A. Hitchcock,

2 Sheets, Sheet 1.

Windlass.

No. 105,682. Patented July 26. 1870.

Fig. 1.

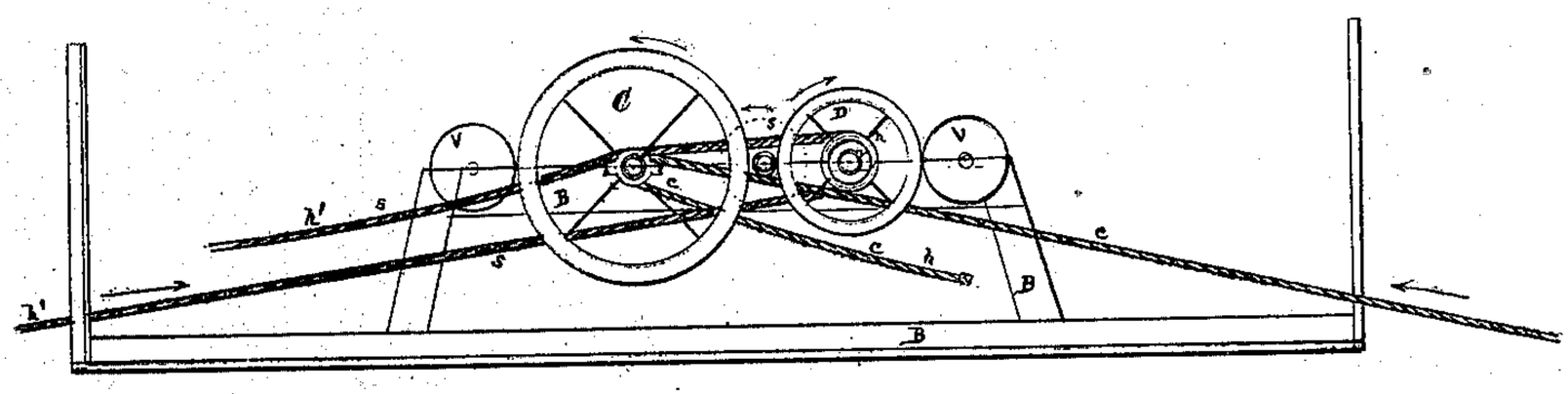


Fig. 2.

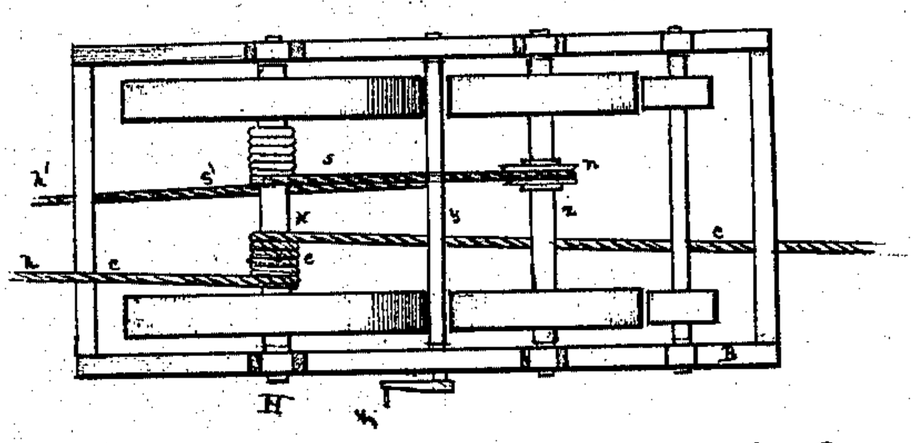


Fig. 3.

