

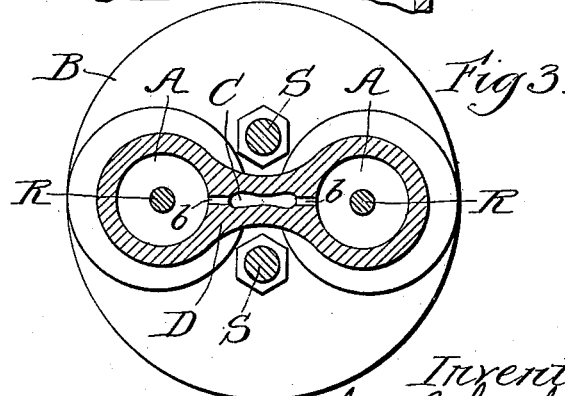
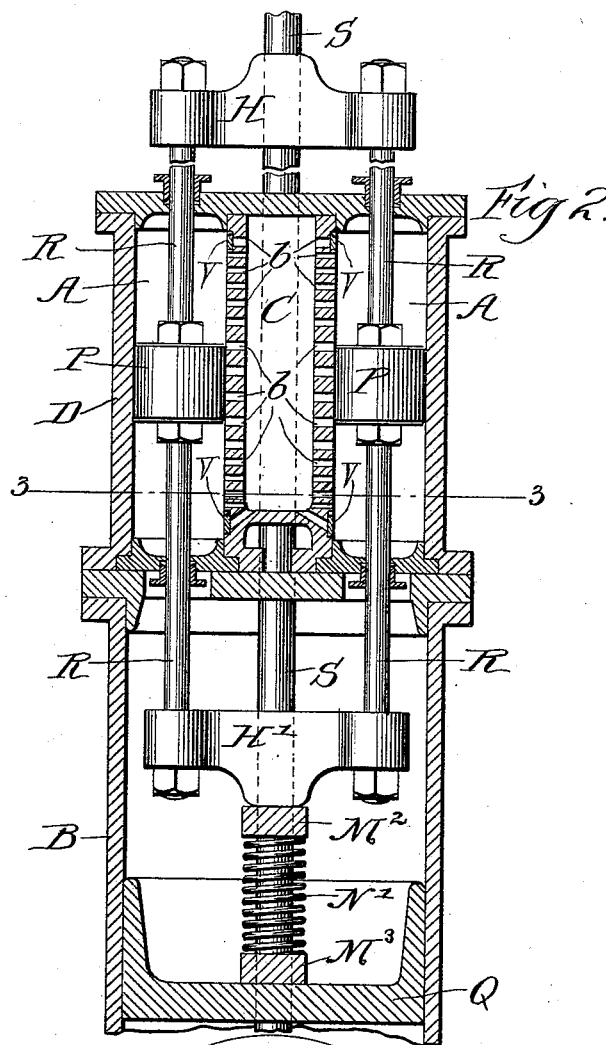
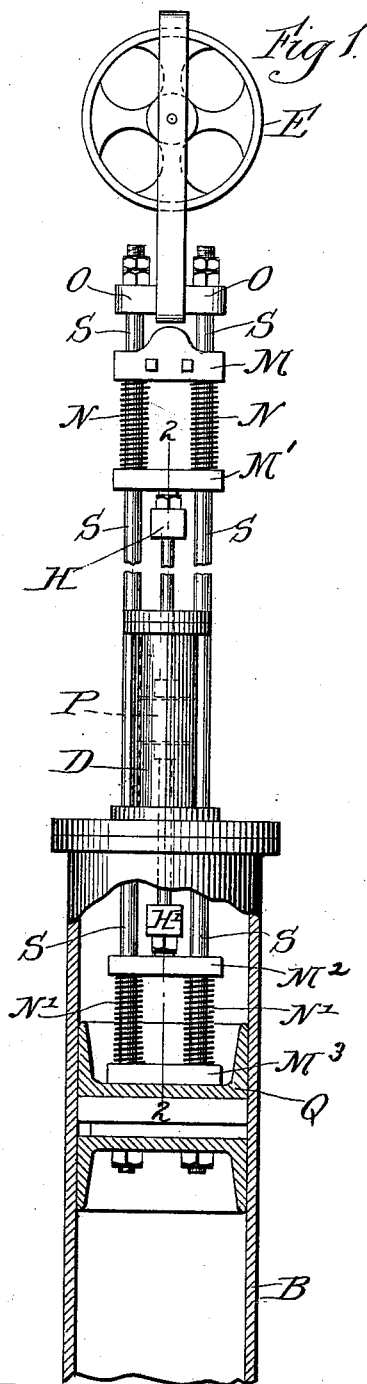
(No Model.)

H. R. SMITH.

AUTOMATIC STOP DEVICE FOR HYDRAULIC ELEVATORS.

No. 523,242.

Patented July 17, 1894.



Witnesses
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UNITED STATES PATENT OFFICE.

