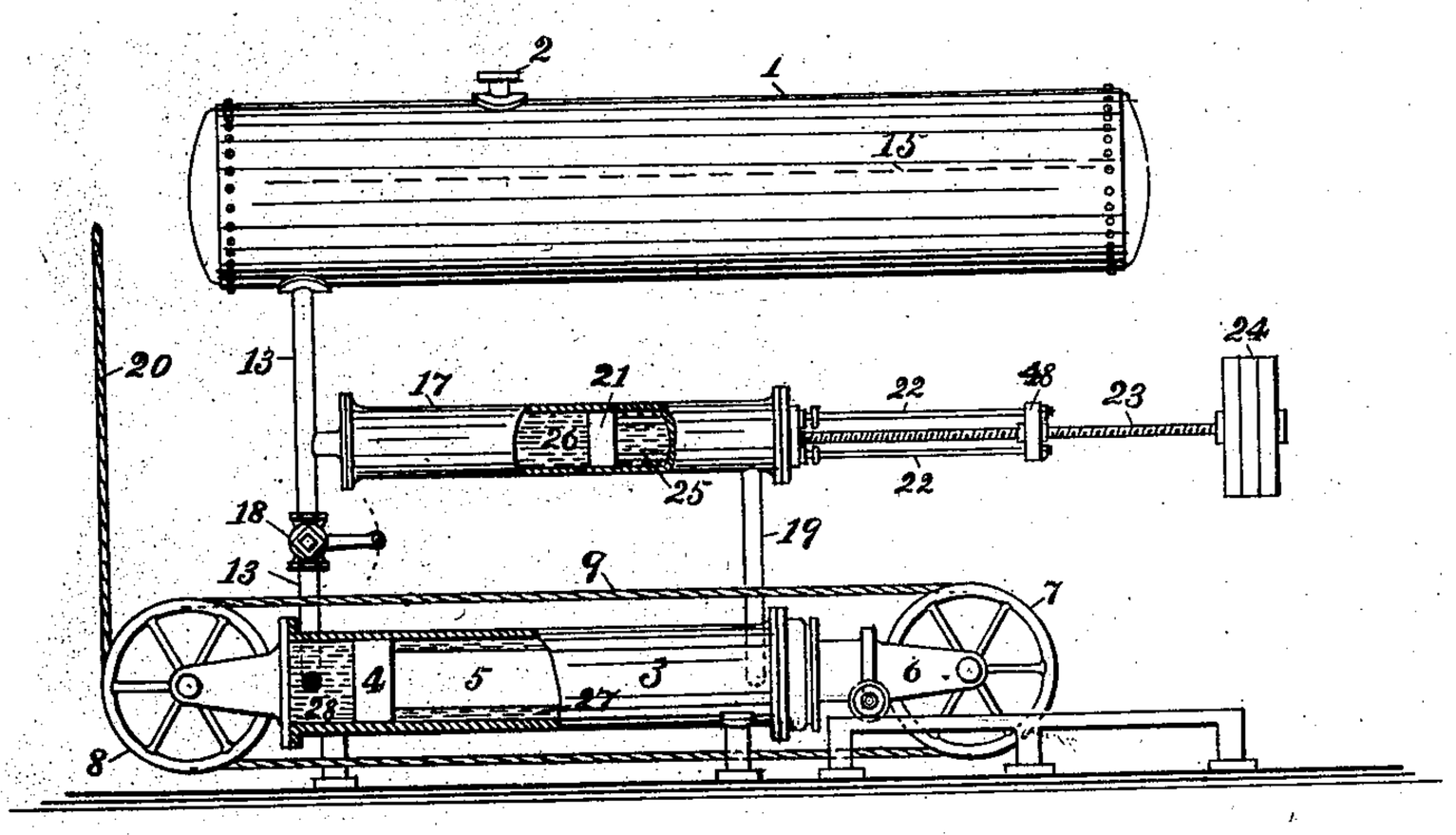
(No Model.)

C. I. HALL.

APPARATUS FOR OPERATING ELEVATORS.

No. 605,044. Patented May 31, 1898.



Witnesses

K. Lockwood-Nevins,

H. Sandersons.

Inventor

Edmund Hall

By

A. Richards

Attorney

UNITED STATES PATENT OFFICE.

COFRAN I. HALL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE CAHILL & HALL ELEVATOR COMPANY, OF SAME PLACE.

APPARATUS FOR OPERATING ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 605,044, dated May 31, 1898.

Application filed April 29, 1897. Serial No. 634,428. (No model.) Patented in England January 17, 1894, No. 1,040, and in France January 17, 1894, No. 235,580.

To all whom it may concern:

Be it known that I, COFRAN I. HALL, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Apparatus for Operating Elevators, (for which Letters Patent have been granted in Great Britain, No. 1,040, dated January 17, 1894, and in France, No. 235,580, dated January 17, 1894,) of which the following is a specification.

My invention relates to apparatus for operating elevators for raising and lowering people and merchandise and to a method of operating the same, so as to guard against accidents by falling, and to consume a minimum amount of power for the work performed.

My invention consists in resisting or counterbalancing a predetermined portion of the weight or load to be raised, preferably the cage and one-half of a service load, by means of a hydraulic piston sustaining a constant pressure derived from a receiver under pressure and in applying the operating power to the piston through the fluid acting thereon by the medium of an auxiliary cylinder and piston operated by mechanical connection with the driving power.

