

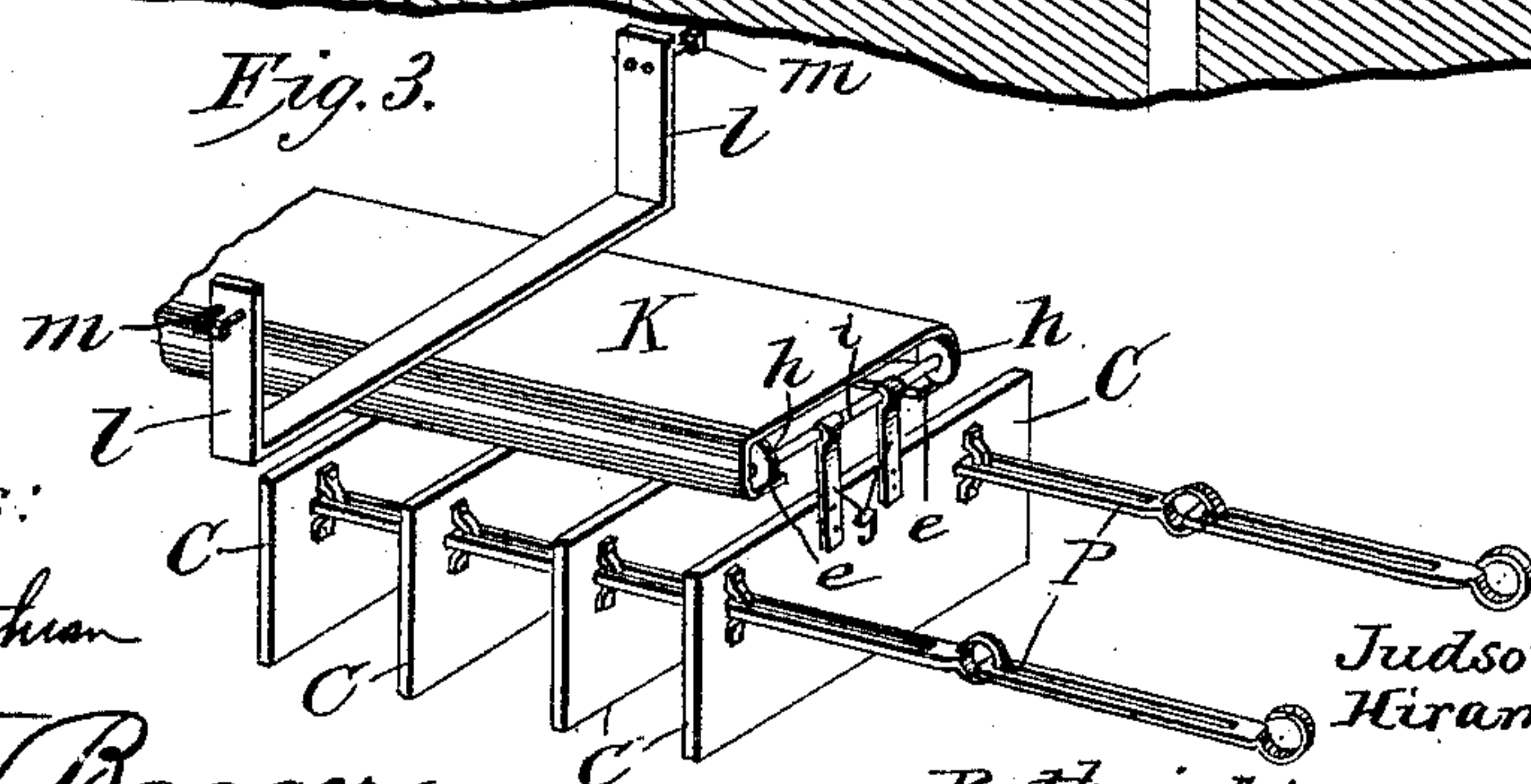
