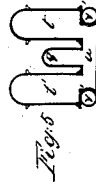
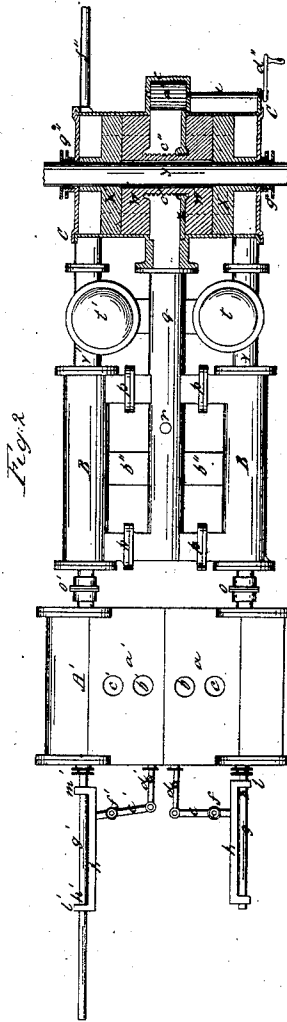
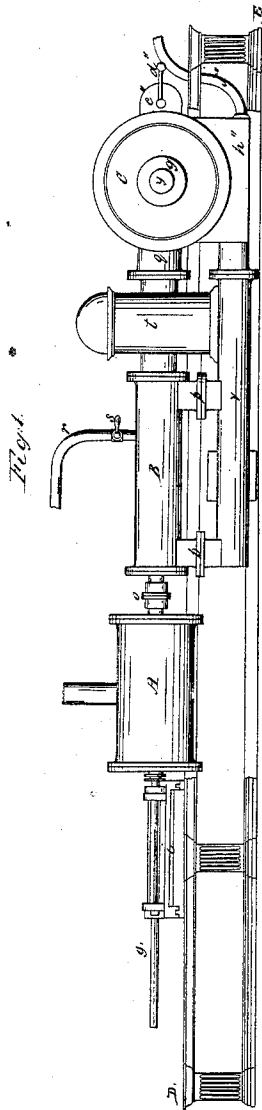
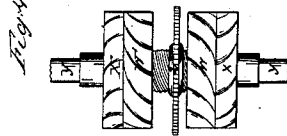
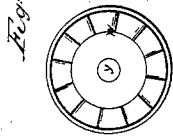


Burgin & Koch,
Hydraulic Engine,

N^o 27,101.

Patented Feb. 14, 1860.



UNITED STATES PATENT OFFICE.

JOHN F. BURGIN AND AUGUSTUS KOCH, OF WILLIAMSPORT, PENNSYLVANIA.

HYDRAULIC ENGINE.

Specification of Letters Patent No. 27,104, dated February 14, 1860.

To all whom it may concern:

Be it known that we, JOHN F. BURGIN and AUGUSTUS KOCH, of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented a new and useful machine, the Hydrostatic Steam-Engine, for the purpose of converting a rectilinear alternate motion into a rotating one; and we do hereby declare that the following is a clear and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal elevation; Fig. 2 is a ground plan, (parts of it being sections as described hereafter.) Figs. 3 and 4 are views; and Fig. 5 is a vertical section of special parts of it.

Similar letters of reference indicate corresponding parts in the different figures.

The nature of our invention consists in a force pump to produce an artificial water power, for the purpose of turning a shaft around its axis by means of a wheel, which is attached to it.

To enable others, skilled in the art, to make and use our invention, we will proceed to describe its construction and operation.

A Fig 1 and A and A' Fig. 2 represent a direct and double acting steam engine, with two cylinders; *a* and *a'* Fig. 2 are their steam chests; *b* and *b'* are the inlet steam pipes; and *c* and *c'* the exhaust pipes; *d* and *d'* are the valve rods, and *e* and *e'* are levers attached to it; *f* and *f'* are their fulcrums; *g* Fig. 1, and *g* and *g'* Fig. 2 are the piston rods; *h* is a cross piece attached to the piston rod *g*, which strikes the shipper *h* in *l* while moving in one direction, and in *m* while moving in the other. The motion from this stroke is carried to the valve rod *d* by means of the lever *e*. The valve rod *d* is moved in the same manner.

i Fig. 1 is a slide for the support of the piston rods *g* and *g'* and the shippers *h* and *h'* Fig. 2.

B, Fig. 1 and B and B' Fig. 2 represent a double acting force pump with two cylinders.

o and *o'* are the stuff boxes, acting for both steam-engine and pump.

p, *p* Fig. 1 are the suction passages of the cylinder B representing also those of B' and *p*, *p*, *p*, *p* Fig. 2 are the discharge passages leading to the common discharge pipe *q* Figs. 1 and 2.

r Fig. 1 is a tube with a cock *s* leading from the discharge pipe *q* to the boiler.

t Fig. 1 and *t* and *t'* Fig. 2 represent two air chambers, communicating with the discharge pipe *q* by a rectangular pipe *u*.

