No. 620,158. Patented Feb. 28, 1899.

J. H. LORIMER.

LIFTING APPARATUS.

(Application filed Oct. 17, 1896.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

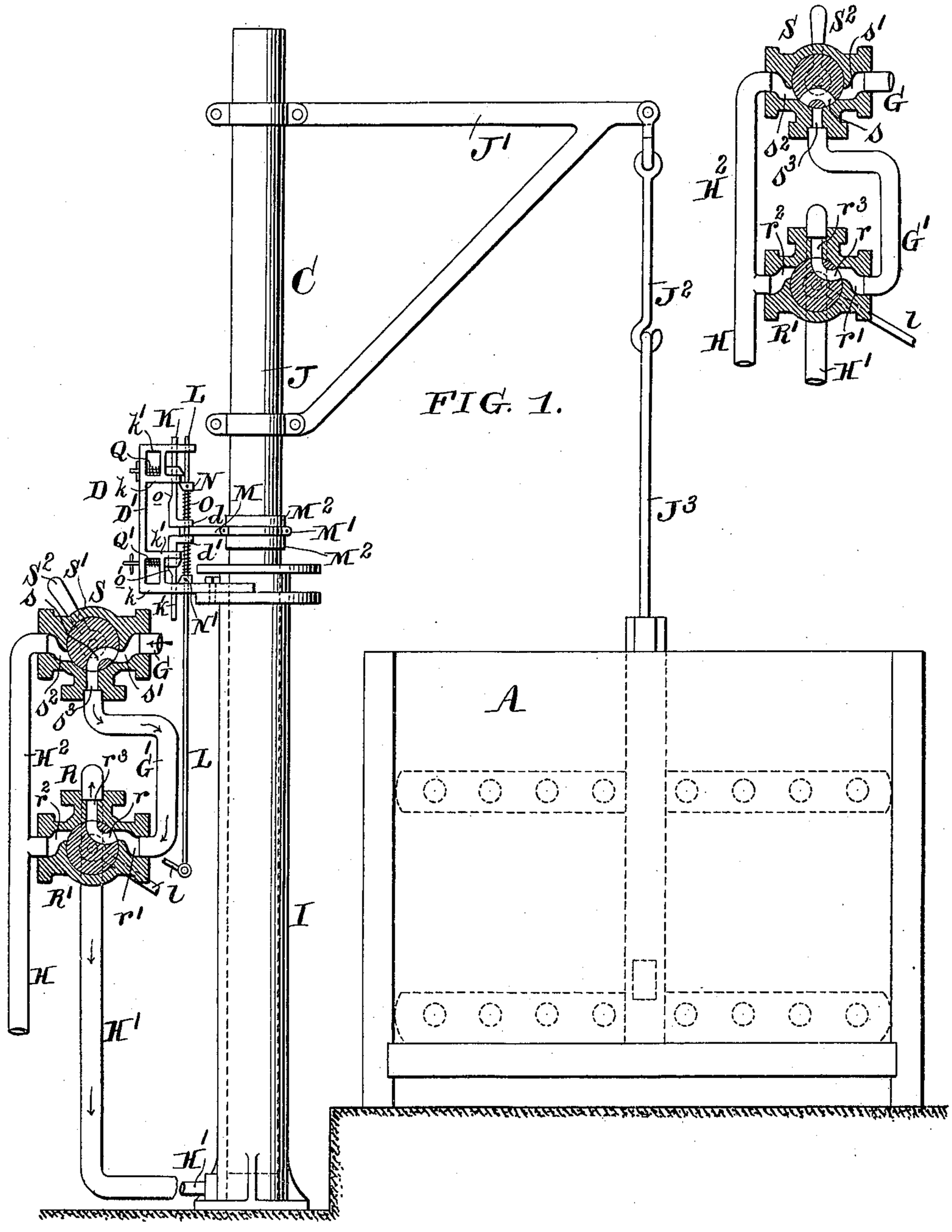

FIG. 5.

