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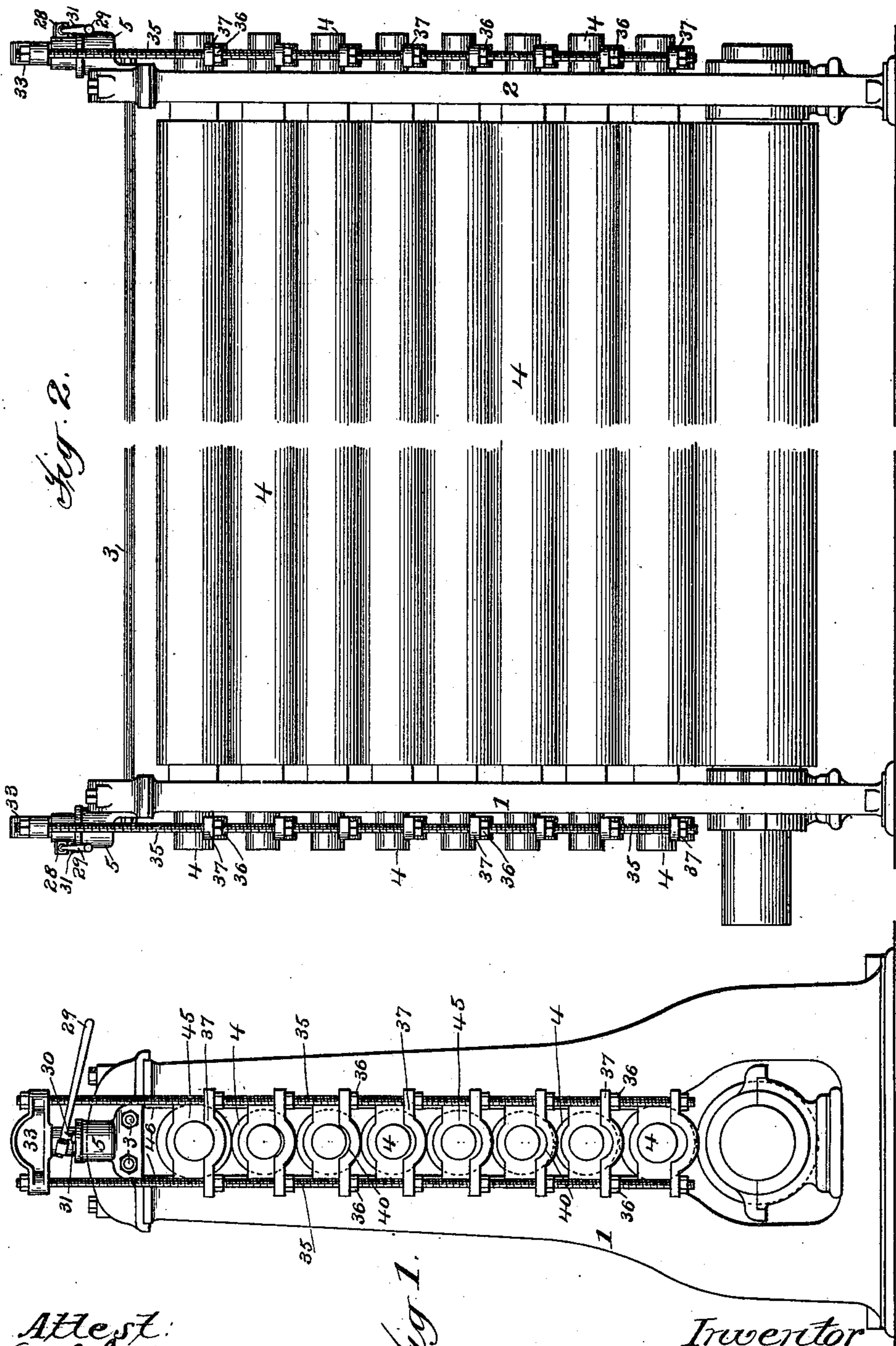
T. H. SAVERY.

LIFTING DEVICE FOR ROLLS OF PAPER MAKING MACHINERY.

(Application filed July 25, 1900.)

(No Model.)

2 Sheets—Sheet 1



Attest:
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Fig. 1.

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UNITED STATES PATENT OFFICE.

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LIFTING DEVICE FOR ROLLS OF PAPER-MAKING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 665,472, dated January 8, 1901.

