

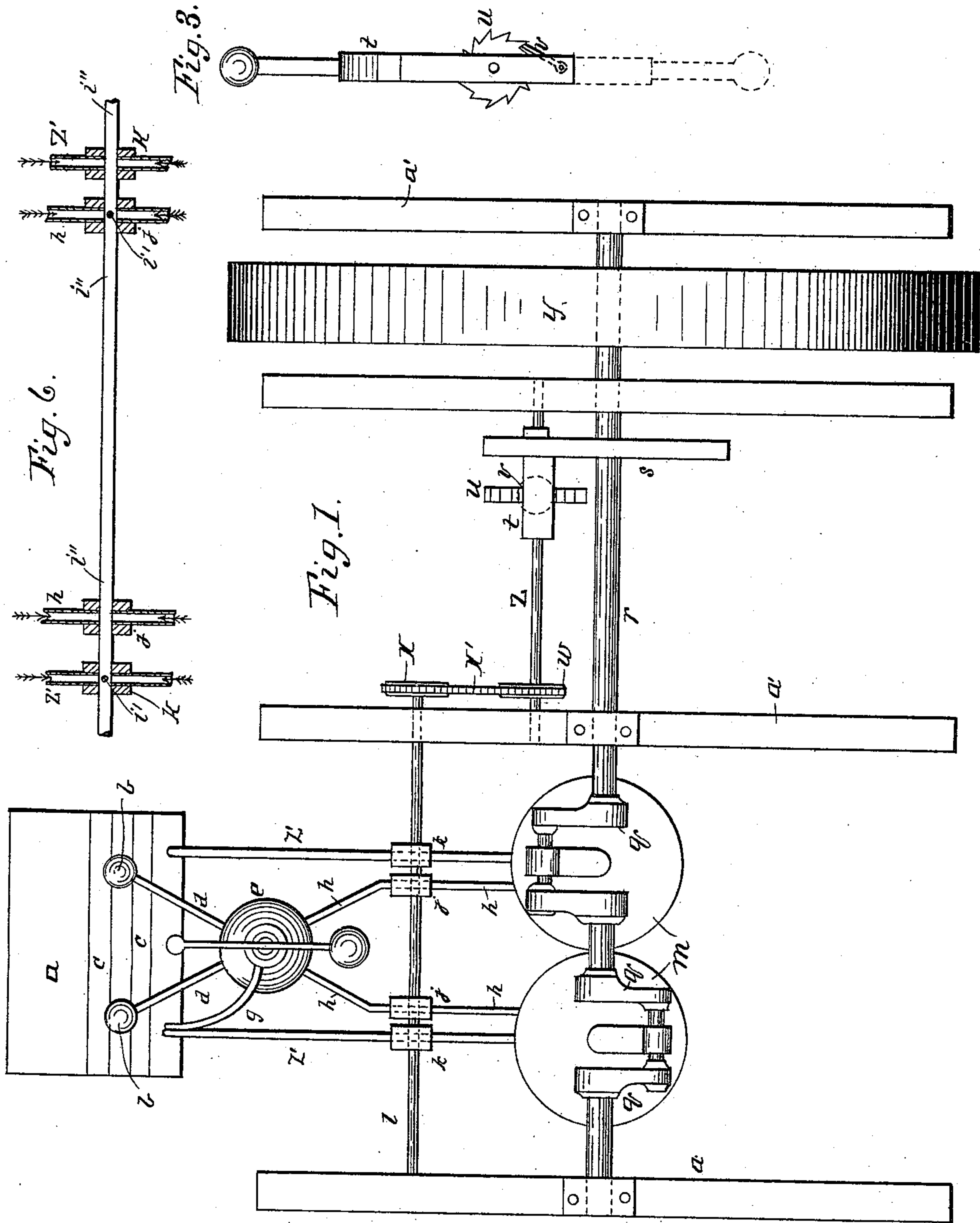
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3 Sheets—Sheet 1.

H. G. T. GLAZEBROOK.
HYDRAULIC ENGINE.

No. 396,556.

Patented Jan. 22, 1889.



Witnesses.