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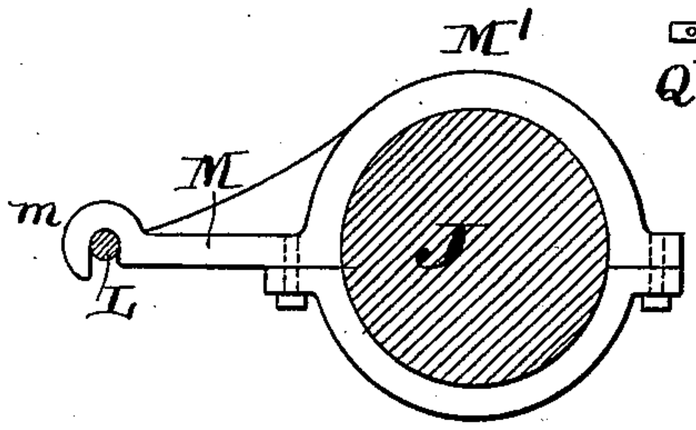
FIG. 6.



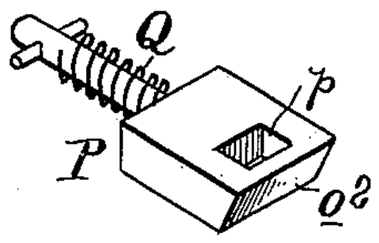


FIG. 7.

FIG. 2.