Application filed July 25, 1900. Serial No. 24,764. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. SAVERY, a citizen of the United States, residing at Wilmington, county of New Castle, and State of Delaware, have invented certain new and useful Improvements in Lifting Devices for the Rolls of Paper-Making Machinery, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in lifting mechanism for the rolls of paper-making machines.

As is well known, the rolls of paper-making machines—such, for instance, as the rolls of calendering-machines—are large and extremely heavy. It is necessary at times to shift the position of these rolls, and this is ordinarily effected by means of gear-operated screw mechanism of a well-known type, one of said mechanisms being located at each end of the machine. This mechanism is cumbersome, expensive, and exceedingly slow in operation, because it is necessary to use reducing-gearing in order to obtain the power necessary to lift the rolls. Attempts have been made to substitute hydraulic lifting mechanism for the gear-operated screw mechanism referred to, the screw mechanism at each end of the machine being replaced by hydraulic cylinders of an ordinary type, these cylinders being connected by piping to suitable pumps or accumulators. While these hydraulic lifting devices have been efficient in operation, the expense of constructing them, owing to the necessity of installing a pumping plant of greater or less proportions, has been so great as to prohibit their extensive use. Furthermore, the piping by which the cylinders are connected to the pump mechanism is objectionable.

It is the object of this invention to produce an improved lifting mechanism for paper-making machines which shall embody the advantageous features of the hydraulic devices heretofore proposed, but which will do away with the necessity for the independent pumping or accumulator plant heretofore used and which will render the use of piping unnecessary, thereby producing a lifting device which is exceedingly effective and which

at the same time will be far simpler and cheaper than the devices heretofore in use.

With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a side view of a calendering-machine constructed in accordance with the invention. Fig. 2 is a front view of the same. Fig. 3 is a detail sectional elevation on an enlarged scale, showing the mechanism for raising the rolls. Fig. 4 is a detail sectional plan view on the line 4 4 of Fig. 3. Fig. 5 is a detail elevation showing the operating means for the pump. Fig. 6 is a sectional plan view on the line 6 6 of Fig. 3. Fig. 7 is a detail side elevation illustrating a modification. Fig. 8 is a detail front view of the construction shown in Fig. 7.

Referring to the drawings, which illustrate a concrete embodiment of the invention as applied to lifting the rolls of a calendering-machine, 1 and 2 indicate the side frames of a calendering-machine. These side frames are or may be of any ordinary or preferred construction and are tied together by cross-rods 3 or in any other suitable manner. Journaled in these side frames are a series of calender-rolls 4. These rolls are similar to and operate in the same manner as the ordinary calender-rolls, and therefore need no further description.

In order to lift the rolls to separate them or for any other desired purpose, a lifting device is provided which may be varied widely in construction. In the preferred form of the construction the top of the frame is provided on each side with a hollow boss or socket 5, and in each of these sockets is located a base 6. Each of these bases has secured to it by threads or in any other suitable manner a tube 7, in which is located a tube 8, said tube 8 having secured to its top in any suitable manner, as by screw-threads, a casting 9, the parts 8 and 9 forming a ram, as will hereinafter appear. The lower end of the opening

in the tube 8 is closed in any suitable manner, as by a screw-plug 10, said plug having an opening therethrough which is closed by a valve 11, the stem of the valve preferably extending slightly above the top of the plug. A spring 12 holds the valve normally closed, said spring bearing against the bottom of the valve and against a suitable bonnet 13, which is secured in the plug. A suitable washer or washers surround the lower end of the plug and serve to make a tight joint between the lower end of the tube 8 and the chamber 15 below the lower end of the plug. The tube 7 may, if desired and as shown, be surrounded by another tube 16, said tube being secured to the casting 9 in any suitable manner. From the construction so far described it will be seen that the tubes 8 and 16 and the casting 9 are mounted so as to be moved up and down with relation to the tube 7, which is secured to the stationary base 6. The casting 9 is preferably hollow, so as to form a fluid-containing chamber 17, a suitable filling-orifice closed by a screw-plug 18 being preferably provided. The opening in the casting 9 communicates with the opening in the tube 8, so that the opening in the tube 8 in reality forms a part of the chamber 17. If desired and as shown, the tube 8 may be counterbored at each end to make the opening at the ends somewhat larger than the opening in the center, and working in the central part of the opening is a pump-piston 19, said piston having a longitudinal opening 20 therein, which communicates with the chamber 17 by means of ducts or passages 21. The opening 20 is closed by a valve 22, a suitable bonnet 23 being provided to hold the valve in position. The casting 9 is preferably formed with an interior projection 24, in which the upper end of the piston works.