HUMPHREY R. SMITH, OF CHICAGO, ILLINOIS.

AUTOMATIC STOP DEVICE FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 523,242, dated July 17, 1894.

Application filed April 23, 1894. Serial No. 508,680. (No model.)

To all whom it may concern:

Be it known that I, HUMPHREY R. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Automatic Stop Devices for Hydraulic Elevators, of which the following is a specification.

This invention relates to hydraulic elevator apparatus and its object is to provide means for automatically checking the motion of the piston in the motor cylinder as it approaches each limit of stroke whereby the motion of the elevator car is arrested at the limits of its travel without jar.

With this object in view the invention consists in the details of construction, location and relative arrangement of parts, and combinations as will be more fully hereinafter described, and shown in the accompanying drawings and finally pointed out in the appended claims.

Reference is had to the accompanying sheet of drawings and to the several views and reference signs appearing thereon, and wherein—

Figure 1 is a view in side elevation, parts being broken away and parts in central vertical section, of an apparatus embodying my invention. Fig. 2 is a vertical central sectional view of the same on an enlarged scale taken on the line 2, 2, Fig. 1. Fig. 3 is a horizontal sectional view taken on the line 3, 3, Fig. 2.

The same reference signs are used to designate the same parts wherever they occur throughout the several views.

In the drawings reference sign B indicates a fluid motor cylinder of the upright type, in which piston Q is adapted to travel, being propelled by any suitable fluid in the usual manner, suitable inlet and exhaust ports being provided for admitting and exhausting the operating fluid to and from the cylinder.

Piston rods S, S, are suitably bolted to the piston, pass through suitable stuffing boxes in the cylinder head, and carry in their upper ends a cross bar O, to which is secured the cable operating sheave E, in the usual manner.

Suitably secured to the head of cylinder B is a casting D, provided with two cylindrical chambers, A, A, and an intermediate passage

way or chamber C, which communicates with each of said cylindrical chambers, through openings *b, b*, extending throughout the length thereof, as shown. These openings *b, b*, are comparatively large in area midway the length of the casting D and are gradually reduced in size toward the ends of such casting, as clearly shown in Fig. 2, for a purpose presently to be described.

In each of the cylinders A, A, is arranged a piston P, each having a rod R, projecting on opposite sides thereof. The lower ends of rods R pass through suitable boxes in the main cylinder head, and, within said main cylinder, are joined by a cross head H', suitably bolted thereto. The upper ends of said rods pass through suitable boxes in the head of said auxiliary cylinders, A, A, and are joined by a cross head H' suitably bolted or otherwise secured thereto.

In the operation of my automatic stop device the chambers or auxiliary cylinders A, A, are filled with any suitable fluid, preferably glycerine, as that substance has been found to be admirably adapted to this purpose. The cross heads H, H', are arranged in the path of travel of a moving part of main pistons S, S, and as the main piston is moved, say upwardly, as it approaches the limit of its stroke cross head H' is engaged by said moving part and hence pistons P, are moved upwardly in auxiliary cylinders A, A, forcing the fluid contained in the upper part of said cylinders, through openings *b, b*, into passage C, and thence into the lower part of said cylinders. By reason of the openings *b, b*, being of comparatively large area midway the length of cylinders A, it will be seen that at the beginning of the upward travel of pistons P, their movement is opposed by a comparatively small resistance, but as they continue their travel and approach the upper limit thereof and the area of passages *b* gradually decreases, their movement is opposed by a gradually accelerating resistance, thus gradually, easily and smoothly arresting the travel of the main piston, and hence of the car as it approaches the limit of its travel. A similar action occurs upon the downward movement of the main piston by a movable part carried by the piston rods S, S, coming in contact

with the upper cross head H, thus forcing the pistons downwardly in their cylinders A, A, against a gradually increasing resistance, thus arresting the travel of the piston and hence of the car at the other limit of its travel, without jar or bump.

In order that the movable parts carried by the main or operating piston and piston rods may engage the rods R, R, easily and without jar, I provide cross bars M, M', M², M³, arranged in pairs and which are mounted upon piston rods S, S, one member of each pair being suitably secured against movement along said rods. Interposed between each pair of cross bars and coiled around rods S, S, are spiral springs, N, N, N', N', the coils N being arranged between bars M, M' and the coils N' being arranged between bars M² M³.

It will be observed that the piston rods S, S, are arranged in a line transverse to the line in which auxiliary cylinders A, A, and hence rods R, R, are arranged, and consequently as the pistons S, S, travel up and down, cross bars M' and M² engage cross heads H, H', respectively, and by reason of the springs N, N' the engagement is without shock.

