

(No Model.)

2 Sheets—Sheet 1.

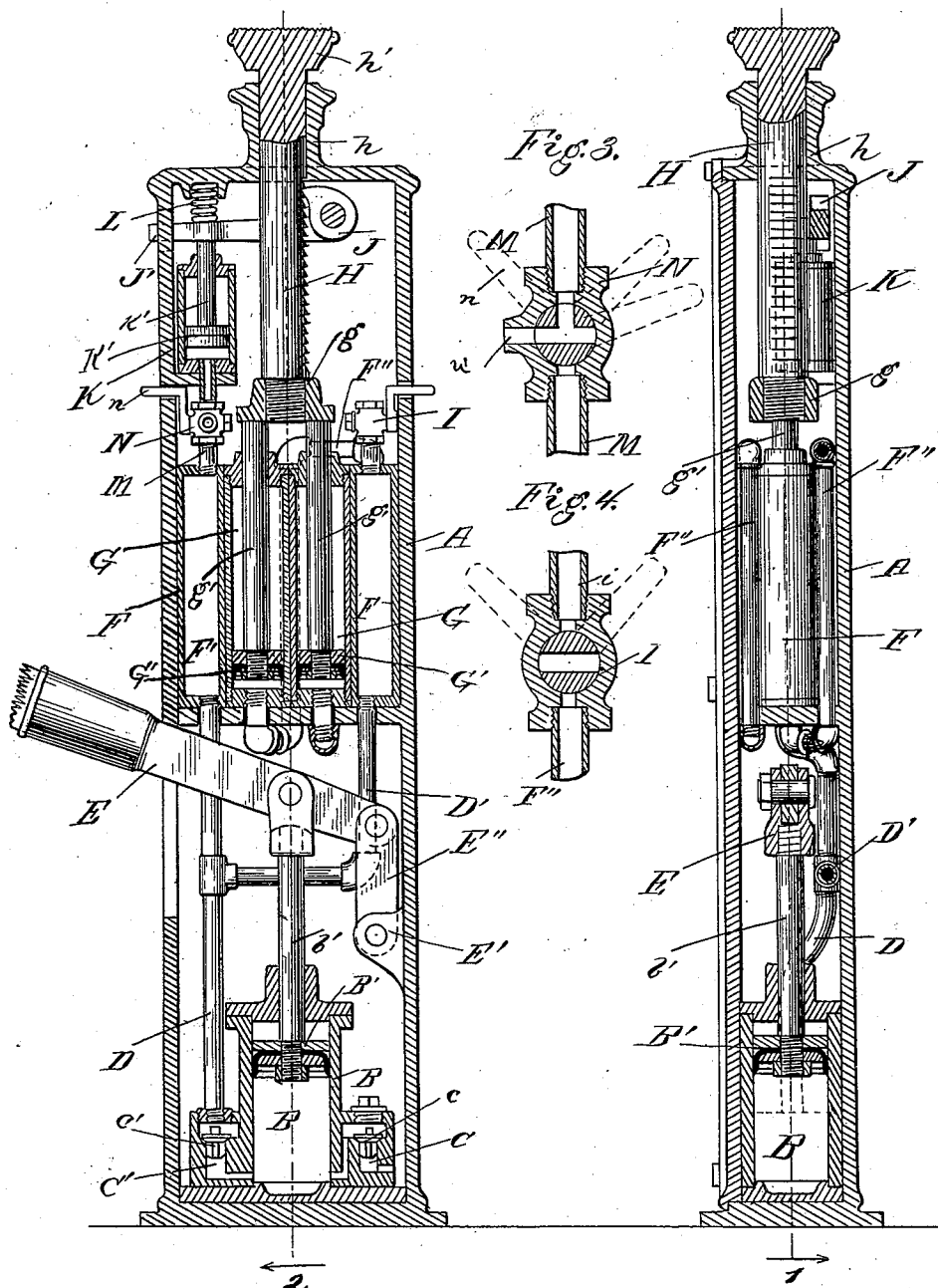
A. J. McDONALD.
PNEUMATIC JACK.

No. 512,313.

Patented Jan. 9, 1894.

Fig. 1.

Fig. 2.