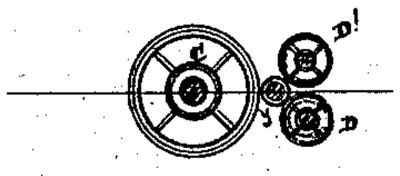


Fig. 4

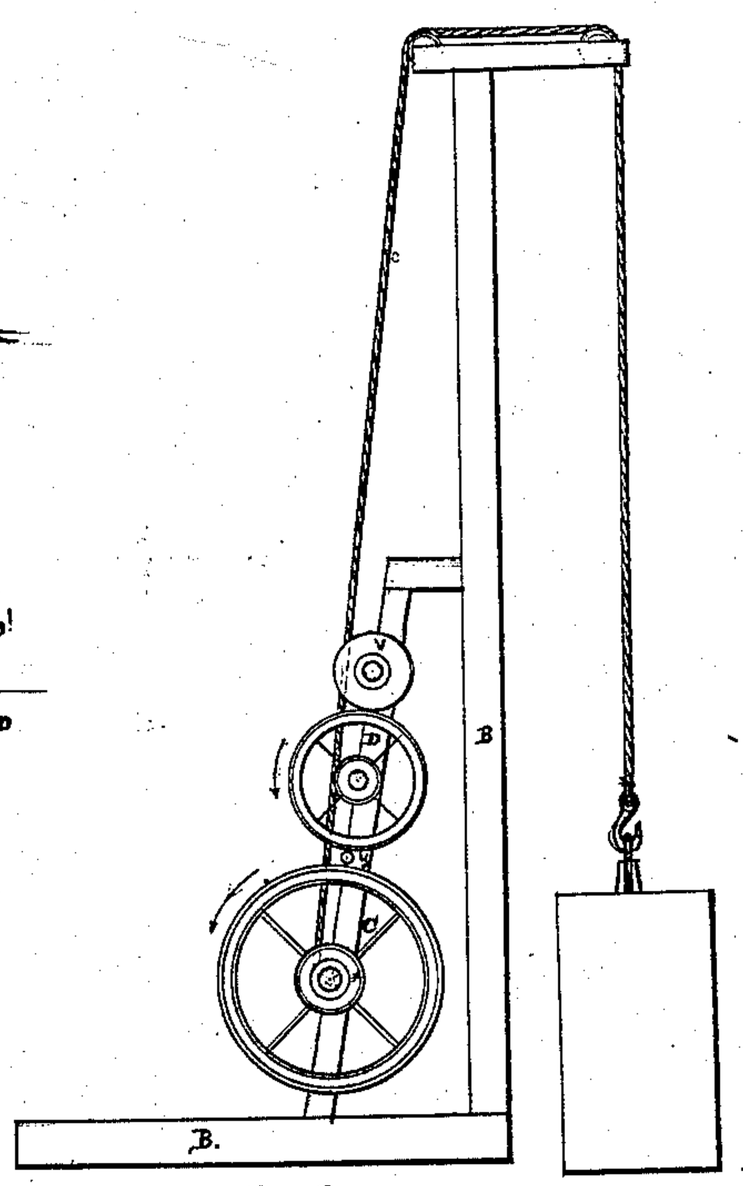
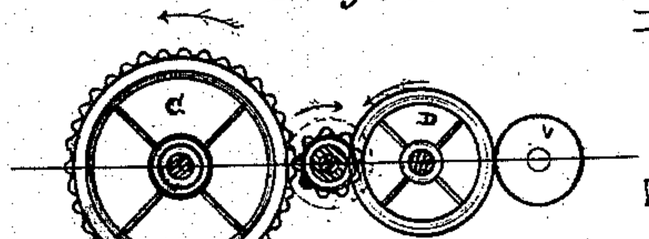


Fig. 5.



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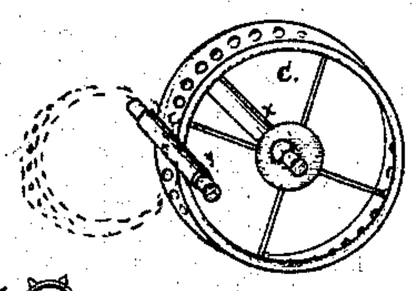

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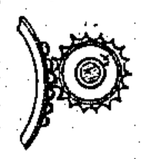


Fig. 9

Fig 10.

