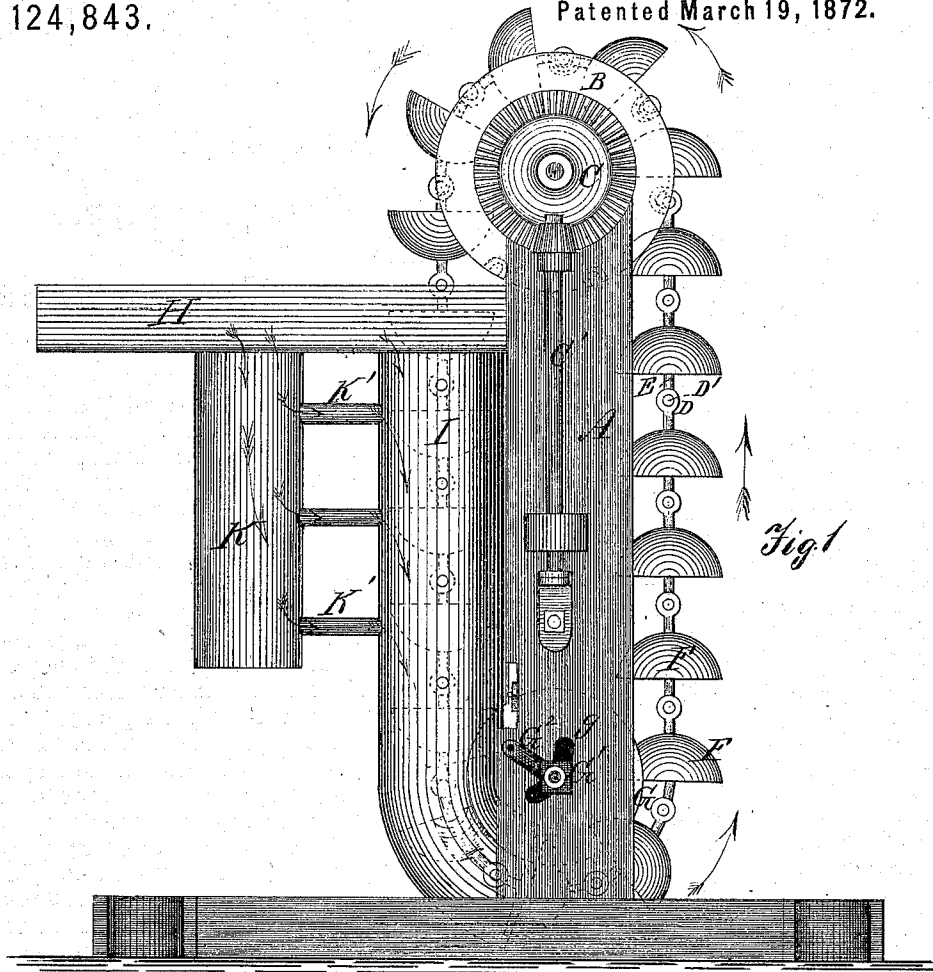


M. MILLARD.
Hydraulic Motor.

No. 124,843.

Patented March 19, 1872.



M. Millard
Inventor
D. P. Holloway & Co.
Atty

Witnesses:
A. Ruppert,
C. F. Clausen

Fig. 4.

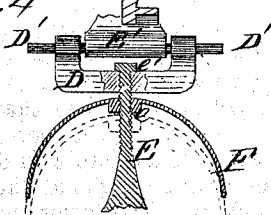


Fig. 3.

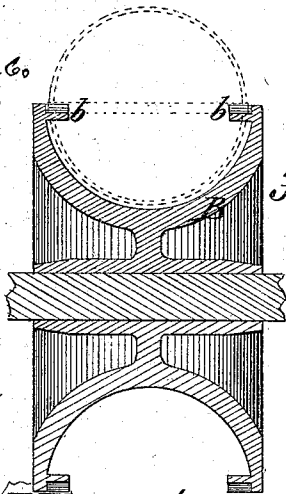
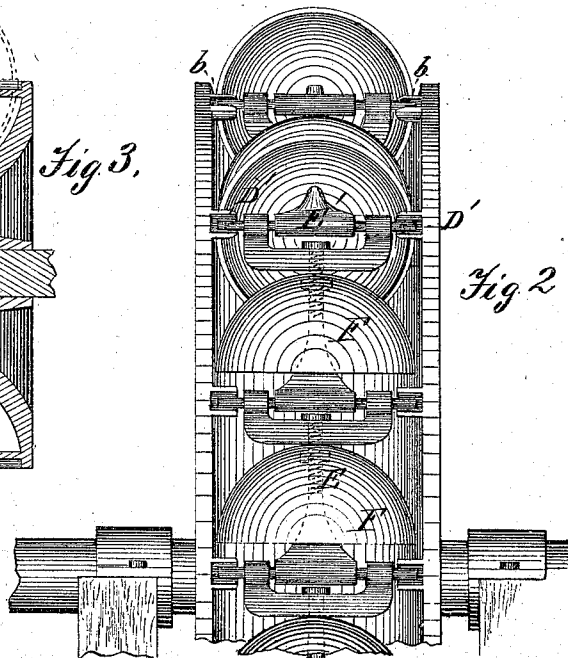


Fig. 2.



