(No Model.)

E. M. BUTZ.

FLUID PRESSURE MOTOR.

No. 267,490. Patented Nov. 14, 1882.

Fig. 1.

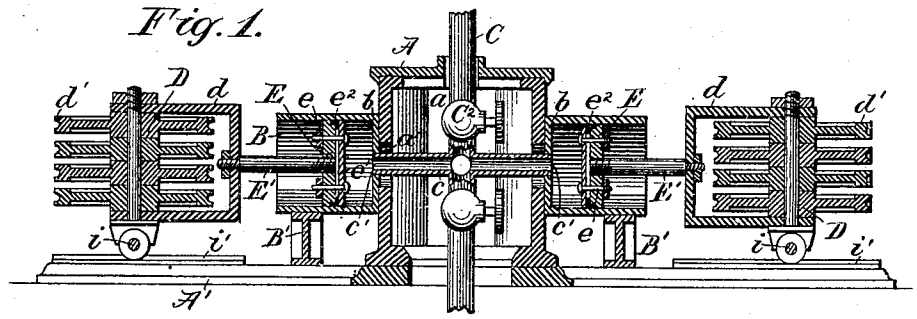


Fig. 2.

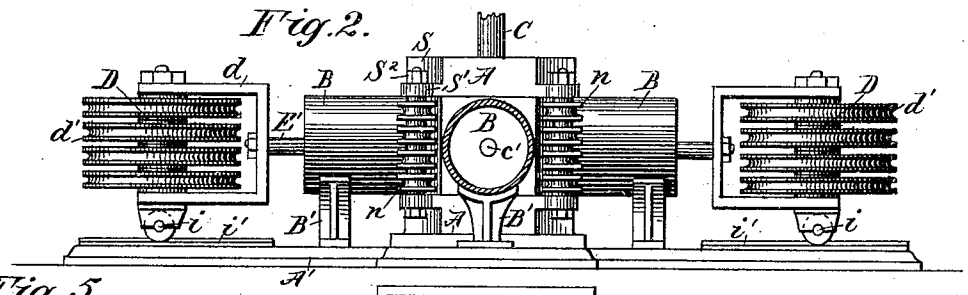


Fig. 5.

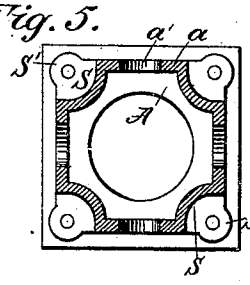


Fig. 4.

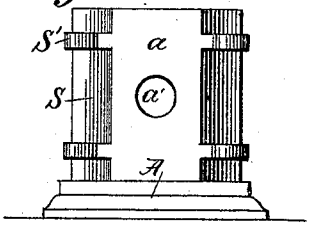


Fig. 3.

Witnesses.
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UNITED STATES PATENT OFFICE.

EDWARD M. BUTZ, OF ALLEGHENY CITY, ASSIGNOR TO THE PENNSYLVANIA CONSTRUCTION COMPANY, OF PITTSBURG, PENNSYLVANIA.

FLUID-PRESSURE MOTOR.

SPECIFICATION forming part of Letters Patent No. 267,490, dated November 14, 1882.

Application filed February 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. BUTZ, of Allegheny City, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Fluid-Pressure Motors; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a vertical sectional view of my improved fluid-pressure motor, the section being taken in the plane of the line *x x*, Fig. 3. Fig. 2 shows the same in sectional elevation, the section being taken in the plane of the line *x' x'*, Fig. 3. Fig. 3 is a top plan view, partly in section. Fig. 4 shows a side elevation of the central frame or support, and Fig. 5 is a horizontal sectional view of the same.

My invention relates to fluid-pressure motors or power apparatus—such, for example, as is used for hoisting purposes; and it consists in the combination of two or more fluid-pressure cylinders, arranged radially with relation to each other, with sheaves attached to and movable with their several pistons, a rope passing over such movable sheaves, and also over guide pulleys or sheaves, as hereinafter more fully described and claimed.