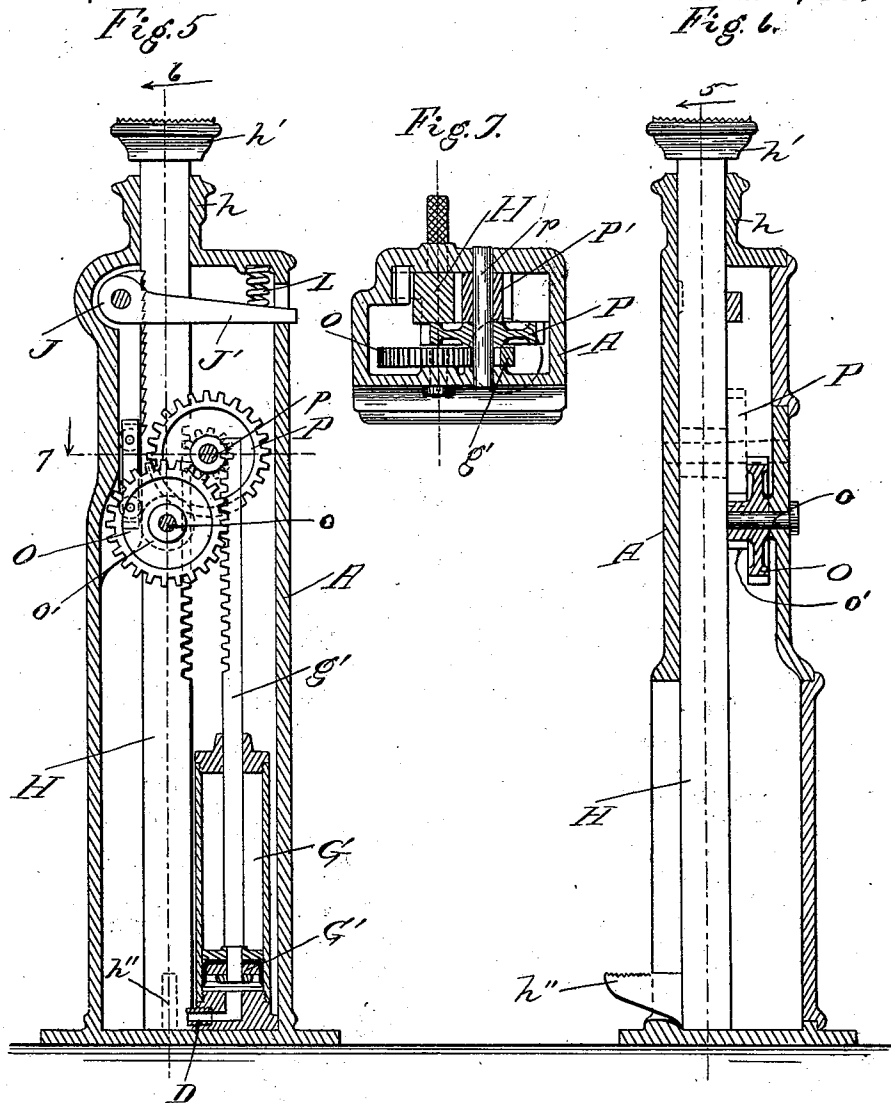
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UNITED STATES PATENT OFFICE.

ALEXANDER J. McDONALD, OF CHICAGO, ASSIGNOR OF ONE-FOURTH TO
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PNEUMATIC JACK.

SPECIFICATION forming part of Letters Patent No. 512,313, dated January 9, 1894.

Application filed March 31, 1892. Renewed June 12, 1893. Serial No. 477,380. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER J. McDONALD, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Pneumatic Jacks, of which the following is a specification.

Jacks, as is well known, are devices used in the arts for raising various heavy bodies. They have been constructed heretofore in a variety of forms and operated in various ways, and the object of my invention is to provide a jack which shall be operated by the pressure of compressed air.

As will be seen from the description hereinafter contained, my improved form of jack is simple in construction and highly efficient in operation, there being no question but that the power of compressed air is sufficient, so long as the parts of the apparatus remain unbroken, to raise and sustain almost any weight.

My device is so constructed that the power of the air is readily applied to the lifting rod to raise the same with a superincumbent weight. I also provide means whereby the air pressure can be instantly released, so as to permit the jack to be readily removed from the place in which it is being used, if necessary.

Accidents have frequently happened with the use of jacks as heretofore constructed, owing to the difficulty of readily removing them from the place of use, and accidents will be entirely avoided by the use of my invention.

My invention also relates to various novel features of construction and combinations of parts as will be hereinafter more particularly pointed out in the description and claims.

In the drawings, Figure 1 is a vertical central section on line 1 of Fig. 2, looking in the direction of the arrow; Fig. 2 a similar section on line 2 of Fig. 1, also looking in the direction of the arrow. Figs. 3 and 4 are sectional views illustrating details of the apparatus. Fig. 5 is a section on line 5 of Fig. 6; Fig. 6 a section on line 6 of Fig. 5; and Fig. 7 a section on line 7 of Fig. 5, all sections looking in the direction of the arrows respectively.