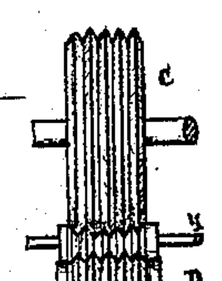
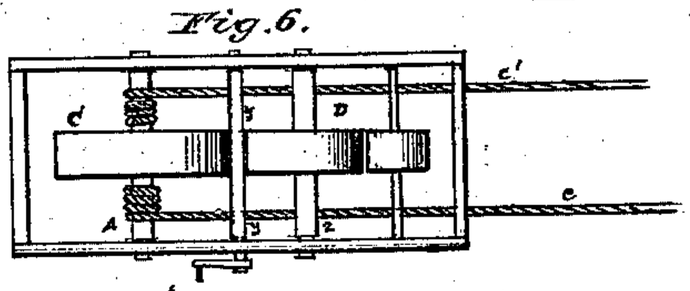


Fig. 6.



Witnesses.

George Ashforth

Daniel Higbee

Inventor,

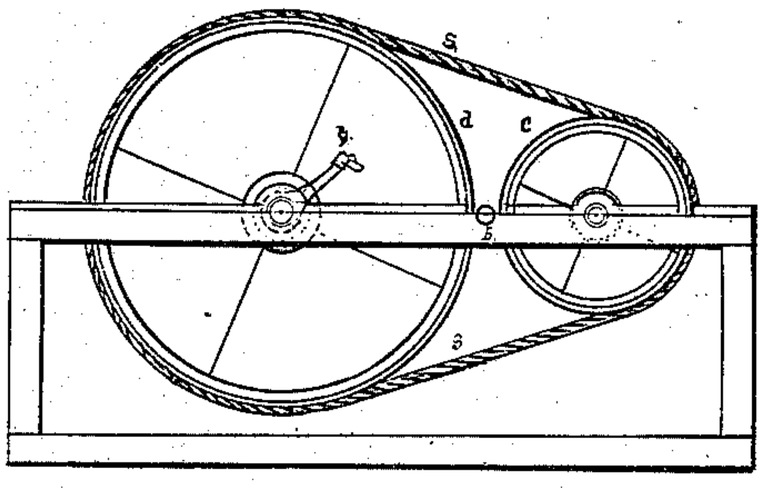
Alonzo Hitchcock.

A. Hitchcock, 2 Sheets. Sheet. 2.

Windlass.

No. 105,682. Patented July 26. 1870.

Fig. 1.



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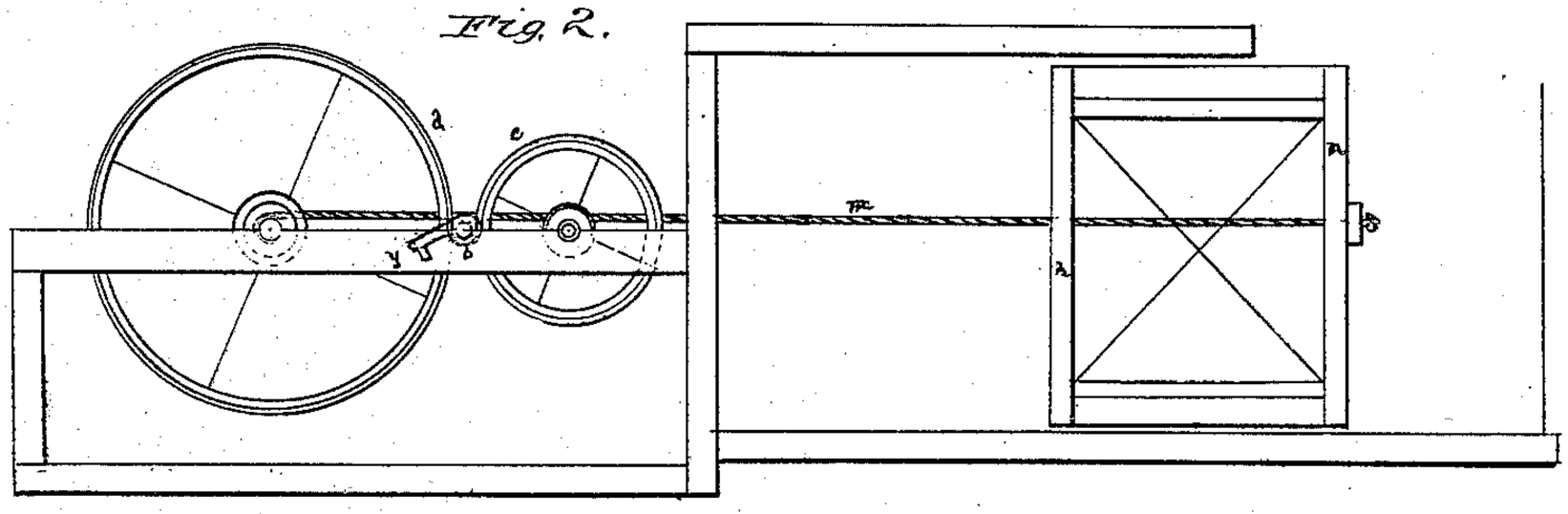

