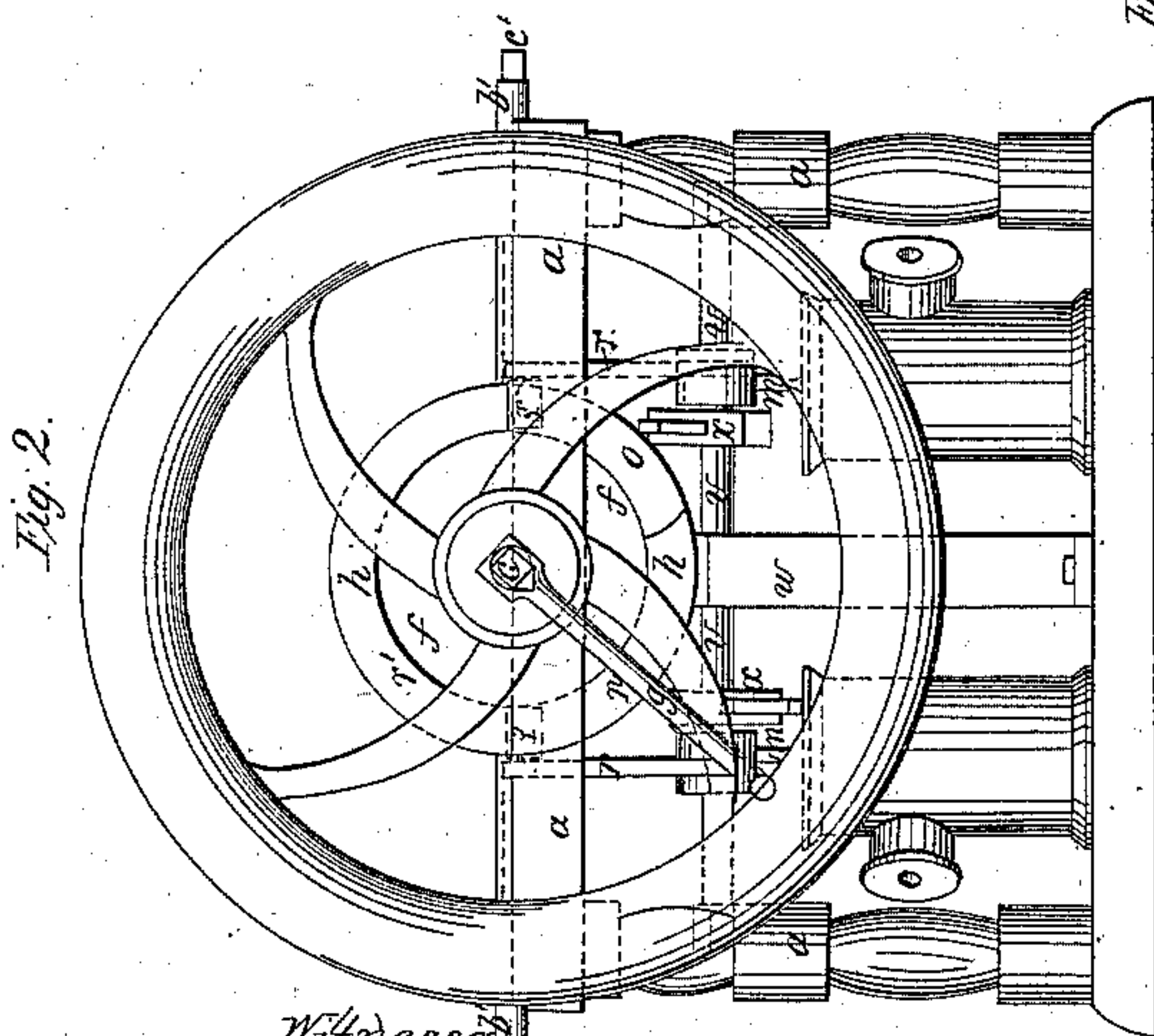