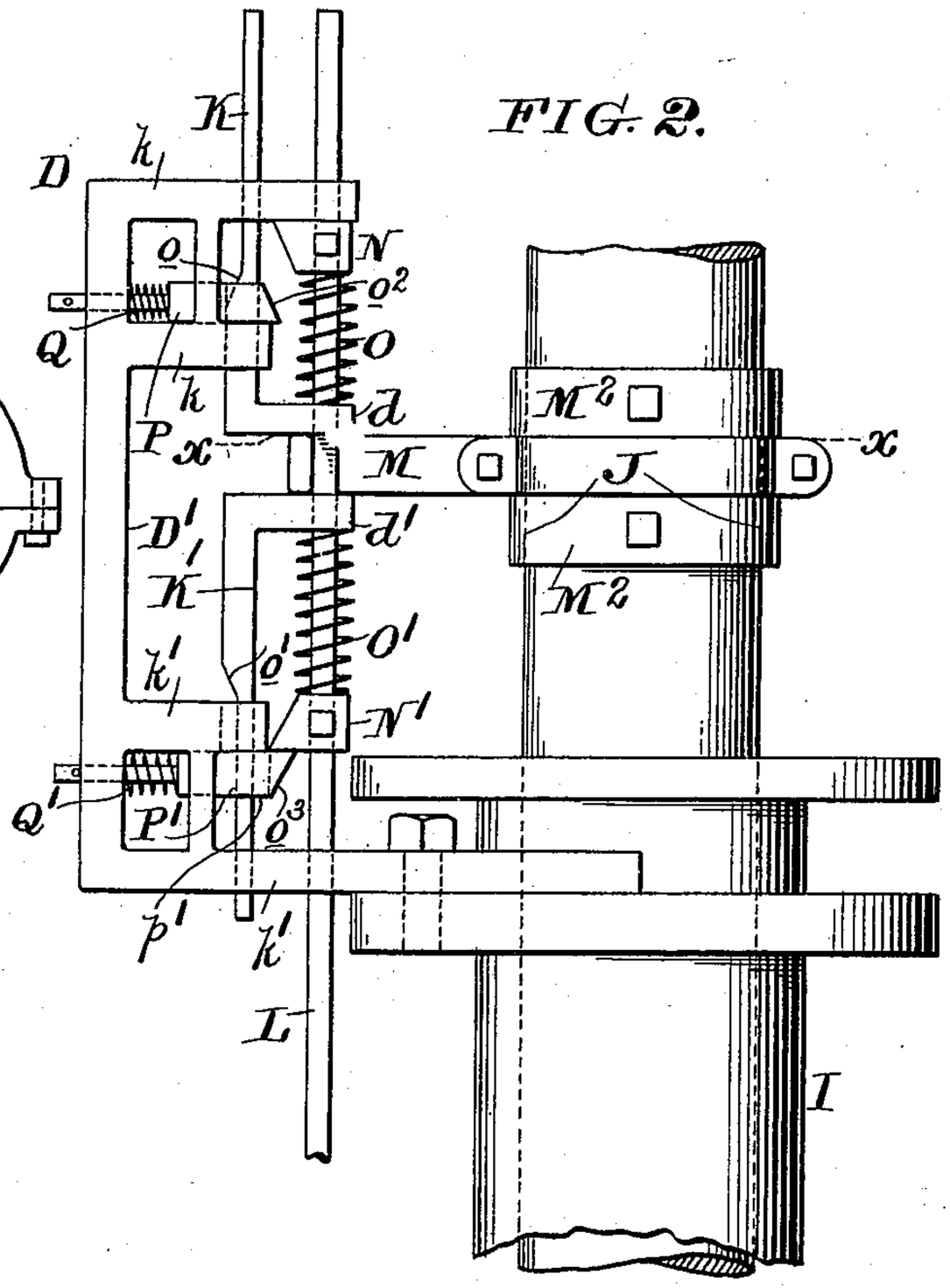


FIG. 3.

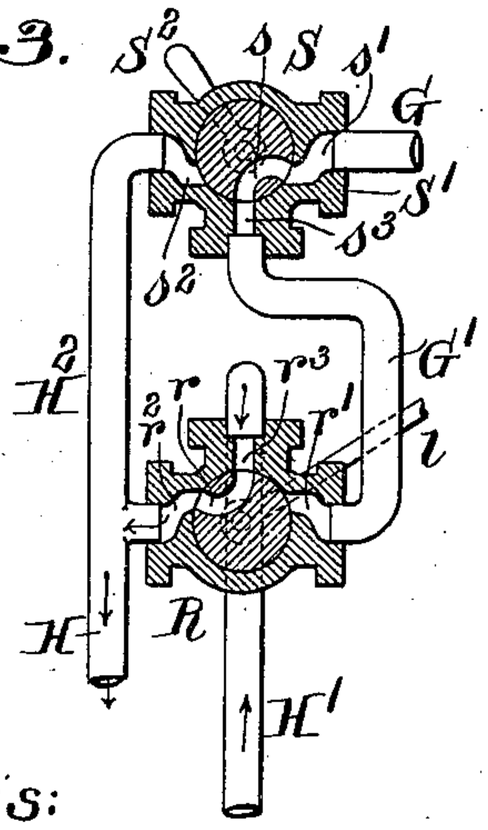
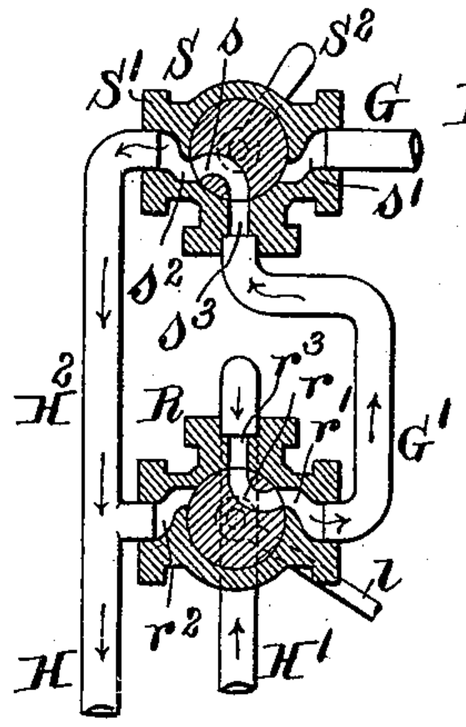


FIG. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH H. LORIMER, OF PHILADELPHIA, PENNSYLVANIA.

LIFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 620,158, dated February 28, 1899.

Original application filed April 15, 1895, Serial No. 545,705. Divided and this application filed October 17, 1896. Serial No. 609,205. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. LORIMER, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Lifting Apparatus, of which the following is a specification.

My invention relates to lifting apparatus; and it consists of certain improvements, which are fully set forth in the following specification and are shown in the accompanying drawings.

This application is a division of my application, Serial No. 545,705, filed April 15, 1895, patented November 3, 1896, No. 570,488, and comprehends the specific features of the valve-controlling devices of the hydraulic mechanism therein set out.