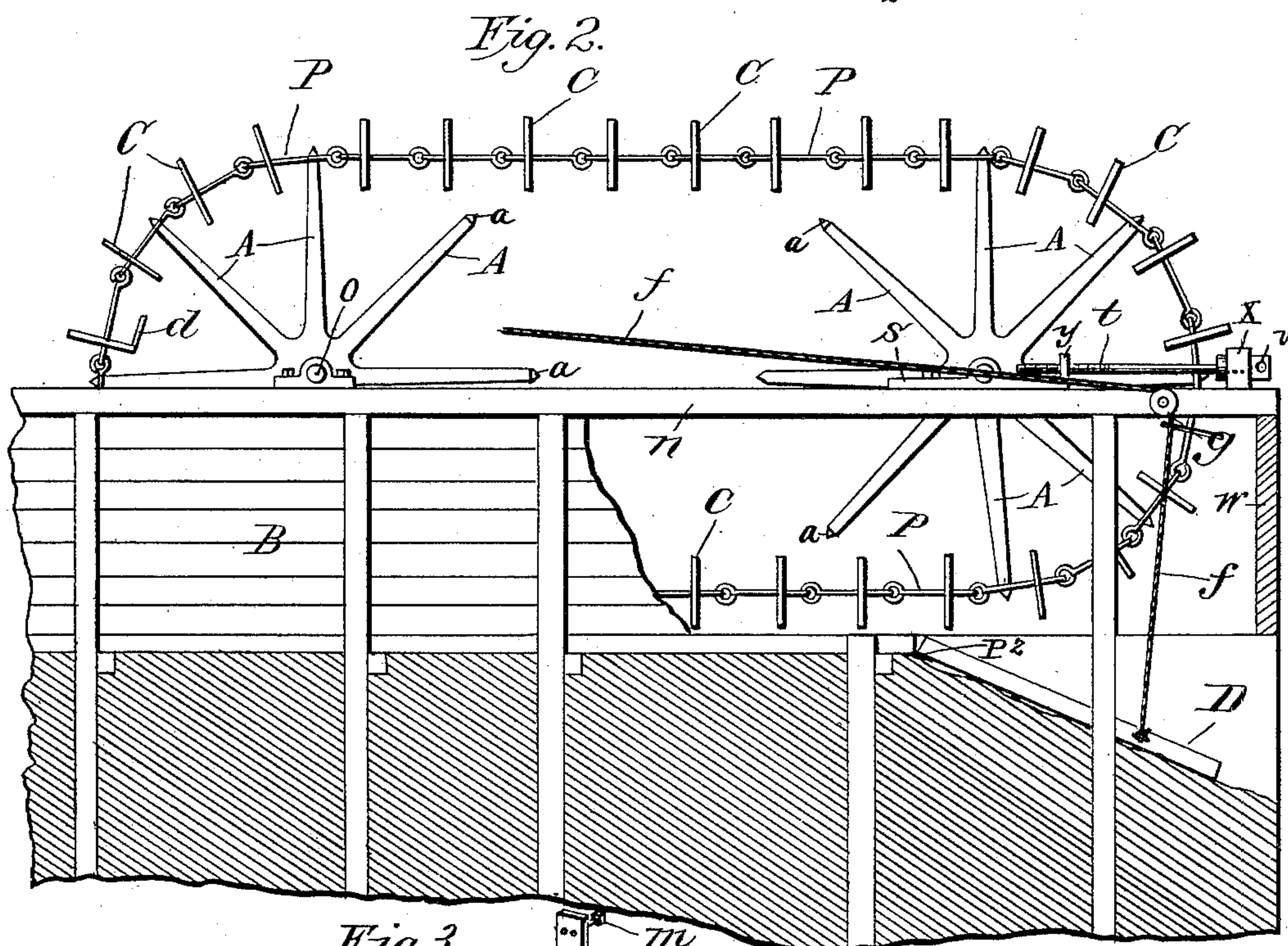
