No. 878,133. PATENTED FEB. 4, 1908.

J. A. GOODNER.

WATER ELEVATOR.

APPLICATION FILED JAN. 8, 1907.

Fig. 1.

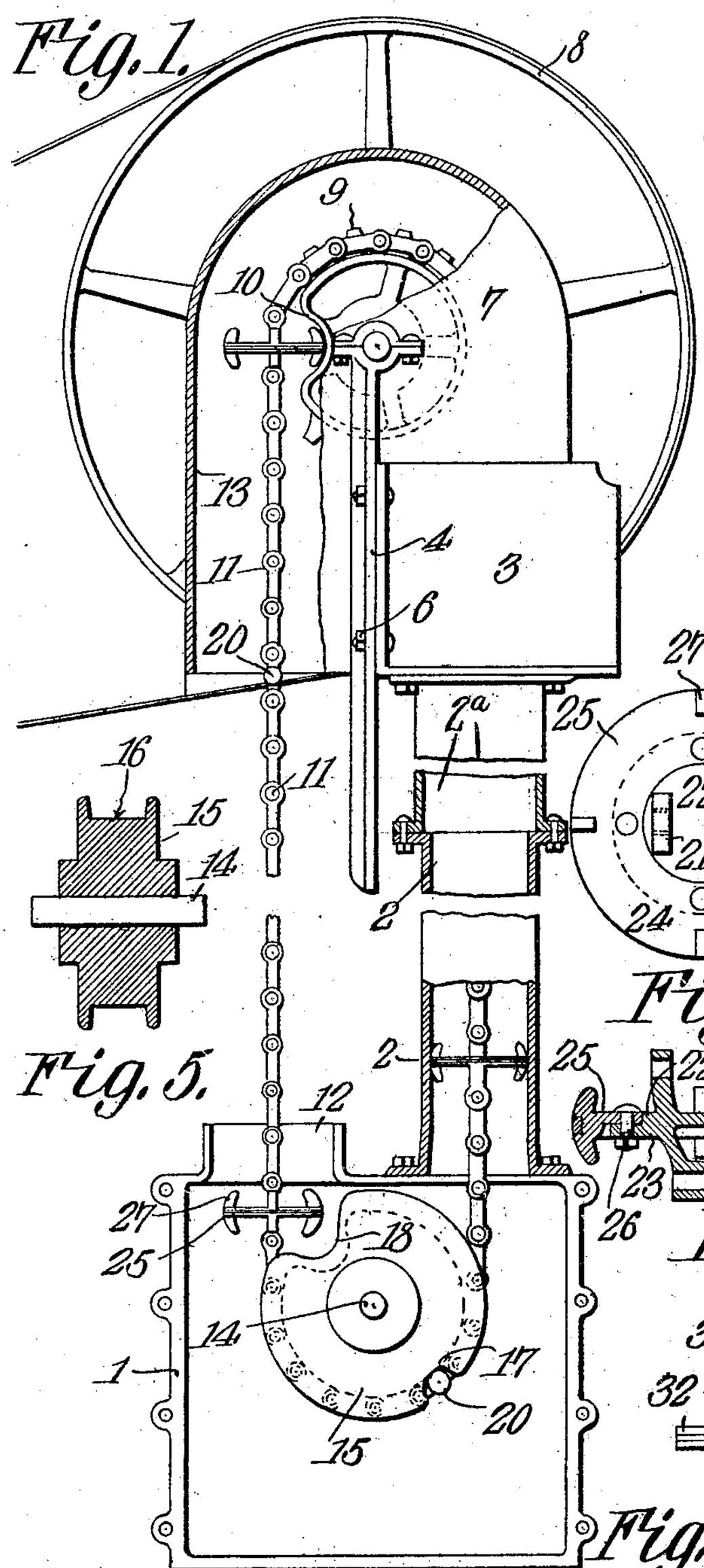

Fig. 2.