My invention relates particularly to that class of lifting apparatus designed for imparting reciprocations to the object lifted and is particularly adapted for use in connection with dyeing apparatus for the purpose of automatically reciprocating the yarn-frame in the liquor of the dye-vat, though not confined to that use.

In carrying out my invention I employ a lift operated by a motor fluid, with a valve for controlling the motor fluid in the lift, and automatic devices controlled by a moving part of the lift for shifting the valve to change the direction of the movement of the motor fluid, and thereby automatically reverse the direction of the movement of the lift and produce the desired reciprocation. The operative connection between the movable part of the lift and the automatic valve-operating devices may be disconnected when desired to throw the automatic devices out of action, and the movements of the lift may be controlled by an auxiliary valve independent of the automatic valve when it is desired to raise or lower the lift without reciprocating it.

My improvements are particularly adapted for use in connection with hydraulic lifts, but may also be employed with other actuating media.

I shall now refer to the accompanying drawings for the purpose of more particularly describing my invention.

Figure 1 is a view of my improved lifting devices in elevation, shown for purpose of illustration applied to a yarn-dyeing machine and having the valve mechanism enlarged and in vertical section. Fig. 2 is an enlarged view of the valve-operating devices of the lifting mechanism. Figs. 3, 4, and 5 are respectively vertical sectional views of the valve mechanism, showing the valves in different positions. Fig. 6 is a horizontal sectional view of part of the lifting apparatus on the line $x\,x$ of Fig. 2. Fig. 7 is a perspective view of one of the trips.

A is the tank of the yarn-dyeing apparatus.

C is a lift, preferably operated by hydraulic pressure.

D is the valve-operating mechanism.

R and S are two valves for controlling the movement of the motor fluid.

G is the inlet or supply pipe for the motor fluid.

H is the outlet discharge-pipe.

I is the cylinder of the lift, and J is the movable plunger thereof.

J′ is an overhanging bracket to which the object to be operated by the lift may be attached. In the drawings I have shown the bracket J′ connected with the yarn-frame by a suitable connection J^2, (shown as a pendent hook engaging a rod J^3 of the yarn-frame.)

D′ is the frame of the valve-operating mechanism, which is arranged adjacent to the plunger J. It is shown in the drawings bolted to a flange of the cylinder I.

K K′ are two oppositely-disposed slides, each movable in suitable guides $k\,k'$ in the frame D′. These slides are provided with suitable lugs or projections $d\,d'$, respectively, through which a valve-rod L extends. The valve-rod is also guided through guides in the frame D, as in the guides $k\,k'$ thereof, and is movable with reference to the slides K K′.

M is an arm carried by the plunger J and moving therewith, which extends between the two opposed portions $d\,d'$ of the slides K K′.

N N′ are stops carried by the rod L and disposed on opposite sides of the lugs $d\,d'$.

O O′ are springs located between the respective lugs $d\,d'$ and stops N N′.

P P′ are trips carried by the frame D′ and movable in suitable guides therein. The trips P P′ are located adjacent to the slides K K′, and the slides are provided with cam-faces $o\,o'$,

adapted when the slides are moved to act upon opposed faces of the trips P P′ and push them back against the action of springs Q Q′, which normally throw them forward. In the construction shown the slides K K′ extend through apertures p p' in the trips P P′, and the cam-faces o o' act upon the faces of the trip in these apertures. The extremities or noses o^2 o^3 of the trips P P′ are located in the path of the stops N N′, respectively, so as to obstruct the movement of either stop until the trip is retracted by the cam-face of the corresponding slide.