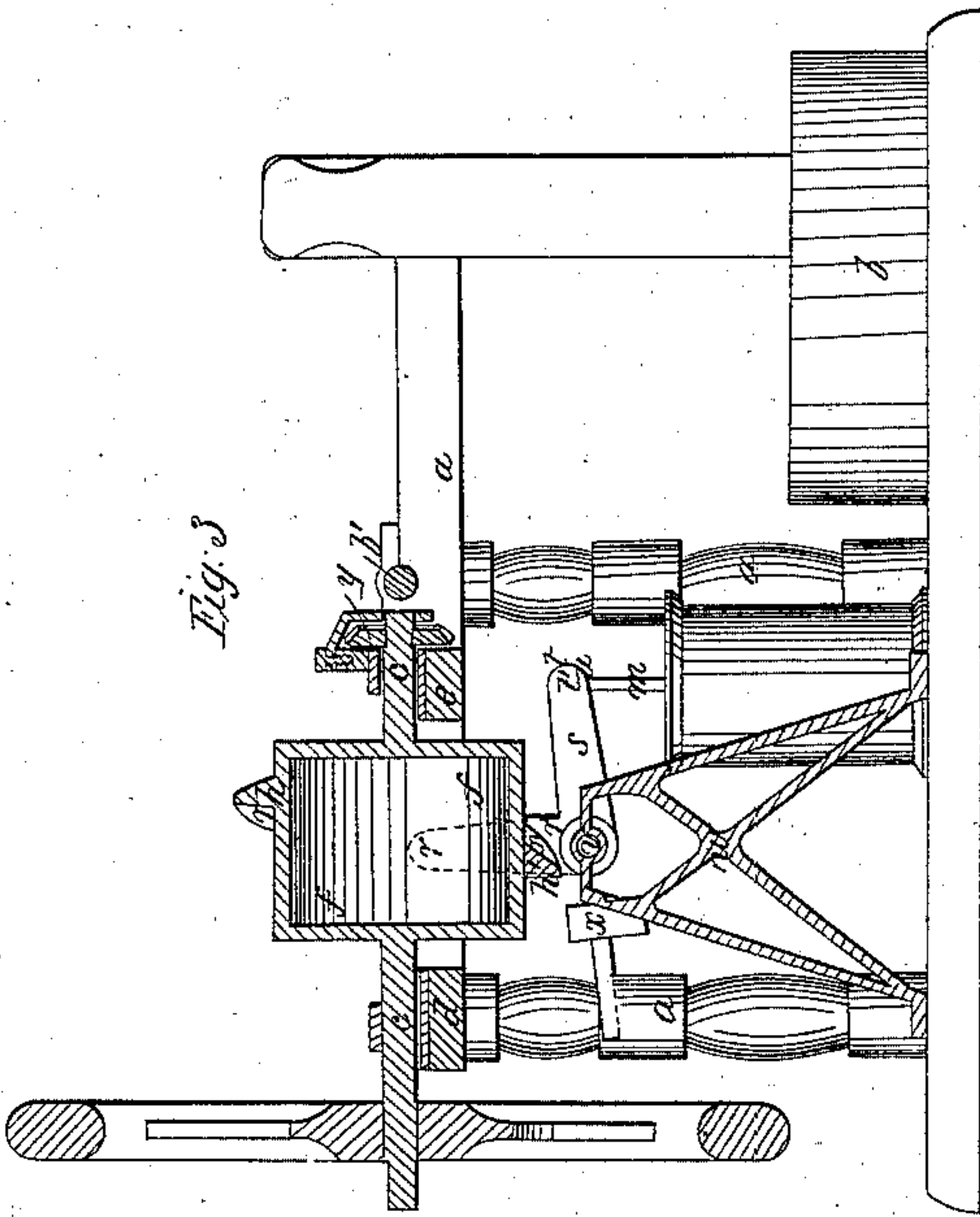
