

J. A. PERONY.
HYDRAULIC WINDLASS FOR DROP STAMPING MACHINES.
APPLICATION FILED NOV. 2, 1920.

1,417,856.

Patented May 30, 1922.
3 SHEETS—SHEET 1.

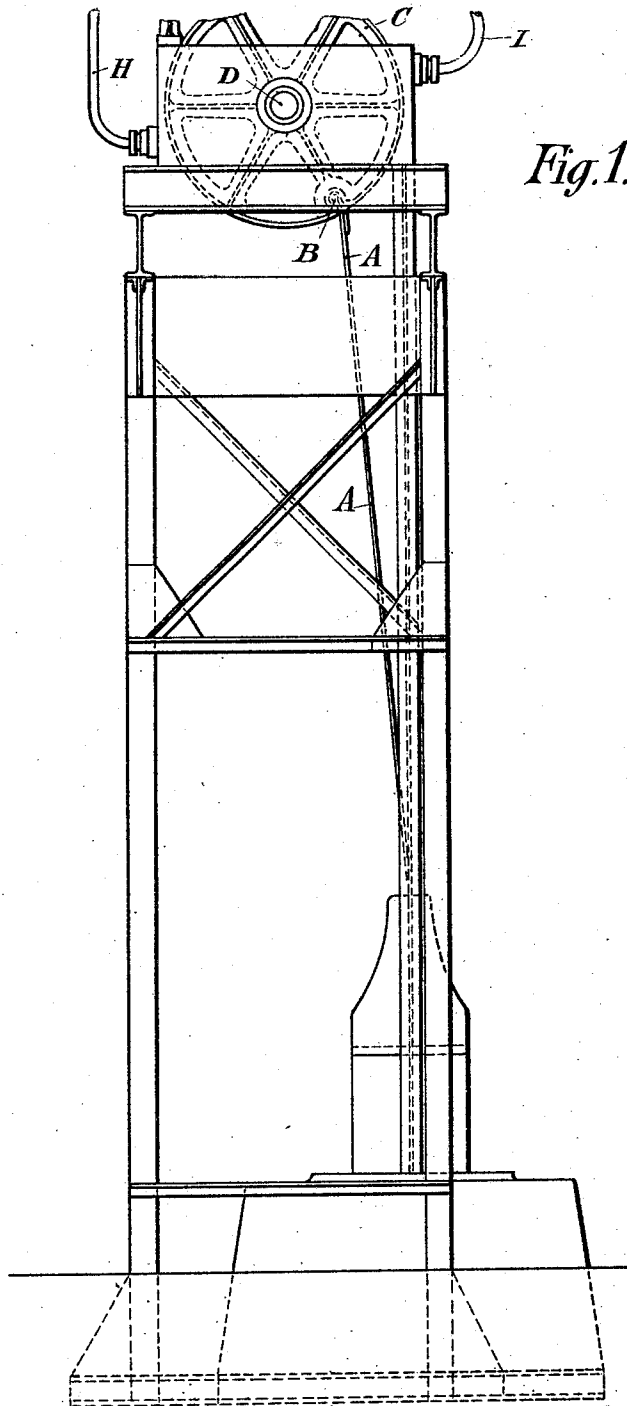


Fig. 1.