Fig. 5 is a section through the centers of the air chambers, showing their connection with the pipe *q* by means of the cross pipe *u*.

v Fig. 1 and *v* and *v'* Fig. 2 are the common suction passages of the pump communicating with the box *h''* Fig. 1. These pipes are also connected with each other by the pipe *b''* Fig. 2.

C Fig. 1 is a view of a cylindrical box, and C C Fig. 2 is a section of the same through its axis.

w Fig. 3 and *w* and *w'* Fig. 4 are views, and *w* and *w'* Fig. 2 are sections of immovable wheels, (called "shuts") fastened to the cylinder C.

x and *x'* Figs. 4 and 2 are rotating, or turbine wheels fastened to the shaft *y*. These wheels are so constructed as to turn the shaft *y* in either direction, forward or backward.

z Figs 2 and 4 is a valve to shunt the stream of water off from the wheels *w* and *x*, while admitting it, at the same time, to the wheels *w'* and *x'*. This valve is made in the shape of a cog-wheel turned around a screw *c''* Figs. 2 and 4 by means of another cog-wheel *a''* Fig. 2. The wheel *a''* is attached to a shaft *i''* leading from the interior of the box *e''* to a crank *d''*. The box *e''* is fastened to the cylinder C. The box *h''* Fig. 1 is prolonged from the cylinder C, and fastened to it, to receive the water discharged from the turbine wheels *x* and *x'*, and to lead it back again to the pumps B and B' by way of the common suction pipes *v* and *v'*.

g'' Fig. 1 and *g''*, *g''* Fig. 2 are the stuff boxes for the box *h''*.

f'' Figs. 1 and 2 is a tube leading to a tender or reservoir.

D E Fig. 1 is a frame to which the whole machine is fastened.

The machine operates in the following way, viz: The steam cylinders A, A are double acting and are regulated by their respective piston rods independent of each other, yet so that their strokes are reversed. The pumps B and B' are worked as steam pumps generally, their pistons being on the same rods as the steam cylinders. This pump, as well as the rest of the machine, viz, the pipes *q*, *v* and *v'*, the passages *p*, *p*,

the box h'' and the rest of the box C C, which is not occupied by any solid parts of the machinery, is filled with water. Supposing the steam engine to be at work, it will draw the water into the pump through the suction pipes from the box h'' , and thence discharge it into the pipe q leading to the turbine box C C, where it will perform its work through the water wheels and cause the shaft y to turn around its axis, and having disposed of its force will fall back again in the box h'' . To reverse the motion of the shaft y , the valve z will be removed by means of the screw c'' , by turning the wheel a'' until the former is on the opposite side, where it will cut off the supply of water from the wheels w and x' .

The steam engine being the principal motive power, water will be the most useful and feasible fluid for the contrivance of this machine, on account of an extra force pump not being required; for by opening the cock s on the pipe r , the water will be forced into the boiler by the pressure in the pipe q , which always exceeds that of the steam in the boiler. The water discharged through the pipe r will be replaced by the pipe f'' . The air chambers are applied to keep the velocity of the water uniform.

The great advantage which renders this machine superior to any one with the crank heretofore used, consists in the principle of converting the rectilinear motion of a piston into the rotating one of a shaft, whose velocity is uniform and independent of the former. The consequence of this is a simpler construction and an increase of the useful effect of engines generally, but particularly where a great velocity is wanted; for instance the locomotive of a passenger train on a rail-way, as any number of revolutions of the shaft of the driving wheels can be produced to only one oscillation of

the piston of the steam engine, and when a speed of from 30 to 40 miles an hour is wanted, yet the highest useful velocity is only 12 miles an hour. There are wheels of different constructions which could be applied and perform the work of the turbine wheels, but as these render the highest useful effect, they will be the most advantageous.

It is evident that this machine is different in its nature from that of a natural water power which is produced from the quantity and velocity of the fluid, or equal to the product of the height of the fall and the quantity of water discharged. The power of this machine is only dependent upon the original force of the piston in the steam cylinder, and a column of water which would produce a natural force to balance the former, would be as different from the artificial water power as two different fluids of different specific gravity; for instance a column of water 150 feet high with a velocity of 97 feet, supplied by 3 cubic feet per second, produces an effective force equal to that of 40 horses; yet mercury applied instead of water, to produce the same power, would require a height of a column of 20.4 feet with a velocity of 36 feet per second only.

What we claim as our invention and desire to secure by Letters-Patent, is—

The arrangement for converting the rectilinear alternate motion into a rotating one, by means of water, or any other non-elastic fluid, whose force, derived from an artificial pressure, causes a wheel to turn around its axis, as herein described.

JOHN F. BURGIN.
A. KOCH.

In presence of—
WM. B. WILKINS,
JAMES BARRETT.