Any suitable means may be employed for operating the piston. Preferably, however, the upper end of the piston is provided with a rack 25, said rack being in mesh with a toothed segment 26, which is fast on a short shaft 27, suitably journaled in the casting 9. The outer end of the shaft is provided with a socket 28, which receives a handle 29, said handle being preferably loosely seated in the socket. The handle is preferably provided with a projection 30, which abuts against a stop 31, formed on the upper end of the casting 9, so that the movement of the handle, and consequently of the piston, is limited in one direction by the operation of this stop.

With the construction as described it is obvious that when the chambers 17 are filled with water, which will preferably be used therein, although any suitable liquid or fluid may be used, by operating the handles 29, as the pistons are given their upward stroke, the water will pass through the passages 21 and openings 20 and around the valves 22 into the chambers 32 beneath the bonnets 23. On the downstroke of the pistons the valves 22 are forced against their seats, and the water

in the chambers 32 is forced downward around the valves 11, which are moved back from their seats into the chambers 15. As the water is forced into these chambers under high pressure the tubes 8 and the parts connected thereto to form the rams are forced upward in an obvious manner.

From the foregoing description it will be understood that two fluid-containing chambers, with their rams and connected devices, are used, one at each side of the machine.

Any suitable means may be provided by which the rams may be caused to operate the calender-rolls. In the construction shown in Figs. 1, 2, 3, and 4 lifting-heads 33 are provided, said heads being positioned to be lifted by the rams. Passing through perforations 34 in each of these heads are two long threaded rods 35, said rods extending down below the last roll but one of the series. The rods 35 are provided with pairs of nuts 36, each pair of nuts serving to support a roll-lifter 37, which is located below the extended end of each roll, there being of course two of these lifters for each roll, one at each end thereof. The lifter 37 is preferably provided with open-ended slots 38 and 39, the slot 38 extending crosswise of the lifter and the slot 39 extending lengthwise thereof, the construction being such that the lifter can readily be removed from the rods, if desired. The lifter is also preferably provided with a concavity 40, which is shaped to fit the extending end of the roll. The lifters are preferably arranged at different distances from their rolls, the distance increasing slightly from the top roll downward, as is clearly shown in Fig. 1. The object of this arrangement is to enable the rolls to be lifted successively. It may be necessary at times to lift only a part of the rolls, and with the arrangement described the first roll may be lifted without disturbing the second, and so on throughout the entire bank of rolls.

Figs. 7 and 8 show a modification of the means by which the rams lift the rolls. A single rod 41 is provided on each side of the machine, each of said rods having a long toe 42, which forms the lifting-head, said toe extending over the top of the chamber 9, which forms the head of each ram. The roll-lifters consist of shorter toes 43, said toes being secured to the rods by screws 44 or in any other suitable manner. A pair of toes is provided for each roll, one being located at each end thereof, and the toes extend under the projecting ends of the rolls. The toe-lifters, like the lifters 37, are preferably arranged at varying distances from the rolls, the distance increasing from the top roll downward.

When it is desired to lift the rolls, the operators seize the handles 29 and operate the pistons, causing the rams to rise in the manner described and carrying the rolls up with them. The projections 30 on the handles 29 coming in contact with the stops 31 prevent the pistons from being driven too far down-

ward in the chambers 32. When it is desired, however, to allow the rolls to descend, the handles 29 are turned over and the pistons forced to descend in the chambers until the bonnets 23 strike the upwardly-projecting ends of the stems of the valves 11 and move them away from their seats, thus permitting the water to escape upwardly around the valves 11. The upward flow of the water will be regulated, however, so as not to force the valves 22 up against their seats and the water therefore pass upwardly around these valves into the chambers 17. It will be seen that by this arrangement, since the speed at which the rolls descend depends entirely upon the amount the valves 11 are opened, the operators have absolute control of the descent with absolute accuracy and check it at any desired time.

Any suitable form of bearings may be provided for the rolls. They are shown as journaled in bearings 45 of ordinary description, said bearings moving in ways 46, formed on the sides of the frame.