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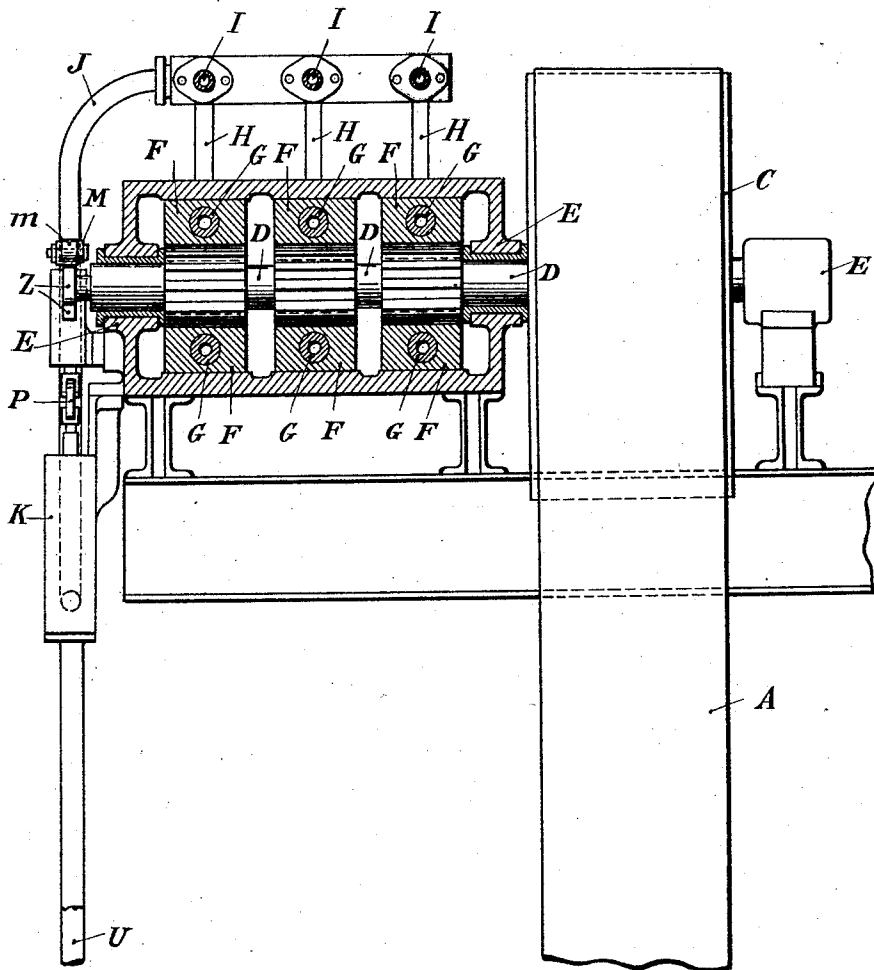
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3 SHEETS—SHEET 2.

Fig. 2.



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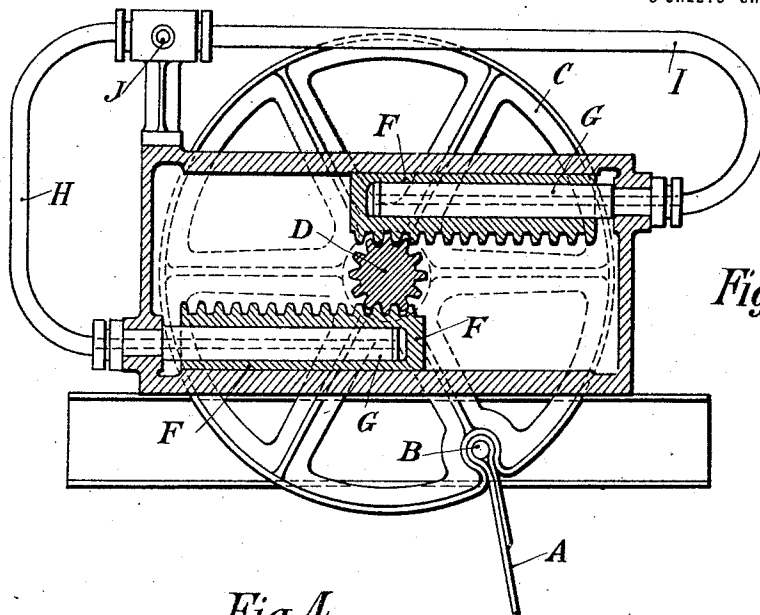
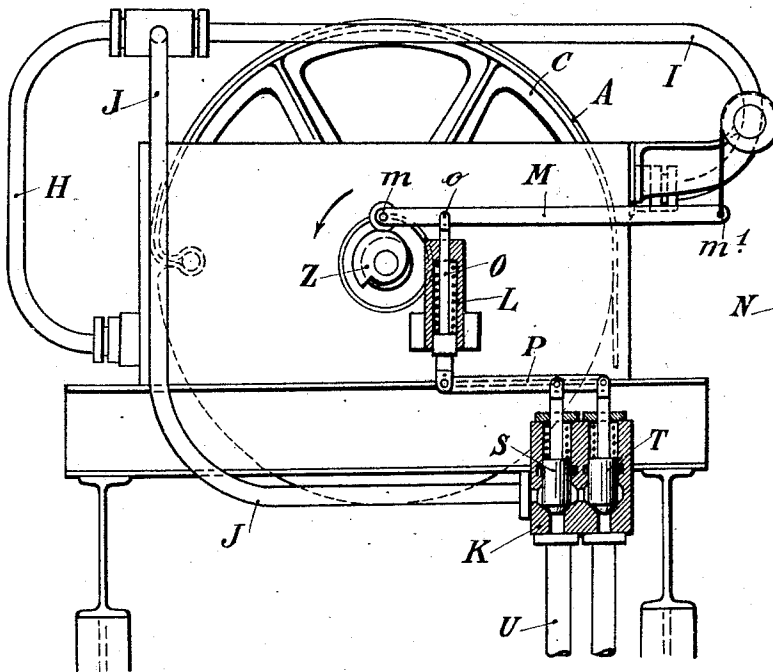