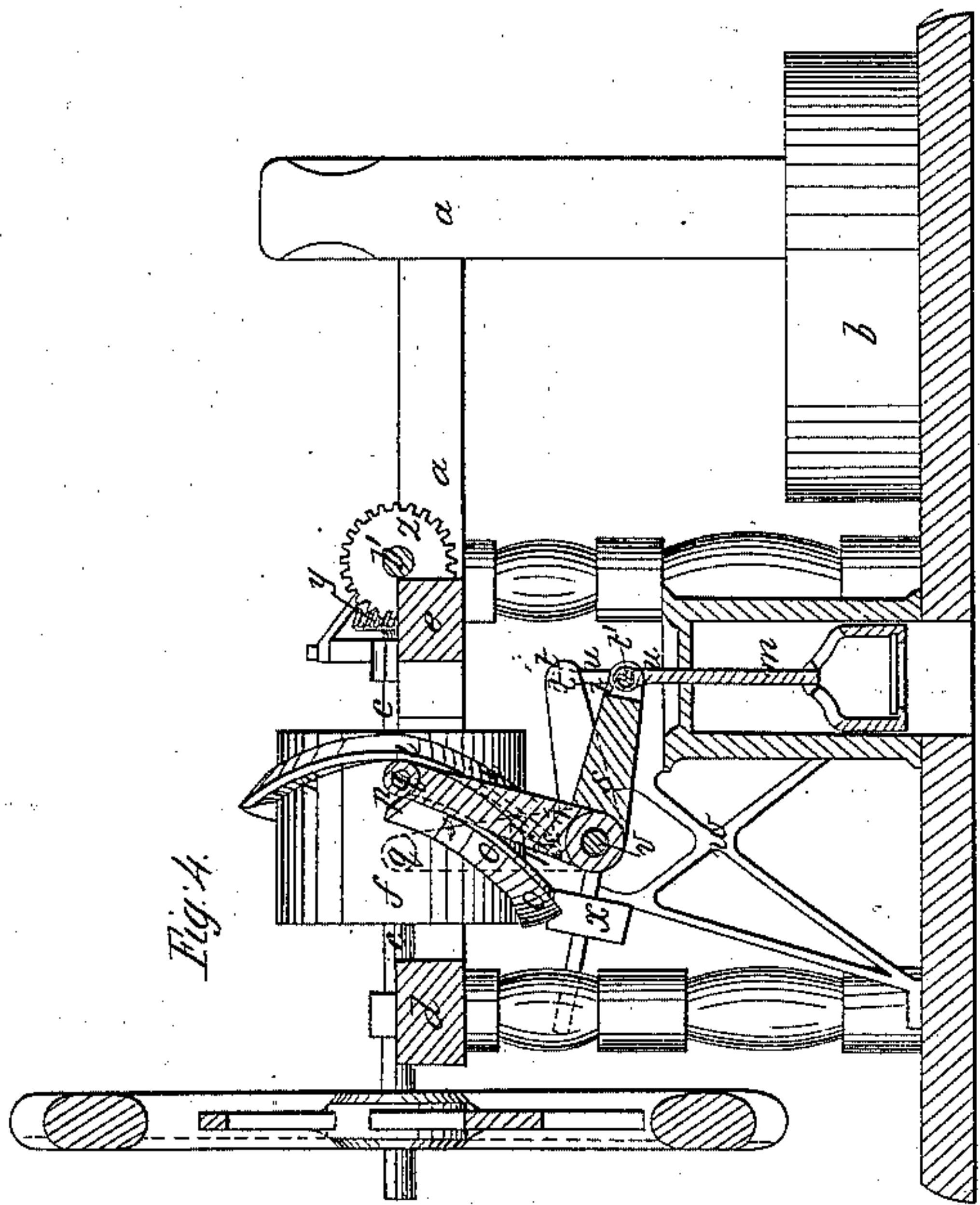


