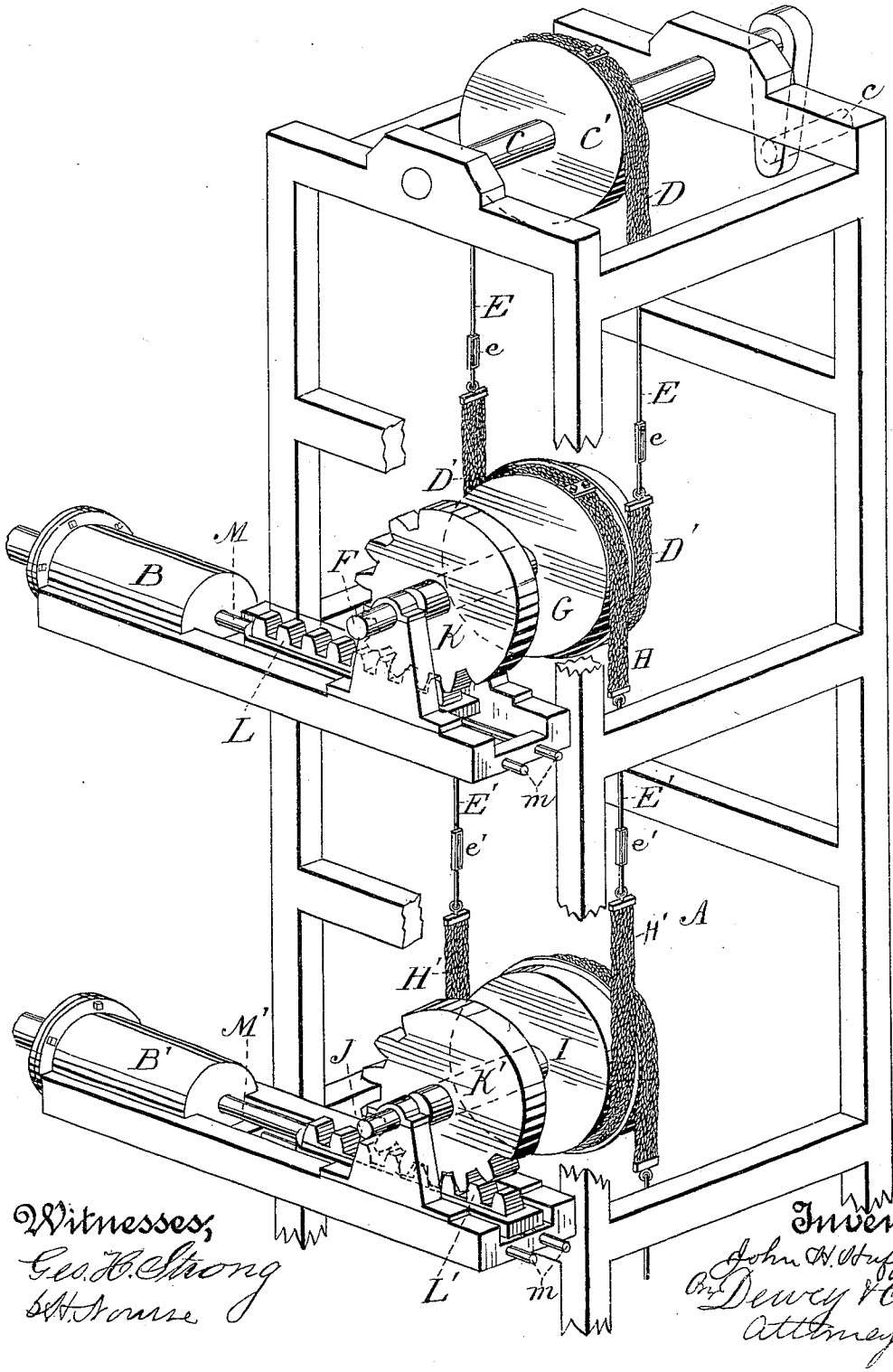
(No Model.)

J. H. HUFFER.

MEANS FOR OPERATING PUMPS IN DEEP WELLS AND MINES.

No. 270,671. Patented Jan. 16, 1883.



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MEANS FOR OPERATING PUMPS IN DEEP WELLS AND MINES.

SPECIFICATION forming part of Letters Patent No. 270,671, dated January 16, 1883.

Application filed May 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. HUFFER, of Jacksonville, county of Jackson, State of Oregon, have invented an Improved Means for Operating Pumps in Deep Wells and Mines; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a novel method and means for operating the pumps in deep wells and mines where the pumps are located at stations upon different levels; and it consists in the transmission of power from the surface of the earth through a system of pulleys, belts, rods, chains or cables, racks, and pinions to the pumps, whereby the operation of the first pump is made to extend to and through each of the others to accomplish the result.

The object of my invention is to furnish means for operating all the pumps upon the various stations or levels in deep wells and mines at the same time by the application of the original power, which by certain mechanical devices is transmitted and assisted throughout the entire system, whereby a saving in power may be effected and the result accomplished.

Referring to the accompanying drawing, the figure is a perspective view of my invention.