I shall now describe the operation of these devices in shifting the valve-rod L. When the plunger J moves up or down, the arm M carried by it operates one of the slides K K′. Supposing the parts to be in the position shown in Fig. 1 with the plunger lowered, as the plunger rises the slide K is moved upward, and through the tension of the spring O the stop N is pressed against the opposing end o^2 of the upper trip P. The movement of the stop N and rod L is thus obstructed, and as the slide K continues to rise its end D compresses the spring O and puts the stop N under considerable tension. When the cam-face o operates the trip P and retracts it, the stop N is released and is instantly moved forward by the tension of the spring O into the position shown in Fig. 2. Thus a very quick movement is imparted to the stop N and rod L, and the valve controlled by the rod L is operated to control the motor fluid and permit the plunger J to descend. On the downward movement the operation is reversed. The arm M moves the slide K′ down and compresses the spring O′, owing to the obstruction of the stop N′ by the extremity O^3 of the trip P′, until the cam-face o' operates the trip, and thus releases the stop N′ and permits the stop and the rod L to move down under the tension of the spring O′. The valve is thus again operated and the plunger rises, as before. The movement of the plunger will thus automatically actuate the rod to operate the valve and impart the up-and-down reciprocation to the plunger and yarn-frame carried by it. The valve-operating mechanism is of such a character that the shifting of the valve to control the motor fluid is accomplished by a quick sudden action instead of by a slow gradual movement.

I shall now describe my preferred valve mechanism for controlling the motor fluid.

R is the control-valve, which is operated by the rod L, with which it is connected by a suitable lever l. The valve R is provided with a suitable passage-way r.

R′ is the control-valve casing, having an inlet-port r' for the motor fluid, a discharge-port r^2 to the discharge-pipe H, and an intermediate port r^3 to a pipe H′, communicating with the port in the lower portion of the cylinder. The movement of the plunger J is controlled by the admission or discharge of motor fluid through the pipe H′ into the cylinder I below the plunger J. When the valve R is turned into the position shown in Fig. 1, communication is opened between the ports r' r^3 through the valve-passage r, and the motor fluid passes from the port r through the pipe H′ and enters the cylinder I. When the valve R is turned into the position shown in Fig. 3, communication is opened between the ports r^3 and r^2 and the motor fluid is permitted to escape from the cylinder I through the pipe H′. As it is desirable that the motor fluid should also be controlled by hand for the purpose of completely lifting the yarn-frame from the vat and for maintaining it in a state of rest, either when raised or lowered, I employ an auxiliary valve S, operated independently of the operation of the valve R, as by the hand-lever S^2. This valve is located in the inlet-pipe to the valve R and also communicates with the discharge-pipe H.

S′ is the valve-casing, having the inlet-port s' communicating with the supply-pipe G, the discharge-port s^2 communicating with the pipe H through the branch H^2, and the intermediate port s^3 communicating with the inlet-port r' of the valve R through a pipe G′.

The valve S is provided with the valve passage-way s. When the valve S is in the position shown in Figs. 1 and 3, the passage-way s opens communication through the ports s' s^3 and pipe G′ to the port r', so that the movement of the motor fluid may be controlled by the operation of the valve R in the manner described. When the valve S is thrown into the position shown in Fig. 4, the inlet to the valve R is closed and the discharge-passage for the motor fluid is opened through the pipe H′, ports r^3 r', pipe G′, ports s^3 s^2, and pipe H^2. The plunger J will then be permitted to remain in a state of rest in its lowered position.

To throw the automatic valve-operating devices into operation, it is only necessary to throw the valve S back into the position shown in Figs. 1 and 3 to open the inlet to the valve R.

To elevate the plunger J, so as to lift the yarn-frame out of the tank, the arm M is disconnected from the valve-operating devices D, and the plunger will continue to rise without any automatic action of the valve R.

To permit the arm M to be easily disconnected from the valve-operating mechanism, I prefer to employ an arm carried by a collar M′, supported upon the plunger J between the fixed collars M′ M^2 and free to be turned upon the plunger, so as to disconnect its end from the mechanism D. The end of the arm M is preferably provided with a notch or hook m, adapted to engage the rod L between the ends d d' of the slides K K′. (See Figs. 2 and 6.) When the arm M is thus disconnected from the mechanism D and the plunger J is permitted to continue its upward movement, the plunger may be arrested by throwing the valve S in a position to close both the ports s' s^2, as shown in Fig. 5. This will close both the inlet and discharge, and the plunger will

be maintained in elevated position until the valve S is again operated.