In constructing my improved jack, I first make a standard or case A of any suitable material, preferably metal, and of any desired dimensions, depending upon the size of jack to be constructed. Within this standard is placed a cylinder B, which I term a "main" cylinder and in which moves a piston B', to which is connected a piston rod b'. Air is admitted into this cylinder through a port C, in which is seated a valve c, and passes out of the cylinder through a port C', in which is situated a valve c'. As the piston is raised, the valve c will rise to admit air, while the valve c' will be held to its seat, and as the piston is depressed the valve c will be held to its seat and the valve c' will be raised and allow air to pass out of the cylinder into the pipe D. To operate this piston I provide a hand lever E, fulcrumed at E', being connected to such fulcrum by means of a link E''. This lever is connected to the piston rod, extends out of the standard, and is provided with a handle, shown broken off, whereby the piston is operated.

Secured inside of the case in any suitable manner is a shell or cylinder F, of any desired dimensions, which connects with the cylinder B by means of the pipe D and the branch pipe D'. Inside of this shell I place one or more smaller or auxiliary cylinders G. I have shown two of these cylinders; but a smaller or greater number may be used as considered desirable. By this means, I form an air chamber F' at each side of the cylinders G; these air chambers being connected with the cylinders by means of pipes F'', which pass from the top of the air chamber downward and under the bottom of the cylinders G, as shown. Inside of the cylinders G are pistons G' and piston rods g'. These piston rods extend out at the upper end of the cylinder, and are attached to a block or cross head g, to which is fastened the lifting rod H. This lifting rod passes through a collar or box h at the top of the standard, and is provided with a preferably roughened head h', which contacts with and supports the body to be raised.

The valve I is connected, as shown, with the pipes F''. The construction of this valve is shown more particularly in the sectional

views, Fig. 4. When in the position shown in this figure the valve is closed, and the air which passes out of the chamber F' passes through the pipes F'' into the cylinder G. When the valve is moved into the other position, the air is allowed to exhaust or escape out of the pipe *i*. It should be understood that the other pipe F'', shown in Fig. 2, does not appear in Fig. 1, but that it passes from one of the chambers F', connects with the valve I, and then enters the lower end of one of the cylinders G, so that each of the air chambers F communicates with one of the cylinders G, and also is to be adapted to be exhausted by means of the valve I.

To hold the lifting rod in any position to which it may be raised, I provide a pawl J, pivoted in the case A and adapted to engage with teeth formed on the side of the lifting rod, as shown. Secured to the shaft upon which this pawl is fastened is an arm J', through which passes a piston rod *k'*, which is connected to a piston K', moving in a cylinder K. A spring L normally holds this pawl in engagement with the lifting rod, and when it is desired to disengage this and allow the rod to fall, it is done in the following manner: A pipe M connects one of the chambers F' with the cylinder K, and in this pipe is a valve N, provided with an operating handle *n*, which extends out of the side of the standard. This valve is more particularly shown in Fig. 3. When in the position shown in that figure, any air that may be in the cylinder K will escape by means of the exhaust port *n*, the piston forced down by the pressure of the spring L, and the pawl brought into engagement with the teeth on the lifting rod. When the valve is moved into the other direction, or turned toward the right (Fig. 3) air will be allowed to pass from the chamber F' into the cylinder through the pipe M, will force up the piston, raise the arm J' and rock the pawl toward the right, (Fig. 1) releasing the rod. The valve I having also been opened, air will be allowed to escape from the cylinders G, and the lifting rod, being no longer sustained by the pawl or by the air pressure, will fall through its own weight.

The operation of this jack, I think, will be obvious from the description, but may be briefly stated here. As the operating lever is worked up and down, air will be continually forced from the main cylinder B into the air chambers F', and thence into the auxiliary cylinders G, raising the lifting rod to any extent desired. When it is desired to lower this rod, the valves will be opened, air will escape from the auxiliary air cylinders, the pawl withdrawn, and the lifting rod allowed to fall. The advantage of interposing the air chamber between the main and auxiliary cylinders is, that thereby I am enabled to maintain a constant pressure of air in all the other cylinders, these chambers serving as a sort of storage reservoir for the compressed air.