A. G. Gray,

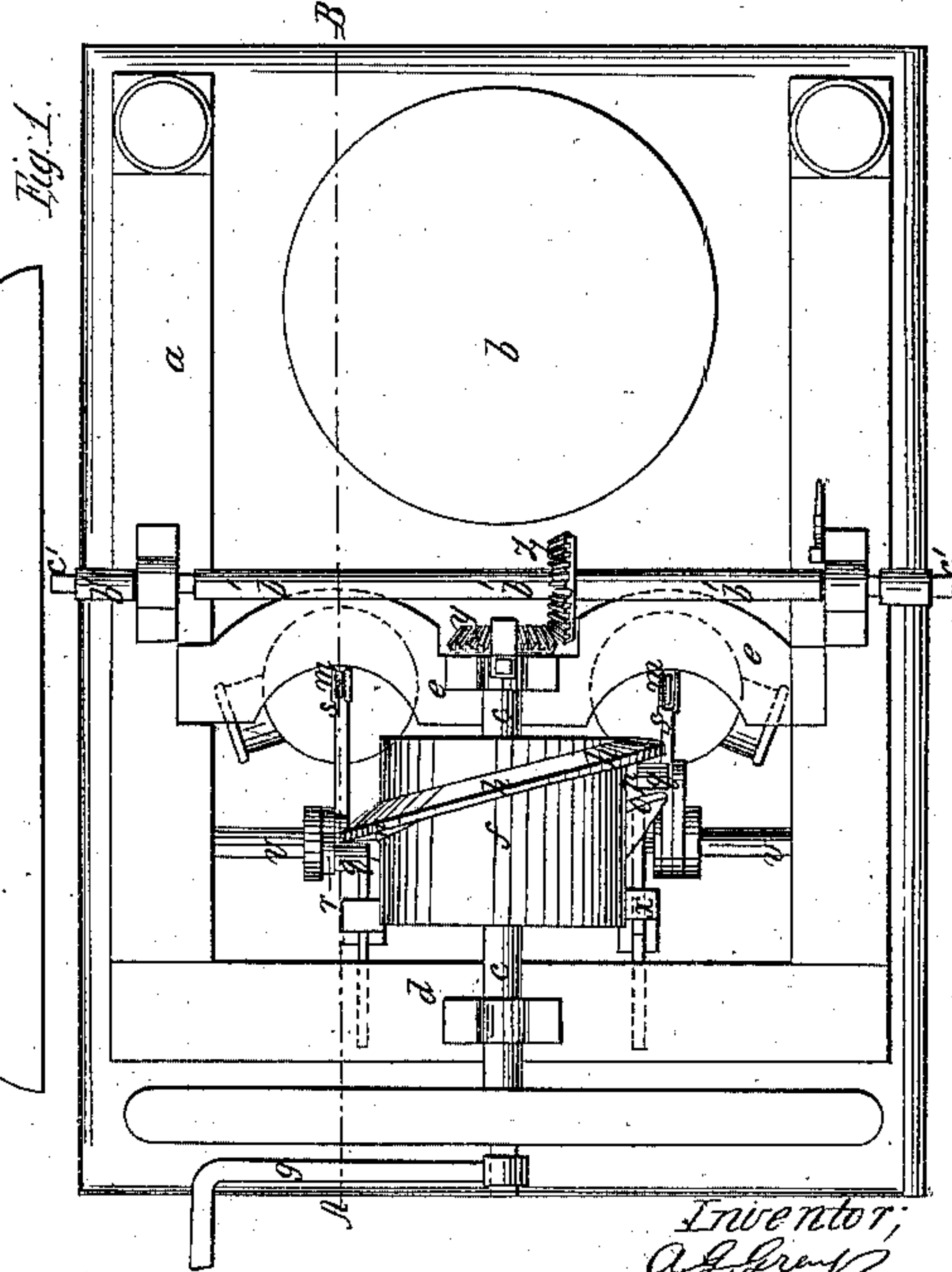
Ship Pump,

N^o 39,728.

Patented Sep. 1, 1863.



Witnesses
P. A. Smith, W. C. Brown



Inventor,
A. G. Gray

UNITED STATES PATENT OFFICE.

A. G. GRAY, OF LONDON, ENGLAND.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **39,728**, dated September 1, 1863; antedated March 11, 1862.

To all whom it may concern:

Be it known that I, A. G. GRAY, of London, England, and a subject of Her Majesty the Queen of Great Britain, but at present temporarily residing in St. John, of the Province of New Brunswick, have invented certain new and useful Improvements in Pumps; and I do hereby declare that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements whereby my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The present invention relates to certain new and useful improvements in the arrangement of mechanical devices for the working of ships' pumps; and it consists in attaching to one end of a right-angular swinging arm the upper end of the piston-rod of an ordinary ship's pump, while the other end, having a suitable friction-roller, travels in or upon a peculiarly-formed inclined channel or groove formed upon the exterior surface of a revolving drum or cylinder and extending entirely around the same, the said groove being so formed thereon as to cause the right-angular lever-arm traveling in or upon the same to be oscillated or reciprocately moved in a vertical plane a sufficient distance to raise and lower the piston-rod attached thereto, and thereby operate the pump as desired.

The principal objects aimed at and secured in the present invention are to obviate in a great measure the friction of the parts employed for operating the pumps, and thus to increase the effective power of the same, to convey the power applied for the working of the pumps to their piston-rods in as direct a manner and with the least complexity of intermediate mechanical devices as possible, and finally to so arrange or construct the mechanism employed as to counteract the tendency of the "vacuum" or partial vacuum necessarily formed below the piston-box to draw back the piston, and also to produce a too sudden reverse in the motion of the same, the advantages resulting from which are evident, and need not be herein specified. This

last result I accomplish by securing to the right-angular lever-arm or its shaft a weight, either susceptible of adjustment or not, which overcomes, as it were, the effects of the vacuum, formed as described, and thus prevents the sudden movement of the piston-rod, as well as also materially assisting in the raising of the water contained within the pump.