It will be seen that as pistons P ascend in cylinders A the fluid contained in said cylinders above said pistons is forced out through openings b, into chamber or passage C and through the openings b in the lower part of the casing and back into cylinders A below the pistons. During the first part of the travel of the pistons P upwardly the fluid is rapidly exhausted from cylinders A through the larger sized openings b, but, inasmuch as the openings through which the fluid is forced to pass into the cylinders A, are of much smaller area, it may result that the maximum resistance to the upward movement of pistons P is encountered at the beginning of their stroke, and thus defeat the important feature of the invention of providing a gradually increasing resistance to such movement. In order to overcome this objection I may construct one or more of the openings b near each end of cylinders A of a comparatively large area, and locate therein a valve V, opening into the cylinders from chamber C. By this arrangement the fluid is permitted rapid ingress into the cylinders from the chamber or passage but egress of the fluid from the cylinders into the chamber through said valves is avoided.

Valves V may be of any suitable construction for accomplishing the desired result. In the drawings I have merely shown a conventional form of valve. It is also obvious that said valve may be located in cylinders A, as shown, or in the passage C, or, in any suitable or convenient position and still accomplish the purposes intended.

Many variations may be made in the size and proportions of parts and many modifications would readily suggest themselves to a skilled mechanic and still fall within the spirit and

scope of my invention. I do not desire, therefore, to be limited to the exact details of construction shown. But

Having now fully described my invention and its mode of operation, what I claim as my own invention, and desire to secure by Letters Patent of the United States, is—

1. In an elevator apparatus a main cylinder and piston, and an auxiliary cylinder adapted to receive a fluid, an independent piston therein and means, operated by the movement of the main piston, for operating said last mentioned piston, whereby the motion of the main piston is arrested at its limits of stroke; as and for the purpose set forth.

2. In an elevator apparatus, a main cylinder and piston, an auxiliary cylinder adapted to receive a fluid, an independent piston arranged therein, adapted to displace said fluid at a gradually decreasing rate of speed as it approaches its limits of travel, and means operated by the main piston for moving the piston in the auxiliary cylinder at each limit of stroke of said main piston; as and for the purpose specified.

3. In an elevator apparatus a main cylinder and piston, a casting comprising a cylindrical chamber and a passage way, adapted to receive a fluid, openings between said chamber and passage way, an independent piston arranged in said chamber and means for operating said piston by the movement of the main piston whereby the fluid contained in said chamber is displaced at each limit of stroke of the piston; as and for the purpose set forth.

4. In an elevator apparatus a main cylinder and a piston, an auxiliary cylinder and passage way, adapted to receive a permanent supply of fluid, openings between said auxiliary cylinder and passage way of varying area, an independent piston arranged in said auxiliary cylinder, adapted to be operated by the main piston as it approaches each limit of stroke, whereby the fluid contained in said auxiliary cylinder and chamber is displaced at a gradually diminishing rate of speed; as and for the purpose specified.

5. In an elevator apparatus, a main cylinder and piston, a casting secured to the cylinder head having auxiliary cylinders therein, a passage way or chamber arranged between said auxiliary cylinders, openings between each of said auxiliary cylinders and said chamber, said openings being of comparatively large area midway the length of said cylinders but decreasing in area toward the ends thereof, a piston in each auxiliary cylinder and means for operating said pistons from the movement of the main piston; as and for the purpose set forth.

6. In an elevator apparatus, an auxiliary cylinder adapted to receive a fluid therein, a passage way and openings between the two of varying area, a piston arranged in said cylinder having a rod projecting on opposite sides thereof, a main cylinder and piston, and

devices carried by said main piston for operating said rod at each limit of stroke of the main piston whereby the fluid contained in said auxiliary cylinder is displaced at a gradually diminishing rate of speed; as and for the purpose set forth.

7. In an elevator apparatus a pair of cylinders and a passage way or chamber arranged between the cylinders, openings between said cylinders and chamber or passage way, of varying area, a piston in each cylinder, a piston rod projecting on opposite sides of each piston, cross heads connecting the projecting ends of said rods, a main cylinder, piston and piston rods, cross bars carried by said main piston rods, arranged to engage the said cross heads alternately and springs for yieldingly supporting said cross bars; as and for the purpose set forth.

8. In an elevator apparatus, a main cylinder and piston, an auxiliary cylinder and passage way, said auxiliary cylinder adapted to receive an independent piston and a fluid, openings between said auxiliary cylinder and passage way, the openings at the ends of the auxiliary cylinder of enlarged area, valves

for said enlarged openings, and means for moving said independent pistons by the movement of the main piston; as and for the purpose set forth.

9. In an elevator apparatus a main cylinder and piston, a casting comprising an auxiliary cylinder and a passage way, an independent piston adapted to be received in said auxiliary cylinder and said passage way, openings decreasing in area from midway the length of said cylinder and passageway toward the ends thereof, openings at the ends being of enlarged area, valves arranged in said enlarged openings, adapted to admit fluid from the passageway into the cylinder but to prevent the passage of fluid from the cylinder to the passage way, and means for operating said independent piston from the main piston; as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 20th day of April, 1894, in the presence of two subscribing witnesses.

HUMPHREY R. SMITH.

Witnesses:

W. E. CARR,
EARL PARCELLS.