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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HYDRAULIC WINDLASS FOR DROP-STAMPING MACHINES.

1,417,856.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JEAN ALBERT PERONY, citizen of the Republic of France, resident of St.-Ouen, Seine, France, have invented new and useful Improvements in Hydraulic Windlasses for Drop-Stamping Machines, which invention is fully set forth in the following specification.

Numerous methods of lifting the tups of drop-stamping machines are known. A large class of such machines comprises a windlass situated at the upper part of the machine for raising the tup through the medium of a flexible member such as a cord or belt.

The present invention has for its object to provide an improved construction of windlass for drop-stamping machines of this class, utilizing the action of water under pressure.

According to this invention the drum for driving the lifting cords or belts of the windlass, is fixed on a shaft which is caused to rotate by the action of hydraulic cylinders having the form of racks meshing with pinions fixed to the shaft on which the drum is keyed.

This invention comprises, further, a special position for the attachment of the belt, which allows an initial acceleration of the weight, and an apparatus for the control of distributors that allows of controlling the motion of the tup by the corresponding motion of the hand of the operator.

A constructional form of this invention is illustrated by way of example in the accompanying drawings in which:—

Fig. 1 is a side elevation showing the entire machine. At the lower part there is shown an anvil and a tup similar to the corresponding parts of all known drop-stamping machines. At its upper part there is shown the windlass that constitutes the subject matter of this invention; this windlass is carried by a metal structure, but could be supported by any other known means.

Fig. 2 is a section taken along the axis of the shaft of the windlass.

Fig. 3 is a section along the axis of one of the cylinders, showing the meshing of this cylinder with the corresponding pinion on the windlass shaft.

Fig. 4 is a diagrammatic view of the distributing apparatus.

In these figures, A is the belt for lifting

the weight; B is the pin for fixing this belt to the lifting drum; C is the lifting drum; D is the shaft of the drum, mounted in bearings E; F are the hydraulic cylinders for rotating the shaft D; G are the pistons of these hydraulic cylinders; these fixed pistons are bored with an axial hole that serves for the admission or exhaust of the water under pressure; H and I are pipes for connecting the cylinders together. J is the pipe for establishing communication between the distributor and the group of hydraulic cylinders; K is the distributor; M is the operating lever; N is the operating cord actuated by hand.