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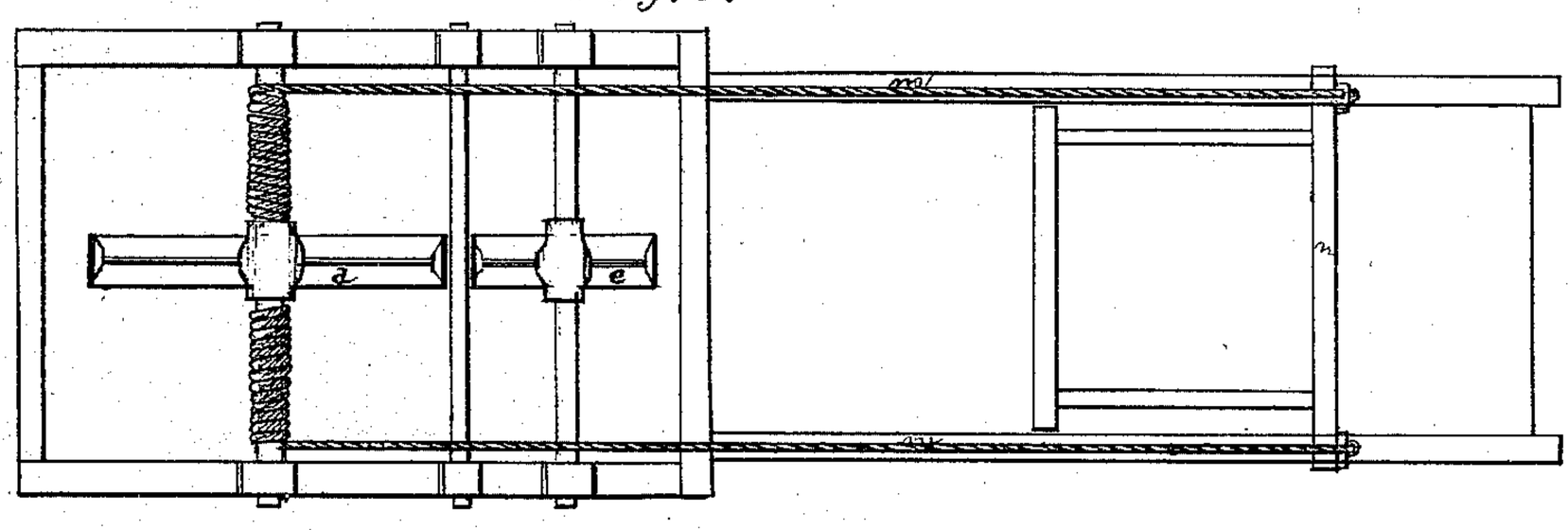

Inventor:-

Alonzo. Hitchcock

United States Patent Office.