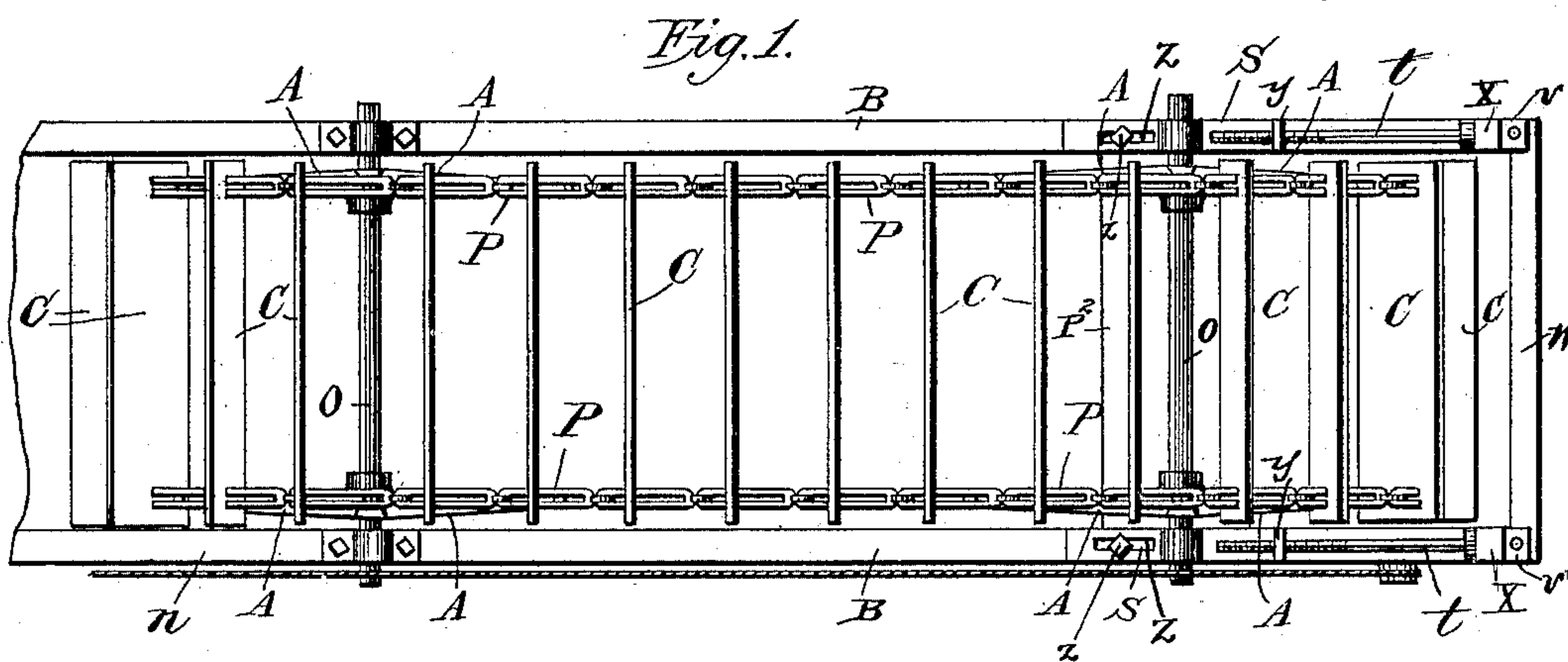
(No Model.)