Let A represent the shaft of a deep mine or well, having any number of side stations at suitable levels, upon which are located the pumps B. I have here shown but two stations, sufficient to illustrate my invention. Across the top of the shaft, at the surface of the ground, is suitably journaled the driving-shaft C, to which power may be applied in any suitable manner, as by a crank, *c*. Upon this shaft, over the mouth of the shaft A, is a pulley, C′, to which is firmly clamped a flat wire cable, D, of any desired size. This cable is clamped at its center to the top of the pulley to prevent slipping. Its ends are loose and hang down upon each side over the face of the pulley.

E represents a round cable of desired size. Its upper ends are connected with the depending ends of the flat cable D.

At the first side station is journaled a horizontal shaft, F, carrying upon one end a double-faced pulley, G. Upon the outer of these faces is firmly clamped, at its center and underneath the pulley G, another flat cable, D′, the ends of which pass about the face of the pulley upon its sides, and extend upward to form a connection with the lower ends of the round cable E, thus forming a continuous connection-belt between the driving-pulley C′ and the pulley G. Into the round cable E are let the tightening screws or links *e*, whereby the belt-connection may be tightened and adjusted. Upon the other face of pulley G, at its top, is firmly clamped, by its center, a flat cable, H, the ends of which pass about the face of the pulley on its sides and extend downwardly. They are connected with another round cable, E′, the lower ends of which are connected with the upper ends of a flat cable, H′, which is clamped at its middle to the under side of the inner face of a pulley, I, upon a horizontal shaft, J, at the second station. The round cable E′ is also provided with tightening-links *e*′, as shown. By this means a continuous belt-connection is established between the first side station and the second. This could be carried on indefinitely by the employment of similar cables, flat and round, and pulleys, as shown. I need not confine myself to round cables for connecting the flat cables, as rods or chains might be made to answer the purpose.

Upon shaft F at the first side station is firmly fixed a pinion, K, which engages with a rack, L, either formed with or attached to the piston-rod M of the pump B. This rack moves on track *m*. A similar pinion, K′, upon shaft J at the second station engages with a rack, L′, of the piston-rod M′ of the pump B′ upon said station.

Power is applied to the main driving-shaft and pulley at the surface to give the said pulley an oscillatory motion. This is transmitted through the continuous belt or cable connections to the pinions at the several stations, and by means of said pinions the piston-rods of the pumps are moved back and forth to operate the pumps.

The pumps may be of any character, either double or single acting; or I may have two single-acting pumps, one at each end of the rack.

The cables are of the best quality of steel wire, and the pinions and racks are made of the best steel casting, as light as the nature of the work to be done will admit.

The pulleys are made as light as possible to stand the strain.

The shafts carrying the pinions are provided with strong and well-fitting boxes, and the slides upon which the racks run are properly boxed.

The pumps may be operated at any angle desired by clamping the flat cables at suitable points upon their pulleys, and by the interposition of guide-pulleys the power may be transmitted to them in any location, as in a tunnel or down another shaft. In like manner, if a tunnel is made into a mountain and a shaft sunk from the tunnel, the power can be placed at the mouth of the tunnel and be transmitted to the pumps in the shafts. The pumps will work as readily in a perpendicular as in a horizontal position.

In sinking a shaft the whole system can be lowered with the progress of the work.

The water columns and suction-pipes are the same as in other pumps used in mines.

In working the pump at a moderate depth—say less than two hundred and fifty feet—the cable should be attached directly to the pinion at points below the center, which would give sufficient stroke with double-acting pump. In common wells the cable should always be attached to the pinion. Vibration of the cables could be provided for by tightener or guide pulleys. The surface of the pulleys over which the cables pass may be suitably cushioned to prevent wear. Stretching of the cables is guarded against by first submitting them to a greater strain than any which will thereafter be placed upon them.

It is obvious that in the system I have described the power is only exerted to lift the column of water, as the action of the pumps is balanced.

I am aware that devices have been used to operate pumps located in proximity with each other, where the power applied to operate one pump may be transmitted and applied to others in the vicinity; but these devices differ from mine.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The means for operating pumps of deep wells and mines, consisting of the oscillating power-pulley C′ at the surface of the earth, the flat cable or belt D, clamped to its top, as shown, and the intermediate round cable, E, in combination with the pulley G, with its flat cable D′ clamped underneath it, and connected with the round cable E, the shaft F, and pinion K, and the rack L, piston-rod M, and pump B, operating as described, and substantially as shown.

2. The means for operating pumps at various levels or stations of deep wells and mines at the same time and by the same power, consisting of the oscillating power-pulley C′ at the surface of the earth, the double-faced pulleys G I at each station or level, the flat cables or belts D H, firmly clamped to the pulleys C′ and G, respectively, intervening round cables E E′, with their tightening-links *e e′*, the flat cables or belts D′ H′, firmly clamped underneath the pulleys G and I, respectively, the shafts F J, pinions K K′, and racks L L′, connected with and operating the piston-rods M M′ of pumps B, all arranged and operating substantially as herein described.

In witness whereof I hereto put my hand.

JOHN H. HUFFER.

Witnesses:

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WM. HOFFMAN.