547,451. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS JOHN COLE, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented a new and useful Improvement in Hydraulic Jacks, of which the following is a specification.

My invention relates to an improvement in hydraulic jacks in which the elastic force of compressed air is utilized in a simple manner instead of the usual method of laboriously operating by hand. I obtain this object by the arrangement illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the jack in which the pneumatic cylinder is located at one side of the main lifting-ram. Fig. 2 is a fragmentary sectional view of the base, showing the release or lowering valve and the ports relating thereto. Fig. 3 is a sectional elevation of another form of jack in which the pneumatic cylinder is contained in the head and is located axially with the main lifting-ram. Fig. 4 is an enlarged fragmentary section of the lower part of main ram, showing the admission and discharge valves. Fig. 5 is an enlarged section of the lowering or release valve with the ports relating thereto located in the lower portion of the pneumatic cylinder.

Similar letters refer to similar parts throughout the several views.

A is the main plunger or lifting-ram of the jack. B is the head of same placed under the object to be raised; C, the main casing or tube in which the ram A reciprocates; D, the base of jack, which forms in Fig. 1 the receptacle for the non-elastic fluid; E, the base-plate, bolted or otherwise secured to the base D, Fig. 1. It is made separate from the base for convenience in arranging the valves and for easy examination should any repairs or adjustment be required of same.

F is the pneumatic cylinder; G, the piston reciprocating therein; H, the piston-rod forming the pump-plunger at its lower end with the hydraulic packing I; J, the chamber in which the piston H reciprocates; K, the release-spring for returning the piston G back to its original position when the air is exhausted.

L is the admission-valve which allows the non-elastic fluid to flow from the chamber formed in the base D, Fig. 1, and from the interior of the main plunger, Figs. 3 and 4, into the hydraulic chamber J when the plunger H is drawn back.

L′ is a spring which serves to keep the admission-valve against its seat, but is light enough to be compressed by the fluid rushing in to fill the partial vacuum caused by the motion of the plunger H on its upward stroke.

M is the discharge or check valve, with its spring M′. This valve allows the non-elastic fluid on the downward stroke of the plunger I to flow into the interior of the casing C, under the main ram, through the passage N, Fig. 1, and N′, Fig. 4.

O is the hydraulic packing at the base of the main ram A.

O′ is the hydraulic packing at the base of casing C.

O^2 is the packing between the base D and the base-plate E.

P is an opening for the admission of air-pressure to the pneumatic cylinder F.

In Fig. 3, P is shown in the lower part of the pneumatic cylinder, connected with the upper portion by port P′. A suitable valve of usual construction for the admission and release of the compressed air is conveniently connected to P, but is not shown on the drawings.

Q is the release or lowering valve and connected at the port N by the port Q′. When it is desired to lower the jack, valve Q is unscrewed a short distance, allowing the non-elastic fluid to pass from port N through the port Q′ into the interior of the base D by means of the port Q^2. In Fig. 4 the non-elastic fluid passes through the pipe R and through the spud or bushing R′, which is screwed into the side of the pneumatic cylinder F in its lower portion at the point R^3 and thence through the port R^2 to the interior of the main ram A.

S is a screw-valve, and S′ a port by means of which direct air-pressure can be admitted on top of the non-elastic fluid in the chamber formed in the interior of the ram A. This forces said fluid out through the valves M and L and raises the ram rapidly and con-

tinuously when a considerable distance has to be traversed before the head comes in contact with the object to be raised.

In operating the jack, all that is necessary to do is to place the head B under the object to be raised and connect the admission-port P with the supply of compressed air. The air is then admitted to the pneumatic cylinder F and forces the piston down, thereby forcing the non-elastic fluid through the check-valve M, and forces up the main lifting-ram. The air is then released, and the spring K forces the piston back to its original position. During the upward stroke the non-elastic fluid flows through the admission-valve L into the hydraulic chamber J. By alternately admitting and releasing the air the jack is operated with great rapidity and much saving in manual labor.

One great advantage gained by this improvement is that a number of these jacks can be operated simultaneously with one admission-valve by one person. Another advantage obtained is the ability to rapidly raise the main ram by means of the direct air-pressure on the non-elastic fluid, as before described.

Although compressed air has been uniformly described in the foregoing as a motive power, its use being most advantageous on account of the absence of excessive heat and any annoyance or difficulty attending the disposal of the exhaust, yet it is obvious that the jack could be readily operated by means of steam or water pressure.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a hydraulic jack of a main lifting ram; a chamber or reservoir for the non-elastic fluid; a cylinder adapted for fluid pressure; a piston reciprocating therein; a substantially integral piston rod rigidly attached to said piston, forming at its end a hydraulic pump located axially with said piston and cylinder, forcing the non-elastic fluid used to actuate the main lifting ram by a series of strokes or impulses, the fluid being controlled by suitable admission and discharge valves; admission and discharge valves for said non-elastic fluid; means other than fluid pressure for returning the piston to its original position after each stroke; and a release or lowering valve "Q" substantially as described.

2. The combination in a hydraulic jack of a main lifting ram; a chamber or reservoir for the non-elastic fluid; a cylinder adapted for fluid pressure; a piston reciprocating therein; a piston rod operated directly by said piston, forming at its end a hydraulic single acting pump, adapted for forcing the non-elastic fluid used to actuate the main lifting ram; valves for controlling the non-elastic fluid; and a spring surrounding said piston rod for returning piston to its original position.

3. The combination in a hydraulic jack of a main lifting ram; a chamber or reservoir for the non-elastic fluid; a cylinder adapted for fluid pressure; a piston reciprocating therein; a hydraulic plunger of relatively much smaller diameter located axially with said piston, adapted for forcing the non-elastic fluid used in operating the main lifting ram; and means for admitting the air pressure directly into the chamber containing the non-elastic fluid.

FRANCIS JOHN COLE.

Witnesses:
J. N. ADAMS,
JOSEPH C. RAMAGE.