2 Sheets—Sheet 1.

J. B. HURD & H. H. McLANE.
HYDRAULIC MOTOR.

No. 461,938.

Patented Oct. 27, 1891.



Witnesses:

Jas. L. McLathum

Wm. Bagger

Inventors.

Judson B. Hurd
Hiram H. McLane

By their Attyys

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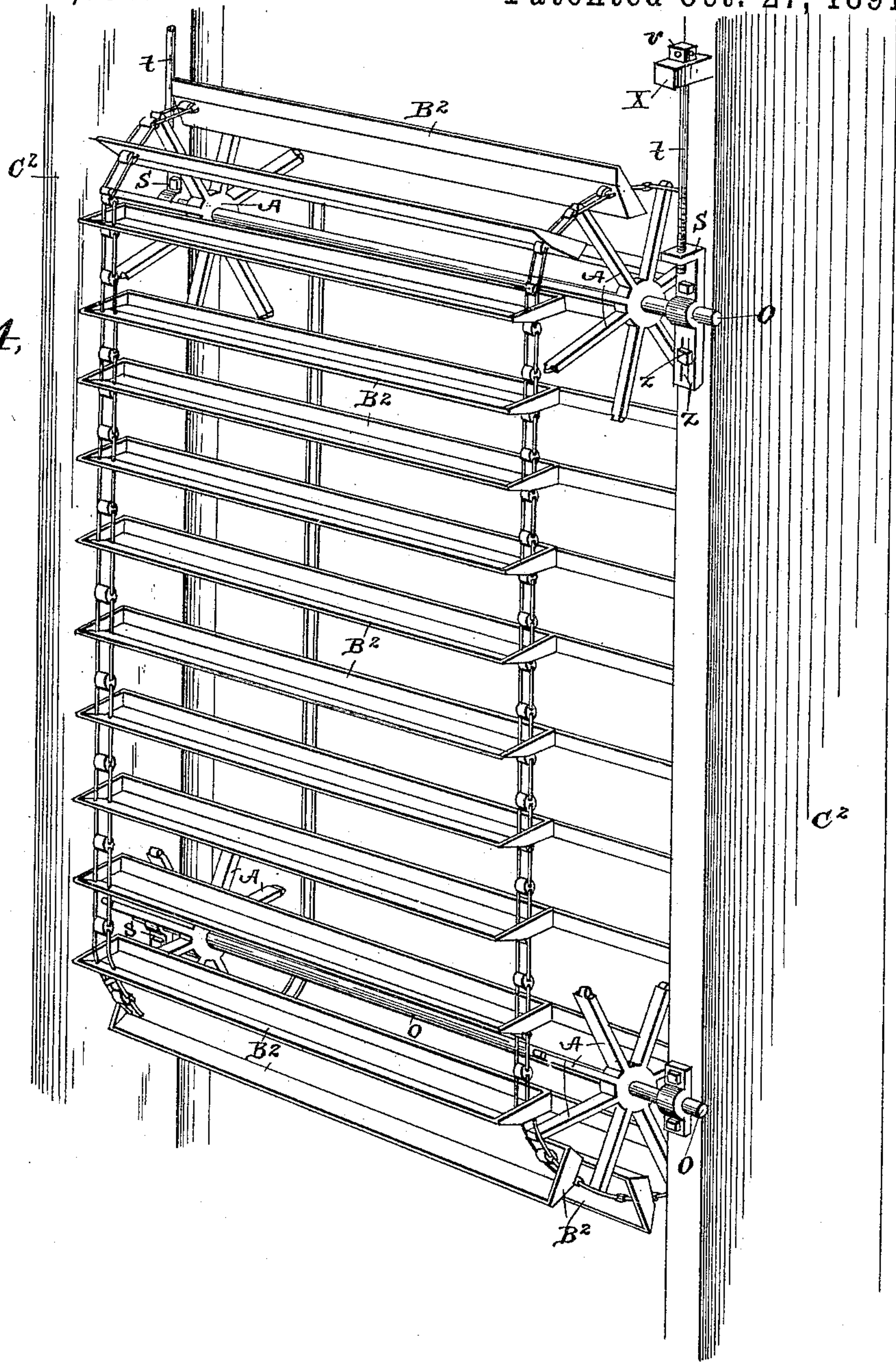
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Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

JUDSON B. HURD AND HIRAM H. McLANE, OF SAN ANTONIO, TEXAS; SAID
HURD ASSIGNOR TO SAID McLANE.

HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 461,938, dated October 27, 1891.

Application filed November 15, 1890. Serial No. 371,608. (No model.)

To all whom it may concern:

Be it known that we, JUDSON B. HURD and HIRAM H. McLANE, citizens of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented a new and useful Water-Wheel, of which the following is a specification.

This invention relates to water-wheels and paddle-wheels of that class in which flat boards or paddles are mainly used; and it has for its object to construct a wheel of this class the general principles of which may be applied either to a breast-wheel or current-motor, to a paddle-wheel for the propulsion of vessels, or to an overshot water-wheel.

A further object is to provide a water-motor in which the float-boards, paddles, or buckets move through the water in such a manner as to get as nearly as possible all the force it is capable of yielding, avoiding the great waste of power that results from the use of water-wheels of the present style and pattern.

A further object of the invention is to provide a water-wheel adapted to high and low heads and to the action of currents as well.

With these several ends in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a plan view of our invention, showing the device arranged as an undershot wheel horizontally in a suitable flume. Fig. 2 is a side elevation of the same, with parts broken away for the purpose of more clearly showing the construction. Fig. 3 is a perspective detail view illustrating a modification. Fig. 4 is a perspective view showing our invention applied to an overshot water-wheel.

Like letters of reference indicate like parts in all the figures.

Four skeleton wheels or spiders A are placed in pairs upon shafts O, that are journaled in suitable bearings upon the sides of the flume B. The arms of the wheels A are provided at their outer ends with sprocket projections *a* and are adapted to carry the chains P, upon which are secured at regular intervals the float-boards or paddles C, which extend entirely across the flume, their ends being se-

curely fastened to the chains in any suitable manner. The wheels are securely mounted upon the shafts with which they turn as the force of the water strikes the paddles. When desired, these paddles may be provided with flanges or projections around their edges, as shown at *d* in Fig. 2. This construction will adapt them to receive the water just below the axis of the wheels, the motor thus taking the place of a breast-wheel in places where the fall is suitable for such an arrangement, while at the same time it also makes use of the current.