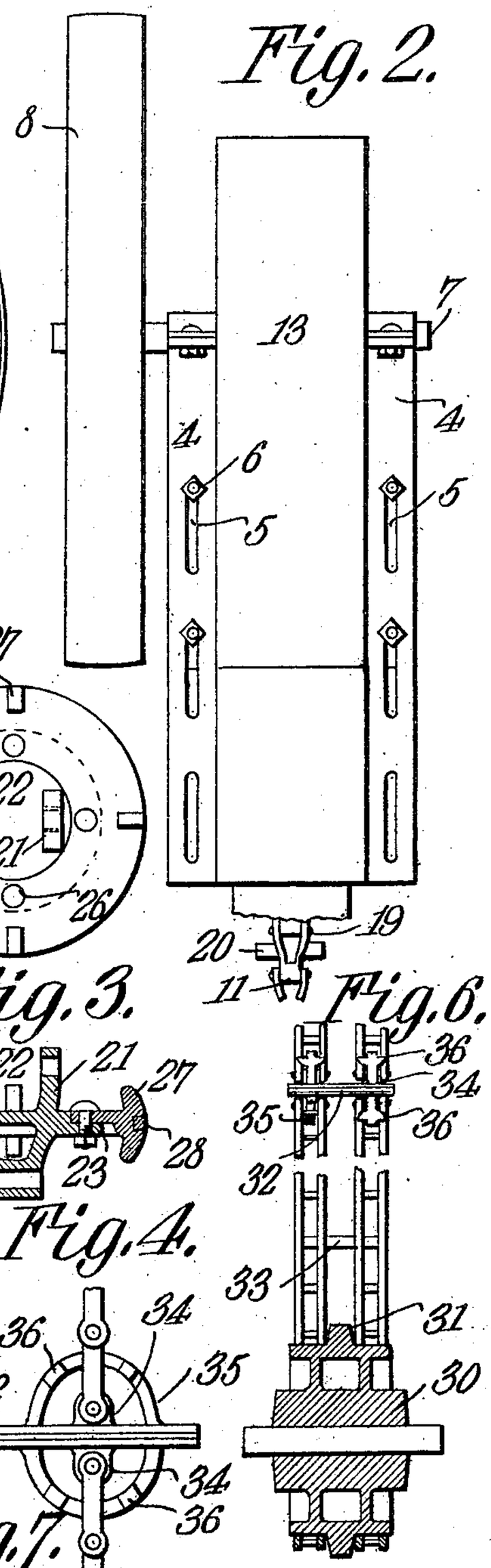

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

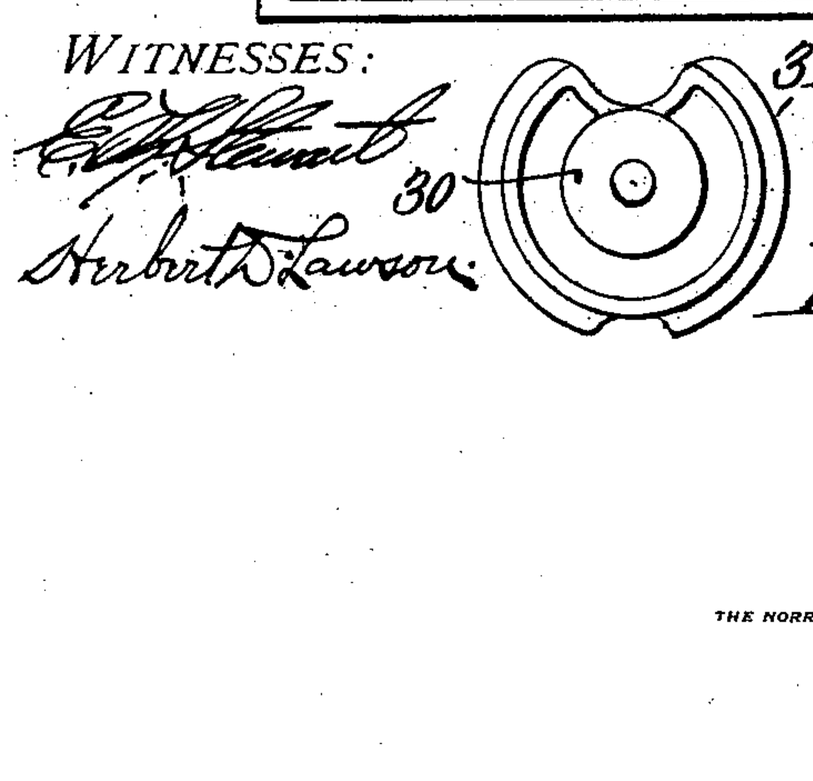

Fig. 8.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES A. GOODNER, OF ROCKY FORD, COLORADO.