In Figs. 5 to 7 I have illustrated a modifi-

cation of my device. In this form I do not show the cylinder D, with its piston and operating lever, but they would of course be supplied in the completed jack. When made in this form, I have entirely omitted the air chambers F, and connect the pipe D directly to the cylinder G. The piston rod *g'* is provided with teeth at its upper end forming a rack. These teeth engage with a gear O mounted on a shaft *o* in the casing. This same shaft carries another gear O', which meshes with a gear P on a shaft *p*. On this same shaft is a gear P', which engages with a rack formed on the side of the lifting rod H. From the construction of these gears, it will be obvious that as the piston G' is forced upward by the pressure of the air, the lifting rod will also be raised by the revolution of the gears, raising the weight. When it is desired to lower the lifting rod, the air can be allowed to escape from the cylinder and the pawl J disengaged from the teeth in the rack, when the latter will fall through its own weight. In this form the lifting rod is also provided with a foot or projection *h''*, whereby weights may be raised as well as by the head *h'*.

While I have described more or less precise forms, I do not wish to be unduly limited thereto, but contemplate changes in form and proportions and the substitution of equivalent members, as may be desirable or necessary. For example, and as illustrating such changes, I may state that I may only use one cylinder G, and one air chamber F', which may be annular or at the side of the cylinder as desired. Similarly, I may dispense with the air chambers and connect the main or operating cylinder directly to the auxiliary cylinder, as shown in Figs. 5-7, and similarly, other changes may be made without departing from the spirit of my invention, the gist of which consists in providing a jack adapted to be operated by pneumatic pressure.

I claim—

1. In a pneumatic jack, the combination of a standard, a main air cylinder having a piston, an auxiliary air cylinder connected to such main cylinder and having a piston and lifting rod, and means whereby such rod is raised by air pressure from the main cylinder, substantially as described.

2. In a pneumatic jack, the combination of a standard, a main air cylinder therein, an air chamber connecting with such cylinder, an auxiliary cylinder connected with such chamber, a piston sliding up and down in such cylinder and connected to the lifting rod, whereby as air is forced from the main cylinder it will enter the air chamber and thence pass into the auxiliary cylinder and raise the rod, substantially as described.

3. In a pneumatic jack, the combination of a standard, a main cylinder placed therein provided with suitable ports, a piston and rod moving in such cylinder, and means for operating the same, an air chamber connected with such cylinder, an auxiliary cylinder con-

ected with such air chamber, a piston and rod moving in such chamber, and a lifting rod attached to the latter piston rod, whereby as the piston in the main cylinder is worked
 5 up and down, air will be forced into the air chamber and thence into the auxiliary cylinder to raise the lifting rod, substantially as described.

4. In a pneumatic jack, the combination of
 10 a lifting rod, means for pneumatically raising the same, a pawl engaging with teeth on such rod to sustain the same, an arm connected to such pawl, such arm being moved in one direction by means of a spring to hold
 15 the pawl in engagement with the teeth and in the other direction by pneumatic pressure to release the pawl, substantially as described.

5. In a pneumatic jack, the combination of
 20 a lifting rod, means for pneumatically lifting the same, a pawl adapted to engage with the teeth on such rod, an arm connected to such pawl, a spring engaging with such arm, a cylinder connected with a source of compressed air, a piston rod sliding in such cylinder, the
 25 rod being connected to the arm, whereby the pawl is normally held in engagement with the rod, but when air is admitted to the cylinder the piston will be raised withdrawing the pawl and raising the rod, substantially as described.
 30

6. In a pneumatic jack, the combination of
 35 a cylinder, a piston and rod moving therein, a lifting rod connected with such piston rod, means for forcing the air into such cylinder and exhausting it therefrom, a pawl engaging with the rod, and means for withdrawing such pawl by air pressure whereby such rod
 40 may be pneumatically raised, held at any desired height, and allowed to fall, substantially as described.

7. In a pneumatic jack, the combination of
 a standard, a main cylinder supported therein provided with a piston and rod, means for operating such piston, an air chamber supported
 45 within such standard and connected with the main cylinder by a suitable pipe, an auxiliary reservoir placed within such air chamber and connected therewith, a piston sliding in such
 50 auxiliary cylinder and a lifting rod connected to and moving with such piston, substantially as described.

8. In a pneumatic jack, the combination of
 a standard, an air chamber supported therein, a cylinder within such air chamber and
 55 connected therewith by a suitable pipe, a valve in such pipe for exhausting the air from the air chamber, a piston in the cylinder, a lifting rod connected to and moving
 60 with such piston, and means for forcing air into the air chamber, substantially as described.

9. In a pneumatic jack, the combination of
 a standard, a main cylinder therein, a piston working in such cylinder, an auxiliary cylinder connected to the main cylinder, a piston
 65 traveling in the auxiliary cylinder, a piston rod connected to such piston extending out of the auxiliary cylinder and engaging with suitable gearing, and a lifting rod also
 70 engaging with such gearing, whereby as air is forced from the main cylinder to the auxiliary cylinder, the gearing will be operated to raise the lifting rod, substantially as described.

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Witnesses:

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