In the drawings, A represents a polygonal casting, having any desired number of plain side faces, *a*, four being shown, to which are secured, by bolts or otherwise, four cylinders, B. Additional supports, B', may be provided for these cylinders, which, like the central block or casting, A, may be secured in any convenient way on a bed, A'. The inner ends of the cylinders are closed by heads *b*, secured thereto in the usual or any convenient way. Fluid—as water, steam, air, &c.—under pressure is conveyed to the cylinders by pipe C, which passes into the interior of central support, A, and leads by branches *c c*, through openings *a'* in the sides of such support, to the several cylinders through their inner heads, as at *c'*. A discharge-pipe, C', leads off from these branches or from the pipe C; and in both the pipes C C' are arranged valves c^2, which admit and discharge fluid as they are alternately opened and closed by any convenient or suitable mechanism. Pistons E are provided within the several cylinders, which may be of any desired or suitable construction. As shown, they are formed of a body, *e*, and face-plate *e'*, bolted together, and between these plates or around their peripheries is arranged suitable packing, e^2. Fluid under pressure being admitted to the cylinders, as described, the pistons E will be moved radially outward. Piston-stems E' communicate this motion from each piston to sheaves D, consisting of frames or blocks *d* and any desired number of loose pulleys, *d'*. These sheaves may be supported and guided in horizontal position by rollers *i* and tracks *i'*.

At the corners of the central support, A, are mounted pulleys *n*. For convenience in construction, I have hollowed out the corners of this casting, as at *s*, and have provided lugs *s'* thereon, between which the pulleys *n* are pivoted by rods s^2. These pulleys *n* correspond in number and in the planes of their position to those in sheaves D. A rope, H, is secured at one end to any suitable fixed support—for example, to one of the cylinders—as at *h*, Fig. 3. Thence it is passed over or around the large sheaves *d'* and under the small pulleys *n*, in regular succession, around the whole apparatus any desired number of times—four times, for example—as illustrated by the number of sheaves in each frame or block. The purpose of the small pulleys *n* is to change the direction of the rope, passing it to and taking it from each sheave or pulley *d'*, substantially in the direction of its radial spread. By this means the action of the rope upon each sheave will be substantially the same in principle as in ordinary pulley-tackle.

It will be observed that the amount of spread imparted to sheaves D by the combined outward stroke of all the pistons, measured in the radial direction of piston motion, is four times the stroke of one piston; also, since the pistons all move simultaneously, this amount of spread is effected in one-fourth the time that would be required by one piston to move at the same rate over the entire extent of spread; also, that the combined power exerted by all

four pistons upon the sheaves is four times the amount exerted by one piston of the same area as one of the four, it being understood that an adequate supply of fluid under pressure is provided simultaneously for each and all the cylinders. In this improvement I provide for increasing the working-power, when required, by increasing the number of working-cylinders, thus securing any desired amount of power; and in so doing I provide for securing its full efficiency by arranging the cylinders in such way that they move all the sheaves simultaneously, and thereby secure a maximum rate of speed without increasing the pulley combinations or tackle. I also avoid increase in friction and other impediments encountered in complicated pulley-tackle and a considerable part of the extra expense incident to the construction of large cylinders and pistons with long stroke, heretofore required where high power and speed were desired.

An important feature of my present invention is the guide-pulleys *n*, which direct the rope to and from the movable sheaves; and while I have described and shown what I now consider the best and most economical means of mounting such pulleys, I do not wish to limit my invention thereby, as such pulleys may be supported in other positions and by other means, as convenience or the circumstances of each case may suggest, and still perform substantially the functions herein described. By means of such guide-pulleys I am enabled to employ any desired number of cylinders—two or more—radially arranged. For convenience, I have shown four in the drawings; but this number may be increased or diminished. If only two cylinders are used, I prefer to place them in line, and in such case the pulleys *n* may be omitted, the rope being passed directly from one set of sheaves, D, to the other; but such construction and arrangement are not claimed herein, but will be embraced in the subject-matter of a separate application for patent.

It will be understood that by the "rope H" I mean any suitable flexible cord, cable, chain, or equivalent device used for like purposes.

I claim herein as my invention—

1. In a fluid-pressure motor, two or more fluid-pressure cylinders, B, arranged radially with pistons E therein movable outward under pressure, as described, in combination with pulley-sheaves D, secured to and movable with such pistons, rope H, and guide-pulleys *n*, substantially as set forth.

2. The combination of central casting, A, fluid-pressure cylinders B, arranged radially around such casting, supply and discharge pipes C C′, having branches *c*, opening into all the cylinders, pistons E, stems E′, sheaves D, guide-pulleys *n*, and rope H, substantially as set forth.

In testimony whereof I have hereunto set my hand.

EDWARD M. BUTZ.

Witnesses:
R. H. WHITTLESEY,
C. L. PARKER.