The objects of my invention are to secure the safety attained by hydraulic apparatus which forms a positive resistance to falling or sudden movements of a cage or load; also, to equalize as nearly as possible the amount of power required in moving the cage and its load upward and downward and by such division reduce the maximum amount of power and consequent capacity of the motor or the impelling agent, whatever it may be.

To this end I construct apparatus as shown in the drawing herewith.

The drawing is an elevation, partially in section, showing an application of my invention by means of a reciprocating piston interposed between the main hydraulic piston and a receiver or source of fluid-supply.

Said drawing shows a receiver containing the working fluid. This is preferable, because in this manner the same liquid is circulated and not wasted; consequently can be oil, glycerin, and water or other compounds of a lubricating and non-congealing nature. The pressure in the receiver 1 can be derived from compressed air, that partially fills the space and exerts an elastic pressure on the liquids, any waste of air being supplied through the nipples 2 from an air pump or compressor. I also employ steam as the compressing fluid, in which case the receiver 1 is set vertically, so that the area of the liquid exposed to heat will be as small as possible to prevent condensation of the steam and overheating of the water.

In the drawing, 3 is the main hydraulic cylinder.

4 is the piston, and 5 the piston-rod, attached to a movable frame 6, in which are mounted the movable rope-pulleys 7, corresponding to the stationary rope-pulleys 8 at the other end of the cylinder 3. Around these pulleys 7 and 8, which constitute the usual multiplying devices, is wound the rope 9, that extends to a cage or load to be raised or lowered, commonly by passing over pulleys at the top; but this being well understood and not forming a part of my invention does not require illustration.

Between the receiver 1 and the cylinder 3 is placed the auxiliary hydraulic device by which the operating power is applied. Said device can be driven by a belt from an electric motor or other suitable power. A pipe 13 forms a connection between the receiver 1 and the chamber 28 in the cylinder 3, with which the auxiliary hydraulic device is also connected. The receiver 1 being partially filled with liquid—for example, up to the line 15 and above this line with air at the required pressure—the piston 4 is subjected to a pressure equal to its area multiplied into the pressure in the receiver 1, and this area and pressure, as before explained, are so arranged that the draft or tension on the vertical rope 20 will equal or counterbalance the load to be raised or some predetermined part thereof, as the power required in raising or lowering loads will be as nearly the same as the variation of service loads will permit.

To produce movement each way, I provide the auxiliary hydraulic device above referred

to, which controls the flow of liquid between the receiver 1, and the chamber 14 consequently controls the movements of the piston 4 and of the load moved upward or downward, thereby acting either as a retarding force in lowering a heavy load or as an impelling force in raising a load.

The receiver 1 is partially filled with liquid and with air or steam to produce pressure. The main hydraulic cylinder 3 is closed at both ends and provided with a trunk-piston rod 5, the object of which is to partially occupy the cylinder 3, and thus reduce its cubical capacity for liquid, so that the amount of liquid contained in the annular chamber 27, surrounding the said trunk-piston, shall be the same as that contained in an equal length of the chamber 25, with which said annular chamber communicates and into which it discharges by the coincident movements of pistons 26 and 4, whereby the two cavities are complementary to each other and the combined capacity of the two is a constant volume. The auxiliary piston 21 is moved by the piston-rod 22, attached to a cross-head 48, through which passes a screw 23, driven by the pulleys 24, the latter being arranged to receive open and crossed belts, so that the screw 23 can be driven either way by an electric motor or any other suitable source of driving power. The pipe 13 connects from the receiver 1 to the chamber 28 in the main cylinder 3, also to the chamber 26 of the auxiliary cylinder 17, the chambers in front of the pistons in the main cylinder 3 and auxiliary cylinder 17 and the chambers 25 and 27 being filled with a constant quantity of liquid, which can circulate or pass from one chamber to the other by means of the pipe 19. In this manner it will be seen that the main piston 4 exerts an outward or lifting force and draft on the vertical rope 20 in proportion to the difference of its area on the two sides and that in moving of the piston 21 by means of the screw 23 the main piston 4 will follow the same distance. In the pipe 13 I place a cock 18, which if closed will stop all motion of the pistons 4 21 and the connected gearing and can be employed as a positive stop at the extremes of the stroke of the main piston 4.

A valuable feature of this device consists in providing a water-abutment in the chamber 27 on the back of the main piston 4 and in adapting the apparatus for control by the piston 21 and the revolving screw 23, to which the motive power is applied.

Having thus described the nature and the objects of my invention, what I claim is—

In apparatus to operate elevators, a hydraulic cylinder and a piston therein, said cylinder in communication with a receiver containing fluid under pressure communicating with one side of the hydraulic piston to counterbalance a predetermined load on an elevator to which the apparatus is attached, a second hydraulic cylinder and a piston in communication with the receiver and with the other side of the main hydraulic piston so that movements of the auxiliary piston produce or permit like movements of the main piston, in combination with an electric motor or other power connected to the second or auxiliary piston, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

COFRAN I. HALL.

Witnesses:

JOS. B. KEENAN,

H. J. LANG.