Harold S. MacKay

Frank Dorian

Inventor,

H. G. T. Glazebrook
By his Attorney in fact—
Chas. E. Barber

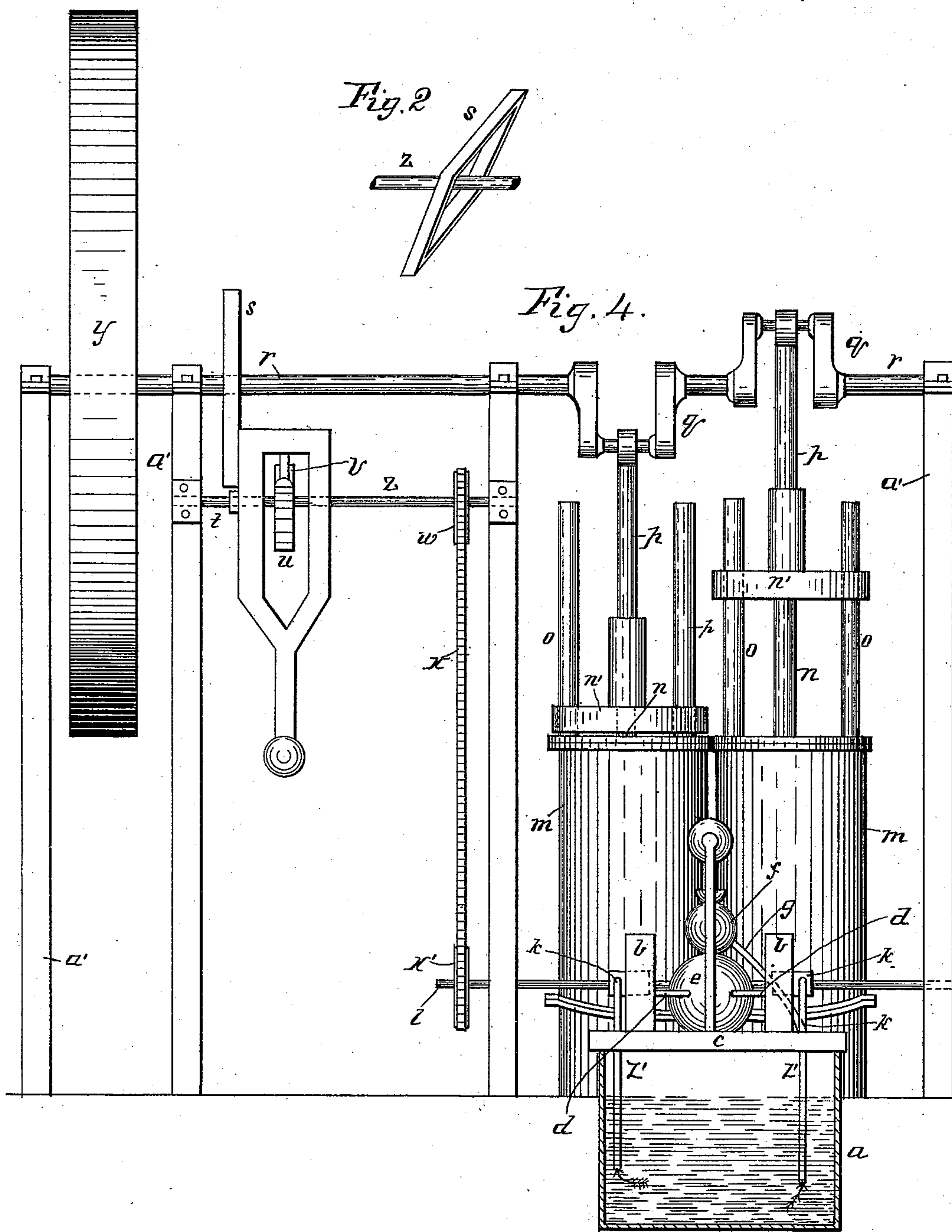