In the accompanying plate of drawings my improvements are represented, and of which Figure 1 is a plan or top view; Fig. 2, an end view; Fig. 3, a central longitudinal vertical section; and Fig. 4, a longitudinal vertical section taken in the plane of the line A B, Fig. 1.

a a in the accompanying drawings represent the ordinary fife-rail of a vessel, surrounding the mast *b* of the same; *c*, a horizontal shaft, turning in suitable bearings of the stretcher-bars *d* and *e* of the said fife-rail *a a*. Attached and firmly secured to the said shaft *c*, and placed between the two bars *d* and *e* is a closed hollow cylinder or drum, *f*, to which a rotary motion may be imparted by means of the winch *g*, or in any other proper manner. Upon the exterior surface of this drum *f*, and extending around the same, I have arranged the two raised lips or cams *h* and *i*, the one, *h*, of which, starting from a point, *k*, of the cylinder, passes in a spiral direction through about three-quarters of the periphery of the drum to the point *l*, the horizontal distance traversed by the same being equal, or nearly so, to the length of stroke of the pumps, plunger, or piston-rod *m*.

Extending between and joining the two points *k* and *l*, and thus forming one continuous lip around the cylinder, is the other lip, *i*, parallel with which, throughout its entire distance, is another raised lip, *o*, leaving a groove or way, *p*, between their inside surfaces.

Bearing against and traveling upon the surface *n* of the two lips *h* and *i*, as the drum of the same is revolved, is the friction-roller *q* of the upright arm *r* of a swinging right-angular lever arm, *s*. To the end *t* of the said arm *r* is attached by a pivot, *t'*, the upper end, *u*, of the plunger *m* of the pump *a'*, the said right-angular arm being attached at or near its angle to a horizontal transverse shaft, *v*, having bearings in the standard *w* and fife-rail *a a*. Thus it will be seen that upon each revolution

of the drum the right-angular arm connected with the camway thereof, by the friction-roller *q*, will be made to move back and forth or oscillate in a vertical plane, thereby lifting or lowering the piston-rod and operating the pump, as desired, in each revolution the groove or channel *p*, as the friction-roller *q* passes through the same, causing it (the piston-rod) to descend, after having been first raised by the action of the cam-lip *h* of the said drum.

From the above description it is evident that by constructing the camway of the drum for operating the pumps, as described—that is, with two lips, one of which is continuous, while the other extends but a short distance around the same—a great amount of friction is consequently prevented, thus producing a more effective result.

To obviate the tendency which the vacuum or partial vacuum formed below the box of the pump's plunger as it is raised has to draw the plunger back and render its motion unsteady and too sudden, I have arranged upon the shaft of the swinging angular arm *s* a weight, *x*, which serves not only to overcome and counterbalance the vacuum, but also, as is evident, to facilitate the lifting of the water within the pump-cylinder.

In the drawings two pumps are represented upon opposite sides of the cylindrical drum, and with their respective friction-rollers of their right-angular arms situated at points of the drum diametrically opposite to each other, the arrangement and mode of operation of the same being substantially as described.

To enable a greater force to be applied to the pumps, should occasion require it, than can be obtained through the winch herein referred to, I have placed upon the further end of the longitudinal shaft *c* a bevel gear-wheel, *y*, engaging with another similar gear-wheel, *z*, upon the transverse shaft *b'*, to the ends *c'* *c'* of which cranks may be attached, and addi-

tional power thus readily applied, these gears *y* and *z* being susceptible of being disconnected at pleasure by simply sliding the shaft *b'*, in which position the shaft *b'* is held by a clutch, *d'*, engaging with the same.

It will be apparent that, from the peculiar manner in which the camway for operating the pumps is constructed or arranged, the right-angular lever-arms of the same may be disconnected therefrom at pleasure by simply swinging them back from the camway, and there securing them in any proper manner, whereby the apparatus is readily adapted to the working of one or both of the pumps, which evidently could not be possible were two continuous parallel lips formed entirely around the drum.

The weight employed for overcoming the vacuum of the pump may be made susceptible of adjustment and thus render it easily adapted to any and all degrees of pressure of vacuum, &c., as is evident without further description, the said weight being at all times upon the opposite side of the shaft *v* to the pump being worked.

Having thus described my improvements, I shall state my claims as follows:

What I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. The combination of the peculiarly-constructed driving-cam, with the right-angular lever arm *s*, arranged and operating a pump, substantially as described.

2. The use of a weight or its equivalent, either adjustable or not, so arranged in regard to and operating with the lever-arm *s* as to counteract the tendency of the piston-rod to be drawn back by the formation of a vacuum in the pump, substantially as described.

A. G. GRAY.

Witnesses:

PETER STUBS.

JOSEPH V. ROUSE.