ALONZO HITCHCOCK, OF NEW YORK, N. Y.

Letters Patent No. 105,682, *dated July* 26, 1870.

IMPROVEMENT IN WINDLASS.

The Schedule referred to in these Letters Patent and making part of the same

I, ALONZO, HITCHCOCK, of the city and State of New York, have invented certain Improvements in Multiplying Power in Winding-Machines, as in capstans or hoisting-machines and presses.

The nature of my invention consists in the use of wheels, pulleys, or rollers, when the peripheries of three or more of them are brought into contact and held there by the weight to be raised or work to be done, the center shaft or pulley being the motor, which distributes its power equally to the surrounding pulleys or wheels by means of traction, friction, or adhesion.

Figure 1 is a side elevation of a capstan or windlass.

Figure 2, a plan of the same.

Figures 4 and 6 show different modes of applying the power.

Figures 3, 5, 7, 8, 9, and 10 show the different modes of constructing the different parts.

Fig. 1 shows one combination for a capstan or hoisting-machine, with the front part of the framework left off, the latter to show the application of the principle, B B being outlines of the frame.

C is a large pulley, the shaft of which is to constitute the windlass; it may be made parallel or conical, or carry a drum or barrel of any desired form, for the purposes named.

D is an auxiliary pulley or wheel, which may be of much less size for convenience and saving space.

y is a small pulley or shaft, placed between and in contact with the peripheries of C and D, on opposite sides.

Fig. 2 will show more fully the combination and operation of the parts.

Each shaft, *x* and *z*, in this plan, carries two pulleys, while *y* is a plain parallel shaft.

To lift an anchor by the cable *c c*, the journal-boxes of *z* are firmly fixed to the frame or truss B; but the journal-boxes of *y* and *x* are allowed freedom enough to allow the peripheries of C C to be pressed up against the shaft *y*, which in turn is pressed against D D. It is manifest here that *y* is now being firmly clamped and pressed between the peripheries of C and D, in direct proportion to the weight or power exerted on the cable *c*. At the same time there is no thrust or pull on the journals of *y*, consequently there is no friction on these journals; and as there is no disposition to displace or spring the shaft *y*, it enables me to use a very small shaft as a driver in proportion to the diameter of C, the driver; nor is there any friction on the journals of *x* if the resistance is parallel to the axis of the three shafts *x y z*, always excepting the weight of said shafts and gearing.

To lift a weight by winding up the cable *c* round the shaft *x*, the crank *f*, or other mechanical means attached to shaft *y*, may be turned from left to right, as indicated by the arrow and dotted line in fig. 1; and as the resistance on opposite sides of *y* is equal, by reason of the strain or load on the cable *c*, it follows that *y* becomes the driving power, distributing its power equally between the main driver-pulley or wheel C and its co-operative pulley or wheels D by means of traction or adhesion on their respective surfaces, produced by the strain exerted by the cable *c*. In this combination the whole load is thrown onto the pulleys D and shaft *z*, and as all the rubbing or sliding friction is transferred to the two journals of *z*, it may be relieved by the ordinary arrangement of anti-friction pulleys around the journals; but I prefer the use of large anti-friction pulleys, placed against the peripheries of D, in a line with C, as shown at *v*, figs. 1, 2, 3, and 6. In extreme cases, when the load is very heavy, these large anti-friction pulleys will be very useful, as they enable me to reduce the size and weight of the shaft *z* and transfer a portion of the friction from the journals of *z* to the journals of *v*. This principle may be adopted when it would be impractical to use the anti-friction rollers round the journals.

There is another way of adjusting the cable in this winding-machine that transfers all, or mostly all, the load and friction to the shaft of the main driving-shaft *x*. The cable *s s* shows such a combination on the same figures, 1 and 2.