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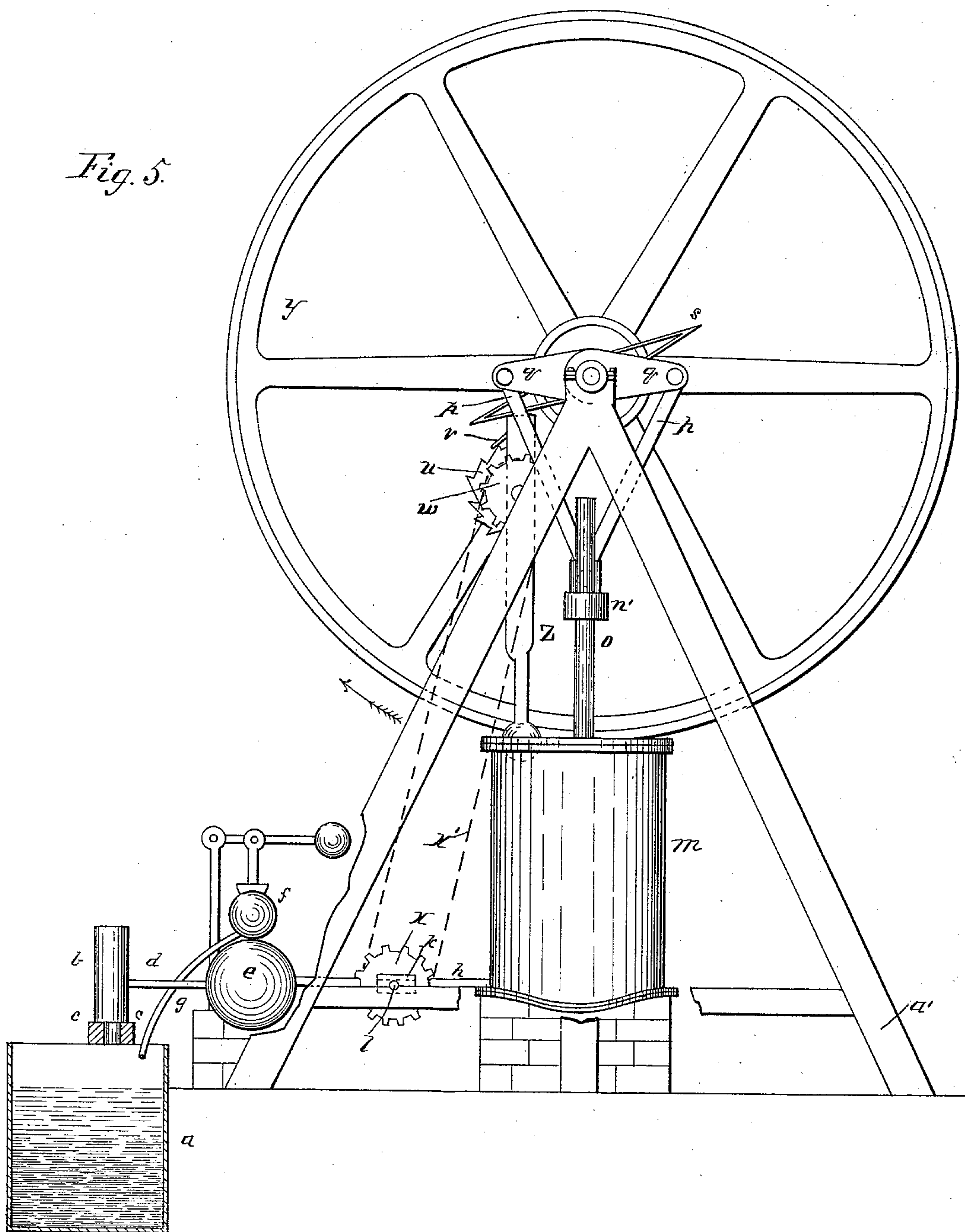
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Fig. 5.