WATER-ELEVATOR.

No. 878,133. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed January 8, 1907. Serial No. 351,376.

To all whom it may concern:

Be it known that I, JAMES A. GOODNER, a citizen of the United States, residing at Rocky Ford, in the county of Otero and State of Colorado, have invented a new and useful Water-Elevator, of which the following is a specification.

This invention relates to water elevators and more particularly to devices better known as chain pumps.

The invention is an improvement upon the device described and claimed in Patent No. 780,099, granted to me on January 17, 1905.

The object of the invention is, among other things, to increase the efficiency and simplify the construction of the pump.

Another object is to provide a novel form of piston for hoisting water within the pump.

Another object is to provide a chain of peculiar construction and novel forms of sheaves for operating the same whereby the power required for actuating the pump is considerably reduced.

With these and other objects in view the invention consists of certain novel features of construction and combinations of parts which will be hereinafter more fully described and pointed out in the claims.

In the accompanying drawings is shown the preferred form of the invention.

In said drawings: Figure 1 is a view partly in section and partly in side elevation of a pump constructed in accordance with the present invention; Fig. 2 is a front elevation of the upper portion of the pump and showing the adjustable support for the top sheave and the pulley; Fig. 3 is a plan view of one of the pistons; Fig. 4 is a transverse section therethrough; Fig. 5 is a transverse section through the sheave shown in Fig. 1; Fig. 6 is a view partly in section and partly in elevation showing a modified form of chain and a sheave adapted to be driven thereby; and Fig. 7 is a side elevation of said chain and a piston connected thereto; and Fig. 8 is a side elevation of the double sheave.

Referring to the figures by characters of reference, 1 is a casing adapted to be suspended in the bottom of a well and having an outlet cylinder 2 extending upward therefrom and connected by a pipe 2^a with an outlet tank 3 from which water is adapted to be conveyed to any suitable points. The internal diameter of this pipe 2^a is slightly greater than that of the cylinder 2. A bracket 4 having longitudinally disposed slots 5 therein is adjustably connected as by means of bolts 6 to this tank and constitutes a bearing for a shaft 7 to which is secured a drive pulley 8 and a sprocket 9. This sprocket has a peripheral recess 10 for the purpose hereinafter described and engages and supports a chain 11 which extends longitudinally through the cylinder 2, thence downward to an inlet 12 formed within the top of the casing 1. Sprocket 9 and the upper portion of the chain 11 are disposed within a housing 13 arranged upon the tank 3.

Located within the casing 1 is a transverse shaft 14 on which is mounted a sheave 15 the periphery of which is grooved as shown at 16 so as to receive the chain 11. Each flange of this sheave has a notch 17 formed therein said notches being disposed directly opposite each other and formed within the periphery of the sheave diametrically opposite the notches 17 is a recess 18 similar to the recess 10 hereinbefore referred to, said recess not only intersecting the flanges of the sheave but also projecting into the body thereof. The chain 11 is made up of substantially V-shaped links 19 and at distances apart equal to one-half the diameter of the sheave 15 these links are provided with laterally extending arms 20 adapted to ride within the notches 17. Midway between these arms 20 are disposed links 21 extending outward from circular plates or disks 22 each of which has an annular flange 23. Each plate 22 is adapted to fit within a circular opening 24 formed within the center of a ring-like piston 25 and said piston is secured upon the flange 23 in any desired manner as by means of bolts 26. Arcuate guide arms 27 extend upward and downward from the piston and are preferably disposed at ninety degrees apart. These arms curve inward over and under the piston and are for the purpose of guiding the piston into the lower end of the cylinder 2 when the same is brought thereagainst by the chain 11. Suitable packing 28 may be disposed within the periphery of the piston to prevent leakage.