While a fluid-containing chamber and its connected parts are shown at each side of the machine and this is the preferred construction, it is to be understood that constructions within the invention might be used in which only a single fluid-containing chamber is used, suitable connections being of course employed, so that the ram of such a chamber would lift both ends of the rolls. It is obvious, furthermore, that the mechanical details by which the invention is carried into effect may be varied. The invention is not, therefore, to be confined to the specific mechanisms hereinbefore described.

What is claimed is—

1. In a paper-making machine the combination with a frame, of rolls mounted therein, bearings therefor, a suitable support on the frame, a fluid-containing chamber separate from the support but sustained thereby, a ram mounted in the chamber, a pump mechanism, lifting connections between the ram and the rolls and means for operating the pump mechanism, substantially as described.

2. In a paper-making machine, the combination with a frame, of rolls mounted therein, bearings therefor, a support on the frame, a fluid-containing chamber mounted on the support, a ram mounted in the chamber, a pump mechanism also mounted in the chamber, lifting connections between the ram and the rolls, and means for operating the pump mechanism, substantially as described.

3. In a paper-making machine the combination with a frame, of rolls mounted therein, a socket in the frame, a fluid-containing chamber located in the socket, a ram or plunger located in the chamber, a pump mechanism, lifting connections between the ram and the roll and means for operating the pump mechanism, substantially as described.

4. In a paper-making machine, the combi-

nation with a frame, of rolls mounted therein, a socket in the frame, a fluid-containing chamber located in the socket, a ram or plunger located in the chamber, a pump mechanism also located in the chamber, lifting connections between the ram and the rolls, and means for operating the pump mechanism, substantially as described.

5. In a paper-making machine, the combination with a frame, of rolls mounted therein, bearings for the rolls, a fluid-containing chamber, a ram located in the chamber, a pump mechanism also located in the chamber, a lifting-head positioned to be operated by the ram, connections between the lifting-head and the rolls, and means for operating the pump mechanism, substantially as described.

6. In a paper-making machine, the combination with a frame, of rolls mounted therein, bearings for the rolls, a fluid-containing chamber, a ram located in the chamber, said ram having an opening therethrough, a pump-piston working in the opening, suitable valves for controlling the passage of the fluid, means including a handle connected to the chamber-casing for operating the piston, a lifting-head, and connections between the lifting-head and the rolls, substantially as described.

7. In a paper-making machine, the combination with a frame, of rolls mounted therein, bearings therefor, a fluid-containing chamber mounted in the frame, a ram mounted in the chamber, a pump mechanism also mounted in the chamber, lifting connections between the ram and the rolls, said connections being arranged to lift the rolls successively, and means for operating the pump mechanism, substantially as described.

8. In a paper-making machine, the combination with a frame, of rolls mounted therein, a fluid-containing chamber mounted in the frame, a ram mounted in the chamber, a pump mechanism also mounted in the chamber, a lifting-head positioned to be operated by the ram, a plurality of roll-lifters, said lifters being normally positioned at different distances from the rolls, and connections between the lifting-head and the roll-lifters, and means for operating the pump mechanism, substantially as described.

9. In a paper-making machine, the combination with a frame, of rolls mounted therein, a pair of fluid-containing chambers, one at each side of the frame, a ram located in each chamber, a pump mechanism also located in each chamber, a pair of lifting-heads, one for each ram, roll-lifters, connections between the roll-lifters at one end of the machine and the lifting-head at that end, connections between the roll-lifters at the other end of the machine and the lifting-head at that end, and means for operating the pump mechanism, substantially as described.

10. In a paper-making machine, the combination with a frame, of rolls mounted therein, a fluid-containing chamber located at each side of the frame, a ram located in each cham-

ber, a pump mechanism also located in each chamber, means for operating each pump mechanism, lifting-heads at each side of the frame positioned to be operated by the lifting-
5 rods, and roll-lifters adjustably connected to the lifting-rods, said lifters being normally positioned at different distances from the ends of the rolls, substantially as described.

10 11. In a paper-making machine, the combination with a frame, of rolls mounted therein, a socket at each side of the frame, a fluid-containing chamber located in each socket, a ram in each chamber, a pump mechanism also located in each chamber, means for operating

each pump mechanism, lifting-heads located 15 on each side of the frame, rods connected to each lifting-head, and roll-lifters, one for each end of each roll, mounted on the rods, said lifters being normally positioned at different distances from the ends of the rolls, substan- 20 tially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS H. SAVERY.

Witnesses:

VINCENT G. HAZARD,
WILLIAM H. SAVERY.