Witnesses,
Harold S. Mackay
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H. G. T. Glazebrook
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UNITED STATES PATENT OFFICE.

HENRY G. T. GLAZEBROOK, OF WOODHOUSE, ONTARIO, CANADA.

HYDRAULIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 396,556, dated January 22, 1889.

Application filed October 4, 1886. Serial No. 215,314. (No model.)

To all whom it may concern:

Be it known that I, HENRY GEORGE TWAN-BROOK GLAZEBROOK, of the township of Woodhouse, in the county of Norfolk, in the Province of Ontario, Dominion of Canada, a subject of the Queen of Great Britain, have invented certain new and useful Improvements in Hydraulic Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same.

The object of the invention is the construction and combination of parts in a hydraulic engine in such a manner as to obtain the greatest amount of power with the least possible expense.

The invention consists—

First. In a tank or cistern, large or small, according to the quantity of water required, and two small force-pumps, large or small, according to the power it is proposed to employ in operating them and the pressure it is proposed to employ. They are to be operated alternately, which may be done with any motive power—such as a horse-power, water-wheel, or steam-engine—capable of exerting sufficient force to give whatever pressure is needed.

Second. A regulator is employed and constructed, as follows: The lower part of it is a hollow iron globe of sufficient strength to withstand great pressure and connected to the pumps by pipes for the supply of water, and the upper part a smaller globe communicating with the lower portion, and by means of a small aperture closed by a valve operated by a weighted lever attached to the lower part, also a waste-water pipe leading from the upper globe back to the cistern or tank containing the water-supply.

Third. Two strong iron cylinders are connected by short iron pipes of very small diameter to the regulator to convey water from the regulator to the cylinders, and in these cylinders are placed water-tight pistons with guides fixed to the cylinders and having pitmen, each of which is attached to a crank on a main shaft supported by frame-work. On the end of the said shaft a large drive-wheel is affixed to drive any mechanism required.

Fourth. Devices employed for automati-

cally regulating the supply and discharge of the water to and from the cylinders by the ingress and egress pipes.

By reference to the drawings forming part of this specification, it will be seen that Figure 1 represents a plan view of the device. Figure 2 is a view of a straight arm on the main shaft detached. Figure 3 represents a section of ratchet-wheel and frame. Figure 4 represents a side elevation of the machine. Figure 5 represents an end elevation of machine and frame-work to support the shafting. Figure 6 is a sectional view of pierced blocks and shaft.

a, Fig. 1, represents a small tank or cistern large enough to contain the required quantity of water.

b b are two small force-pumps, the size of which will be proportionate to the power it is proposed to employ in operating them and the pressure required. These pumps are to be operated alternately by any motive power—such as horse-power, water-wheel, or steam-engine—capable of exerting sufficient force to give whatever pressure it is proposed to employ.

It may be observed that a double-action force-pump may be substituted for the two force-pumps over the tanks. The action is continuous in either case, and both would work, the only advantage of the latter is that only one piston would be necessary.

c c are two strong cross-beams placed over the top of the tank for the force-pumps to rest upon.

d d are two short iron pipes of small diameter, varying in strength according to the pressure it is proposed to employ, to convey the water from the force-pumps to the regulator, and having valves opening inward into the said regulator.

e is the lower part of the regulator, consisting of a hollow iron globe strong enough to resist a considerably greater pressure than it is proposed actually to employ, and having a small aperture at the top closed by a safety-valve weighted in such a manner that if the pressure becomes greater than it is proposed actually to employ it will allow some of the water to escape into the upper part of the regulator *f*, which is a hollow iron globe

placed on and communicating with the lower part of the regulator by means of a small aperture at the top of the latter.

g is a metal pipe attached to the upper part, *f*, of the regulator and leading to the cistern or tank *a*, for the purpose of conveying any waste water from the upper part of the regulator back to the tank.

h h are two short iron pipes of very small diameter, varying in strength according to the pressure it is proposed to employ, to convey the water from the regulator to the cylinders.

z' z' are two iron pipes connecting the cylinders with the tank *a*, to convey the waste water from the cylinders back to the tank.

j j are square pierced blocks on the supply-pipes *h h*, leading from the regulator to the cylinders, and are so formed as to allow the horizontal shaft *l* to pass through them, the said shaft having drilled openings at right angles to one another on a line with the supply-pipes where they pass into the said block, by which means the shaft or rod *l* acts as a stop-cock to admit the water to each cylinder alternately as required.

k k are square pierced blocks on the return-pipes *z' z'*, leading from the cylinders to the tank *a*, and are so formed as to allow the horizontal shaft *l* to pass through them, the said shaft having drilled openings at right angles to one another on a line with the return-pipes where they pass into the said blocks, by which means the said rod or shaft *l* acts as a stop-cock to permit the water to issue from each cylinder alternately, as required. The said shaft *l* operates the supply and discharge of the water to and from the cylinder by automatic mechanism connected with and operating the shaft, as will be more fully described hereinafter.

m m are two strong iron cylinders varying in size and strength, according to the power required to be produced. They are provided with two water-tight pistons, *n n*, which are made to operate vertically in the said cylinders, and assisted to be kept in that position by means of guides *o o* on each side, attached to the top of the said cylinders at the bottom and passing through cross-heads *n' n'*, to each of which is attached a pitman, *p*, secured to the cross-heads *n'*, respectively at one end and to cranks *q* at the other, affixed to the main shaft *r*, as shown, said main shaft being supported on the top of the frame-work *a'*.