UNITED STATES PATENT OFFICE.

MORDECAI MILLARD, OF FRANKLIN, OHIO.

IMPROVEMENT IN HYDRAULIC MOTORS.

Specification forming part of Letters Patent No. 124,843, dated March 19, 1872.

To all whom it may concern:

Be it known that I, MORDECAI MILLARD, of Franklin, in the county of Warren and State of Ohio, have invented certain Improvements in Hydraulic Motors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a side elevation. Fig. 2. is a front view on the side on which the chain ascends. Fig. 3 is a section of the sprocket-wheel. Fig. 4 is a section of one of the buckets.

The same letters of reference are employed in all the figures in the designation of identical parts.

This invention relates to hydraulic motors of that class in which an endless revolving chain is employed with a series of buckets, which are carried down by the water falling upon and carried by them on one side of the drum or wheel which supports the chain, causing the chain to ascend on the other side, thus imparting a continuous rotary motion to the drum, which is transmissible to any kind of machinery by suitable gearing. My improvement consists in the means provided for adjusting the length of the chain; also, in the arrangement of the boxes, which form the bearings for the journals of the lower drum on oscillating arms on the frame-work, so that the drum or pulley will be automatically adjusted as the chain lengthens or shortens under changes of temperature; and lastly, in the construction of the forebay, which is provided with a downwardly-projecting branch for charging simultaneously a number of buckets in starting the machine.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The chain is supported on a large drum or pulley, B, the journals of which turn in bearings of the frame A. The latter is made of the necessary height to permit the chain and buckets to move clear of the base. One of the journals of the drum, or the shaft on which the drum is keyed, projects through its box, and carries upon its overhung end a bevel-wheel, C, gearing into a pinion on a counter-shaft, C', from which motion may be transferred to any

kind of machinery. The links of the chain are composed of stirrups D and bars E, which are pivoted together by a transverse spindle, D'. The latter projects through the stirrups at each side to take into pockets *b*, formed upon the inner side of the rims of the grooved drum B, as clearly indicated in Fig. 2. Each bar E is constructed at one end with a transverse tubular enlargement or boss, E', through which the spindle D' passes, and upon its other end a screw-thread is cut. The buckets F are secured on the bars E between a nut, *e*, screwed thereon, and the base of the stirrup, through which the bar then passes to be secured by a nut, *e'*, upon the outside. In a full-sized machine there is considerable space between the base of the stirrup and the tubular boss of the bar E, so that the latter may be drawn some distance through the stirrup by changing the position of the nuts on it. In this manner a means is provided for shortening or lengthening the distance between the transverse spindles of the chain to adjust them with reference to the pockets or recesses in the drum B. The groove in the drum is made of sufficient width and depth to afford the required play to the buckets. The chain of buckets passes under the lower drum or pulley G, concaved on its surface, and supported on journals turning in boxes G¹. These boxes are carried by an oscillating arm, G², upon the outside of the frame, and a segmental slot, *g*, having the axis on which the arm turns for its center, is cut in each side of the frame for the play of the journals of the drum. As the chain contracts on a decrease of temperature it will lift the lower drum automatically, and as it lengthens on an increase of temperature the drum will fall by its own weight and keep the chain properly taut. The boxes which support the drum are suspended on oscillating arms, in order that the drum may meet with as little resistance as possible in the act of falling. H refers to the forebay from which the water discharges into a vertical tube, I, through which the chain of buckets passes. The buckets fit the bore of this tube pretty snugly, so that the weight of the column of water between the buckets in the tube is made available in driving the motor as well as the weight of the water carried by the buckets. The lower end of this tube is curved, as shown, to correspond with the curv-

ature of the chain of buckets, where it begins to pass under the lower drum. The forebay has a downwardly projecting branch, K, which connects by a series of horizontal pipes, K', with the tube I, for the purpose of charging a number of buckets below the one which is charged by water from the forebay directly on starting the machine. The distance between the several pipes K' is about equal to that between the buckets, so that each will fill a bucket and the space in the tube I, between it and the next one above. It will be observed that there can be no waste of water from this branch when the machine is started, as the pressure of the column of water is equally available in all parts of the tube I filled by the buckets.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with the buckets of a hy-

draulic motor, substantially such as described, the adjustable bars E and stirrups D, for regulating the spaces between the buckets, substantially in the manner set forth.

2. In combination with the chain of buckets the drum G, hung upon boxes, which moving in the arc of a circle, may automatically adapt themselves to variations in the length of the chain.

3. The pipes K', in combination with the branch K and tube I, to operate in relation to the chain of buckets, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MORDECAI MILLARD.

Witnesses:

B. EDW. J. EILS,

A. RUPPERT.