Starting from the slack end *h'*, the cable *s* makes several round turns around the shaft *x*, when it passes under or over shaft *y* and makes a half turn, or it may be a round turn, around *z*, and then back to *s'*, in the direction started from; but I prefer to turn the cable around *z*, over a grooved pulley, *n*, that is allowed to run loosely and traverse laterally on the shaft *z* to accommodate itself to the load of the cable. Here it will be seen that the cable *c* and cable *s* pull from opposite directions, *c* from the right and *s* from the left. In some cases it may be convenient to make the journal-boxes of *y* stationary, and allow freedom to C and D to move up to *y* by means of the load on the machine.

Fig. 4 shows one mode of applying this principle to cranes or other hoisting-machinery.

Fig. 6 shows a combination when the driving-pulleys or wheels are on the middle of the shafts and two cables are attached to the out ends of either shaft. This combination is suitable for cotton-presses, wine-presses, or analogous work.

The power of this winding-machine to do work depends mainly on the difference of diameters of the driver *y* and the driver-pulley or wheel C, and my invention enables me to make a greater difference in these diameters than has heretofore been done practically.

I am aware that it is common to distribute the power from the opposite sides of the driver in ordinary cogged gearing, each wheel and pinion made to turn on fixed centers, to correspond to the pitch-line of the cogs. In this gearing the power of the machine depends on the strength of each individual cog, and as there are certain proportions to be maintained between the diameters of the wheel and pinion, in order to avoid too much rubbing friction and secure the requisite strength, it is of necessity limited in its multiplications of revolutions and power.

My invention differs from this, inasmuch as I dispense with fixed centers or axle-boxes, except in one shaft, which is to receive the load, the rest being adjustable, and having no cog gearing to be held on a pitch-line. I am not limited to any proportions, excepting that the shaft *y* shall not be so small as to twist by torsion in performing its work.

So far I have only described pulleys, wheels, or shafts, with plain parallel surfaces, rolling together. But I am aware that, in some cases, the strain may be thrown on so sudden as to cause a slip on the surfaces, or the machine may be overloaded, which would produce like results. I therefore, in certain cases, propose to corrugate the peripheries of the pulley or wheel C with corresponding corrugations in *y*, the driver. The co-operating wheels or pulleys D may or may not be so corrugated.

A very short, round cog-gear, that is made to "bottom," so that the bearings will be continuous, or a system of "hollows and rounds," which would be equivalent, may be used. Figs. 5 and 8 show these plans very much exaggerated. But I prefer the design shown in figs. 3 and 7, where spurs are put into the driver *y* and mesh into holes or mortises *t t*, in the periphery of the driver-pulley C. These spurs are not designed to do constant work, but to prevent accidents in case of slipping, though it is evident that small cogs may be used in combination with my principle of traction to a great advantage.

Fig. 9 shows two co-operating pulleys, D D', resting against the driver *y*. Ordinary grooved friction-gearing, as shown in fig. 10, may be used on the same principle.

For very light working machines, very light corrugations or "milling" of the driving-shaft *y* will be all that would be required to prevent any slipping when the power is irregular.

Claims.

I claim—

1. The use of a driving-shaft, pulley or pulleys, wheel or wheels, when said driver is made to distribute its power equally to the main driving-pulley or pulleys, wheel or wheels, and to co-operating pulley or pulleys, wheel or wheels, placed opposite the main driving-wheel or pulleys or surrounding the driving-shaft, when the peripheries of the driving-pulleys or wheels are all concentrated around and against the driver and held there, thereby producing a driving-power by means of traction, adhesion, or friction, by means of and in proportion to the load or work to be done by the windlass or winding-machine, substantially as and for the purposes set forth.

2. The co-operating pulley or pulleys, wheel or wheels, when placed around and in contact with the driver and held there, so as to relieve the driving-shaft of thrust or pull on its journals, clamping and pressing the driver between the peripheries of the driver by means of the load sustained by the windlass, substantially as and for the purposes set forth.

ALONZO HITCHCOCK.

Witnesses:

GEORGE ASHFORTH,

DANIEL HIGBIE.