It may be observed that it is possible the guides may not be necessary, and the pistons may be made to work the cranks direct instead of by the pitmen.

y is a wheel of large diameter, keyed on the shaft *r* to drive any machinery required, and it may be either a pulley or a spur-wheel.

The devices for regulating the supply and discharge of water to and from the cylinders *m* may be described as follows: The shaft *l* being pierced with four openings, *i' i'* and *i i*, inside of each block *j j k k*, respectively, two of them, *i' i'*, at right angles to the other two, *i i*,

in such a manner as alternately to admit the water into and permit it to issue from each cylinder, and the means for automatically operating the said regulating-shaft *l* is as follows: On the end of said shaft *l* is affixed a toothed wheel, *x*, which is connected to a similar toothed wheel, *w*, affixed on the shaft *z* by an endless chain, *x'*, which transmits motion from the wheel *w* to the wheel *x*, and thence to the shaft *l*.

On the shaft *z* is keyed a ratchet-wheel, *u*, inclosed in an iron frame, *t*, which is made to revolve loosely on the said shaft *z*, having a weight attached to the lower end sufficient to cause the frame to assume a perpendicular position when left to itself, and to carry with it in so doing a ratchet-wheel, *u*, the shaft *z*, to which it is fixed, the wheel *w*, and by means of the chain on the wheel *x*, *v* being a pawl hanging in the said frame and made to pass over the teeth of the ratchet-wheel when the frame is pressed down by the straight arm *s* on the main shaft *r*, and catching in them when the frame is released by the straight arm *s* on the said main shaft *r*. The said arm *s* is fixed in the same direction as the cranks *q* on the main shaft, and on each revolution comes in contact with one end of the frame *t* and presses it down, the pawl *v* sliding over the teeth of the ratchet-wheel *u* until the straight arm *s* is perpendicular, when the frame *t* is released from the straight arm *s* and assumes a perpendicular position, thus causing the ratchet-wheel *u* and the shaft *z* on which it is fixed, together with the wheel *w* and the wheel *x*, to make one-fourth of a revolution, this movement operating the shaft or rod *l*, which passes through the blocks *j j* and *k k*, and being pierced with openings inside of said blocks alternately opens and closes the supply and discharge pipes *h* and *z* to each cylinder.

It may further be observed that the use of the regulator *e f* prevents a jerky movement and causes the machine to work smooth and regular.

Having thus described my device and its advantages, what I claim as my invention is—

1. In a hydraulic engine, the two cylinders, the main shafts actuated by two pistons fitting in said cylinders, the inlet-pipes, outlet-pipes, and blocks in which said inlet and outlet pipes are fitted, in combination with the regulating-shaft fitted into said blocks as bearings, and pierced at its intersections with said blocks, so that the apertures opening into the inlet-pipe of one cylinder and the outlet-pipe of the other cylinder are parallel and at right angles to the outlet-pipe of the former cylinder and the inlet-pipe of the latter cylinder, the gear-wheel mounted upon said regulating-shaft, a second gear-wheel gearing with said wheel, a shaft upon which said second wheel is mounted and carrying a swinging weighted frame bearing a pawl and a ratchet-wheel engaging with said pawl, and an arm rigidly mounted upon said main shaft and engaging

with said weighted frame at intervals, substantially as described.

2. In a hydraulic engine, the two cylinders, the main shaft actuated by two pistons fitting
5 in said cylinders, the inlet-pipes, outlet-pipes, blocks in which said inlet and outlet pipes are fitted, and a regulator in the path of said inlet-pipes, in combination with the regulating-shaft fitted into said blocks as bearings,
10 and pierced at its intersections with said blocks, so that the apertures opening into the inlet-pipe of one cylinder and the outlet-pipe of the other cylinder are parallel and at right
15 angles to the outlet-pipe of the former cylinder and the inlet-pipe of the latter cylinder,

the gear-wheel mounted upon said regulating-shaft, a second gear-wheel gearing with said wheel, a shaft upon which said second wheel is mounted and carrying a swinging weighted frame bearing a pawl and a ratchet-wheel engaging with said pawl, and an arm rigidly mounted upon said main shaft and engaging with said weighted frame at intervals, substantially as described.

Dated at Hamilton, Ontario, this 29th day 25 of June, A. D. 1886.

H. G. T. GLAZEBROOK.

In presence of—

R. E. RALPH,

WM. BRUCE.