Pulley 8 is adapted to be rotated by means of a belt 29 or in any other preferred manner and causes shaft 7 and sprocket 9 to rotate and thereby move the chain longitudinally through the cylinder 2. The pistons will be brought successively into the peripheral recess 10 in sprocket 9 and into the peripheral

recess 18 in sheave 15. Immediately prior to the removal of each piston from the sheave 15 the arms 20 following said piston will enter the notches 17 in the sheave and therefore said sheave will be caused to rotate at the proper speed so that the next piston passing downward into the casing 1 will be free to be seated within the recess 18. It is therefore apparent that either a piston or a pair of arms 20 is at all times in engagement with the sheave 15 and therefore said sheave is caused to positively rotate at the proper speed without, however, producing the friction which results from the engagement of a number of links with the teeth of a sprocket. The pistons are brought successively into the lower end of cylinder 2 and the arcuate arms 27 direct them thereinto so that they will assume proper positions. These pistons following each other into the cylinder 2 will carry a column of water upward into the tank 3 from which it can be discharged to any suitable point. Importance is attached to the particular construction of the pistons inasmuch as one of the chain links constitutes the central portion of each piston. Moreover, the semi-circular guides such as heretofore employed are dispensed with without reducing the efficiency of the piston.

Instead of providing a single chain for hoisting water a double chain such as shown in Fig. 6 may be utilized, in which event it is of course understood that two sprockets 9 will be necessary and a double sheave 30 such as shown in Fig. 6 must be utilized. This sheave has an annular flange 31 arranged around the center thereof and the same is provided with a notch and recess similar to those shown in Fig. 1 so as to receive pistons 32 and connecting pins 33. These pins 33 connect the two chains at regular intervals and disposed midway between the pins are the pistons which, as shown in Figs. 6 and 7, have oppositely extending ears 34 to which the two chains are connected. Semi-circular guide arms 35 are disposed in parallel planes upon the upper and lower faces of the pistons 32 and are adapted to extend loosely between the links of each chain. These arms have stops 36 for limiting their movement within the chains. A rocking movement of the piston is therefore permitted but these guides will always cause the piston to assume a proper position upon entering the cylinder 2. The length of the cylinder 2 is slightly greater than the distance between any two adjoining pistons on the chain of the pump so that when one piston passes outward from the upper end of the cylinder another piston will be disposed within the lower portion of the cylinder thereby preventing water from flowing downward into the well. The cylinder 2 can be made very short for pumps of any height and as the pistons during their upward movement only contact with the cylinder it will be seen that friction is greatly reduced and the pump rendered very easy to operate.

What is claimed is:

1. A piston for chain pumps comprising a chain link, a disk integral with, and surrounding the link between its ends, a ring surrounding and secured to the disk, and arcuate guides extending from opposite faces of the ring.

2. A piston for water elevators comprising a flanged disk a chain link integral with the disk and extending from opposite faces thereof, a ring secured upon the flange of the disk and surrounding said disk, and arcuate guides upon opposite faces of the ring.

3. In a water elevator a chain comprising disks, links integral with and extending from opposite faces of the disks, rings secured upon the disks and constituting pistons, each ring and its disk being disposed in the same plane, arcuate guides upon opposite faces of the rings, links interposed between and connecting the links of the disks, and sheave-engaging devices extending laterally from the joints of certain interposed links.

4. In a water elevator the combination with a sheave having an annular flange, there being a recess extending into the periphery of the sheave and a diametrically opposite notch disposed in the flange only of the sheave, and a driving element; of a chain supported by the driving element and extending under the sheave, means extending laterally from certain joints of the chain for engaging the notch within the sheave, a disk integral with one of the links between the laterally extending means, said disk being interposed between the ends of its link, a ring surrounding and secured to said disk and constituting a piston, and arcuate guides upon opposite faces of the ring.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES A. GOODNER.

Witnesses:

H. M. INGRAHAM,

H. P. SAUPASET.