The operation of the machine is as follows:—

When the operating cord N is pulled, the lever M is raised at its right hand end, whereas its left hand end bears by means of a roller *m* upon a cam Z carried by the windlass shaft. A piston O carrying the pivot pin *o* of the lever M, is then raised, and it pulls the lever P which causes one of the plug valves T of the distributor to close, and the other plug valve S to open. The water under pressure, admitted by way of the pipe U, is then admitted into the passage J, and then into the pipes H and I for admission into the cylinders F. The water under pressure, in acting upon the cylinders F, causes the windlass shaft to move in the direction of the arrow, and consequently to lift the weight.

The rotational motion of the shaft D of the windlass causes the cam Z to move, and the motion of the cam Z allows the left hand end of the lever M to drop; the result is that if the position of the hand of the operator acting upon the cord N has not changed, then the point *o* will drop as well as the lever P, thus causing the closing of the plug valve S; the rising movement of the weight or tup stops. If the operator pulls the cord N anew so that his hand occupies a new but lower position, the operation of the parts will be the same, and the tup will be stopped in a fresh position corresponding to the fresh position of the hand of the operator.

Inversely, if the operator raises his hand in letting go the cord N, then the right hand end *m*¹ of the lever M will drop as well as the left hand end of the lever P, under the action of the spring L, and the result will be

that the plug valve T will open and place the cylinders F in connection with the exhaust. The weight of the tup will then cause the shaft D to rotate, and the cam Z will rotate in the opposite direction to the arrow, and will thereby lift the left hand end of the lever M. This movement of the lever M produces a corresponding movement of the lever P which causes the closing of the plug valve T, and consequently an interruption in the descent of the tup. Consequently at each shifting of the hand of the operator, both in lifting and descending, there corresponds a position of the tup, and the movement of the weight reproduces constantly on a larger scale the shifting of the hand of the operator.

At the commencement of the rise of the weight, it is necessary to have available a lifting force that is clearly greater than the weight of the tup to be lifted, so as to produce a rapid acceleration of the weight. Then when the normal speed of ascent has been attained, there is now only necessary a lifting force that will balance the weight of the tup and the passive resistances. Since the effort produced by the hydraulic pistons is constant, the above condition is satisfied by the special position which is given according to the present invention to the point of attachment of the lifting belt. This position shown in Figs. 1 and 3 is such that the lifting belt is not directed tangentially to the drum. The resisting moment of the weight to be lifted, relatively to the axis of rotation, is then clearly smaller than when the attachment has arrived at the point indicated in Fig. 4, where the belt is tangential to the drum.

In the position shown in Figs. 1 and 3, the driving couple of forces produced by the pressure of water is very substantially greater than the resisting couple, thereby allowing a rapid acceleration of the weight. When the belt becomes a tangent to the drum, the driving couple exceeds the resisting couple only by the amount that is necessary to overcome the passive resistances.

During the lift, the maximum speed of ascent of the weight is that which is allowed by the dimensions of the water inlet orifice. If the cord N be let go suddenly during the descent, the speed of the drop will be limited only by the resistance to the outflow of the water contained in the cylinders F through the distributing orifices, and it will always be possible to make the said orifices sufficiently large so that the speed of the drop shall be substantially equal to the speed of a free fall.

It is obvious that the distributor K may be of a type entirely different from that shown in Fig. 4. If the weight of the tup requires a distributor of such dimensions that its direct operation by the hand of the

operator becomes difficult, then the distributor may be a distributor of small size, actuating through an auxiliary motor a distributor of the requisite size. Any desired number of lifting cylinders may be employed; in the accompanying drawings they are shown as being six in number, arranged in pairs of two cylinders acting oppositely to each other so as to exert a driving couple upon the shaft. Nevertheless only four, two or even one cylinder might be employed; or again, a greater number of cylinders might be employed in order to cause the rotation of the shaft. It is further to be noted that the lifting drum may make a fraction of a revolution, or a complete revolution, or a plurality of revolutions, in order to correspond with the lift of the tup.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a motor comprising a driven member provided with a rack engaging said pinion, and controllable means for regulating the operation of the motor to raise the tup, said controllable means being operable to free the motor and permit dropping of the tup.

2. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a fluid-pressure motor having its movable member provided with a rack engaging said pinion, and controllable means for regulating the supply of fluid-pressure to the motor whereby to move the rack, and raise the tup, said controllable means being operable to reverse of the motor, and permit dropping of the tup.

3. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a fluid-pressure piston-cylinder motor having its movable member provided with a rack engaging said pinion whereby the tup is raised on movement of the rack in one direction and dropped on movement of the rack in the opposite direction and controllable means for regulating the supply and discharge of fluid-pressure to and from the motor to provide reciprocal movement of the rack.

4. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a cylinder movable on a fixed piston and having a rack engaging said pin-

ion whereby the movement of the tup is raised on rack in one direction and dropped on movement of the rack in the opposite direction and controllable means for regulating the supply and discharge of fluid-pressure to and from the cylinder to provide reciprocative movement of the cylinder and its rack.

5. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with pinions and carrying a drum to which is attached a flexible connection with the tup, of racks on opposite sides of the shaft engaging said pinions, oppositely driven motors having their movable members attached to said racks whereby to rotate the shaft in one direction and raise the tup, and common controlling means for said motors operative to release the same and permit dropping of the tup.

6. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of racks on opposite sides of the shaft and engaging opposite sides of said pinion oppositely driven motors on opposite sides of the shaft each having its movable member attached to one of said racks so that the movements of the racks rotate the shaft and raise the tup, and controlling means common to said motors operative to release the same and permit dropping of the tup.

7. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a movable rack engaging said pinion to rotate the drum and raise the tup, a cylinder attached to the rack and adapted to move on a stationary piston, and means for admitting fluid-pressure through the piston into the cylinder to move the latter and actuate said rack.

8. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, and a distributor operable to control the passage of fluid through said pipes and open or close communication of the same with said cylinder whereby the drum may be rotated in either direction to raise the tup or to permit its fall.

9. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection

with the tup to be raised, of a movable rack engaging said pinion to rotate the drum and wind thereon the flexible connection, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, a distributor controlling the passage of fluid through said pipes and operable to open or close communication of the latter with said cylinder, and means actuated by the shaft automatically operating the distributor to check movement of the cylinder in either direction and arrest rotation of the drum in either winding or unwinding the flexible connection.

10. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, a distributor controlling the passage of fluid through said pipes and operable to open or close communication of the latter with said cylinder, means for operating the distributor whereby to rotate the drum and wind thereon the flexible connection, and mechanism actuated by rotation of the shaft automatically operating the distributor to arrest the winding action of the drum.

11. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, a distributor controlling the passage of fluid through said pipes and operable to open or close communication of the latter with said cylinder, means for operating the distributor to open communication of the cylinder with the discharge pipe and permit descent of the tup, and mechanism actuated by the rotation of the shaft automatically operating the distributor to close communication of the cylinder with the discharge pipe and arrest the descent of the tup.

12. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, fluid-pressure supply and discharge pipes communicating with the cylinder, valves respectively controlling the passage of fluid through the

supply and discharge pipes, controlling mechanism operable to close the discharge valve and to open the supply valve to rotate the drum whereby fluid-pressure is admitted to the cylinder and lift the tup and mechanism subsequently actuated by rotation of the shaft to close the supply valve whereby to check the rotation of the drum and arrest lifting of the tup.

13. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, fluid-pressure supply and discharge pipes communicating with the cylinder, valves respectively controlling the passage of fluid through the supply and discharge pipes, controlling mechanism operable to close the discharge valve and open the supply valve whereby fluid-pressure admitted to the cylinder causes the latter to rotate the drum and lift the tup, said controlling mechanism being also operable to close the supply valve and open the discharge valve whereby to release the tup, and mechanism subsequently actuated by the shaft and dropping of the tup adapted to close the discharge valve and arrest the fall of the tup.

14. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a movable rack engaging said pinion to rotate the drum and raise the tup, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, valves respectively controlling the passage of fluid through the supply and discharge pipes, a lever coupled at one end to said valves, and mechanism for moving the other end of said lever, an upward movement of the free end of the lever operating to close the valve of the discharge pipe and to open the valve of the supply pipe whereby fluid-pressure admitted to the cylinder causes the latter to rotate the drum and wind the flexible connection thereon, subsequent downward movement of the free end of the lever operating to close the valve of the supply pipe and open the valve of the discharge pipe whereby the fluid-pressure in the cylinder escapes and the tup is permitted to drop.

15. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and a cam and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging a pinion on said

shaft to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, valves respectively controlling the passage of fluid through the supply and discharge pipes, a lever coupled at one end to said valves, and a control lever connected at an intermediate part with the free end of the valve lever and fulcrumed at one end on said cam, an upward movement of the free end of the control lever operating to raise the free end of the valve lever, close the discharge valve, and open the supply valve whereby fluid-pressure admitted to the cylinder causes the latter to rotate the drum and raise the tup, the cam subsequently acting on the fulcrum end of the control lever to depress the same and the free end of the valve lever whereby the supply valve is closed and winding action of the drum arrested, subsequent raising of the free end of the control lever causing a repetition of the opening and closing of the supply valve.

16. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and a cam and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, supply and discharge pipes for fluid-pressure communicating with the cylinder, valves respectively controlling the passage of fluid through the supply and discharge pipes, a lever coupled at one end to said valves, a control lever connected at an intermediate part with the free end of the valve lever and fulcrumed at one end on said cam, a spring normally pressing the fulcrum end of the control lever against the cam, means for manually moving the free end of the control lever, an upward movement of the same operating the valve lever to close the discharge valve and open the supply valve whereby fluid-pressure admitted to the cylinder causes the latter to rotate the drum and raise the tup, the cam subsequently releasing the fulcrumed end of the control lever, the latter being depressed by the spring to move the valve lever and close the supply valve, further upward movement of the free end of the control lever causing a repetition of the opening and closing of the supply valve and intermittent raising of the tup.

17. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and a cam and carrying a drum to which is attached a flexible connection with the tup to be raised, of a movable rack engaging said pinion to rotate the drum, a cylinder attached to the rack and adapted to move on a stationary piston, fluid-pressure supply and discharge pipes com-

municating with the cylinder, valves respectively controlling the passage of fluid through the supply and discharge pipes, a lever coupled at one end to said valves, a
5 control lever connected at an intermediate part with the free end of the valve lever and fulcrumed at one end on said cam, a spring normally pressing the fulcrum end of the control lever against the cam, means for
10 manually moving the free end of the control lever, an upward movement of the free end of the latter operating the valve lever to close the discharge valve and open the supply valve whereby fluid-pressure admitted
15 to the cylinder causes the latter to rotate the drum and raise the tup, a downward movement of the free end of the control lever operating the valve lever to close the supply valve and open the discharge valve whereby
20 the tup is permitted to descend, the cam operating by reverse rotation of the shaft to raise the fulcrum end of the control lever and close the discharge valve whereby to check the descent of the tup, further down-

ward movement of the free end of the control lever causing a repetition of the descent of the tup and checking of the same.

18. In a lifting windlass for drop-stamping machines, the combination with a shaft provided with a pinion and carrying a drum to which is attached a flexible connection with the tup, of a motor for raising the tup and having its movable member provided with a rack engaging said pinion, controllable means for regulating the operation of said motor, said controllable means being operable to free the motor and permit dropping of the tup, said connection being attached to the under side of the drum whereby the couple for starting the tup is rendered less than the normal couple which is attained when the flexible connection becomes tangential to the drum.

Dated this 21st day of September 1920.

In testimony whereof I have signed this specification.

JEAN ALBERT PERONY.