What I claim as new, and desire to secure by Letters Patent, is—

1. In lifting apparatus, the combination of a lift operated by motor fluid, a valve to control the movement of the motor fluid in the lift, spring-actuated mechanism for shifting the valve, and actuating devices controlled by a moving part of the lift for operating the spring-actuated mechanism and thereby automatically shifting the valve.

2. In lifting apparatus, the combination of a lift operated by motor fluid, a valve for controlling the movement of the motor fluid in the lift, a valve-shifting device, springs adapted to act upon the valve-shifting device and actuate it when put under tension, trip mechanism for holding the valve-shifting device against movement, and trip-releasing devices controlled by a moving part of the lift adapted to release the trip mechanism and permit the springs to operate to shift the valve.

3. In lifting apparatus, the combination of a lift operated by motor fluid, a valve for controlling the movement of the motor fluid in the lift, a valve-shifting device, springs actuating on the valve-shifting device and each adapted to move it in one direction when put under tension, a device carried by a moving part of the lift and acting upon said springs to put them under tension, trips to hold the valve-shifting device against movement, while the springs are being put under tension, and trip-releasing mechanism controlled by a moving part of the lift for releasing the valve-shifting device and permitting it to be operated by the spring which has been put under tension.

4. In lifting apparatus, the combination of a lift operated by motor fluid, a valve for controlling the movement of the motor fluid, a valve-shifting rod, stops N, N′ carried thereby, springs O, O′, acting on the stops N, N′, an actuating-arm carried by a movable part of the lift and adapted to act upon one of the springs when moved in one direction and upon the other spring when moved in the other direction, trips arranged in the path of the stops N, N′, each adapted to hold the corresponding stop against movement when the corresponding spring is being operated upon, and trip-releasing mechanism controlled by the actuating-arm for operating the trips and releasing the stops and permitting the valve-shifting rod to be moved by the actuated spring.

5. In lifting apparatus, the combination of a lift operated by motor fluid, a valve for controlling the movement of the motor fluid in the lift, spring-actuated mechanism for operating the valve in either direction, trip mechanism for holding the valve against movement by the spring-actuated mechanism, and devices controlled by a moving part of the lift for operating the spring-actuated mechanism and releasing the trip mechanism to permit said spring-actuated mechanism to shift the valve after a given movement of a movable portion of the lift in either direction, whereby the lift may be automatically reciprocated.

6. In a lifting apparatus, the combination of a lift, operated by motor fluid, valve mechanism to control the movement of the motor fluid in said lift, automatic valve-reversing mechanism, controlled by a moving portion of the lift to automatically reverse said valve mechanism and thereby automatically impart reciprocations to the lift, and an auxiliary valve, independent of the automatically-controlled valve, for independently controlling the movement of the motor fluid and arresting the lift in any desired position.

7. In a lifting apparatus, the combination of a lift, operated by motor fluid, valve mechanism to control the movement of the motor fluid in said lift, automatic valve-reversing mechanism, controlled by a moving portion of the lift to automatically reverse said valve mechanism and thereby automatically impart reciprocations to the lift, and an auxiliary valve, independent of the automatically-controlled valve located in the inlet-passage to the automatically-operated valve, for independently controlling the movement of the motor fluid and arresting the lift in any desired position.

8. In lifting apparatus, the combination of a lift operated by motor fluid, a valve R having a valve-passage r, the inlet-port r', the outlet-port r^2, and intermediate port r^3, a pipe or passage-way between the port r^3 and the lift, automatic valve-reversing mechanism controlled by a moving part of the lift for reversing the valve and automatically imparting reciprocations to the lift, and an independently-operated valve arranged in the inlet-passage r' of the valve R for controlling the passage of the motor fluid independently of said valve R.

9. In lifting apparatus, the combination of a lift operated by a motor fluid, a valve for controlling the movement of the motor fluid in the lift, mechanism for automatically operating said valve, and detachable operating connections between said mechanism and a moving part of the lift, and an auxiliary valve, independent of the automatically-operated valve, for controlling the movement of the motor fluid in the lift.

In testimony of which invention I hereunto set my hand.

JOS. H. LORIMER.

Witnesses:
R. M. HUNTER,
MAUD HUNTER.