In many places where paddle-wheels of ordinary construction are used the situation is such that the flume might be extended a considerable distance beyond the wheel and yet have fall enough to insure that the tail-water would not retard the motion of the wheel, thereby wasting a portion of the water-power from the time it leaves the wheel until it reaches the level of the stream below, and it is the purpose of our invention to provide a means whereby this great waste may be utilized. Furthermore, in any situation the paddles of the common undershot water-wheel, which are radial to the axis, will enter the water before they have reached the vertical position and will not leave the water until after the vertical position has been passed, thus receiving only a relatively small amount of water direct against their surfaces, the rest being allowed to run freely under them. Much force is thus allowed to go to waste not only by the retarding action of the water against the obliquely-entering paddles, but also by the quantity of water which is being raised or lifted by the paddles as they leave the water in an oblique position. Our device is adapted to save as nearly as possible all this loss, and it has other advantages which will be readily seen. As the water approaches the falls at the end of the flume it increases in speed. To get the benefit of the force thus evolved and for the further purpose of avoiding the waste of power caused by the paddles of water-wheels of ordinary construction, we extend the paddles beyond the point at which the water begins to fall from the flume. This point is indicated at P² in Fig. 2 of the drawings.

The sides of the flume are extended beyond the wheels and the end of the flume is closed by the wall W. The discharge-gate is arranged in the bottom of the flume adjacent to said end wall, and it may be arranged either as a sliding or as a hinged gate, the latter construction being illustrated in Fig. 2 of the drawings, where D designates the gate. This construction is deemed preferable where the fall is sufficient to admit thereof; but it is obvious that a sliding gate may be used with the same results. This gate is used to confine the water within the flume when it is first let in until the flume is as full as desired, thereby enabling the force of the water to be exerted upon all of the paddles simultaneously. An operating-rope *f* is attached to the gate and passes over suitable guide-pulley *g* to the inlet-wheel at the opposite end of the flume, where it may be readily reached by the operator. Said inlet-gate has not been shown in the drawings hereto annexed, being of ordinary and well-known construction.

When the flume is long and the wheels A are a considerable distance apart, the paddles are provided with rollers *h*, which may be mounted upon shafts *i*, journaled in brackets *g*, extending upwardly from the inner edges of the paddles. If desired, the said rollers may be journaled to the paddles direct, or the construction may be otherwise modified. These rollers (shown in Fig. 3 of the drawings) are adapted to run in the double track *e*, which is formed of a plate or platform K, extending from one pair of wheels to the other, suspended just above the paddles as they move through the water, said plate or platform being supported and held firmly in place by means of arms *l*, which may be secured by means of bolts *m* to the frame of the flume. The edges of said platform are turned downwardly and inwardly to form the tracks or grooves *e*, adapted to receive the rollers, thereby supporting the paddles and preventing them from dragging upon the bottom of the flume. In place of this platform and the double track thus formed any suitable and equivalent means for supporting the paddles may be used, and where there is much sag to the chain between the two sets of wheels a similar supporting device may be used to support the paddles above the water, the same rollers being used.

In order that the tension of the chains may be regulated as desired, one of the shafts is mounted in boxes or bearings S, that are adjustable laterally upon the upper edges of the sides of the flume by means of screws *t*, swiveled in flanges X, that are mounted securely upon the side walls of the flume and working in flanges Y, that extend upwardly from the sliding boxes. The latter are provided with slots Z to receive the securing-bolts *z*. The heads of the screws may be provided with wrench-seats, or they may have perforations—such as shown at *v*—to receive

a pin, by means of which they may be turned and adjusted.

When our invention is applied to an overshot water-wheel, the shafts O, carrying the wheels A, are mounted in boxes upon the front edges of the walls of a vertically-arranged casing C². The upper boxes S are adjustable by means of screws *t* in the manner just described with relation to the undershot wheel. The construction and arrangement of parts is essentially the same as that of the undershot wheel, the principal difference being that buckets—such as shown at B²—have been substituted for the paddles or float-boards hereinbefore described. The buckets, as well as the paddles or float-boards, are mounted upon the carrying-chain midway between their front and rear edges, thereby balancing the same and preventing excessive strain upon the chains or buckets. It is obvious that where the fall is sufficient to admit of an overshot wheel of this construction a large number of the buckets will be acted upon at the same time, and a much larger percentage of power is derived from the water than would be possible by means of an overshot wheel of the ordinary construction with radially-arranged buckets.

The use of our invention is not confined to stationary water-motors, but is applicable to the propelling of all water-craft where paddles can be used. When the device is used for propelling boats of any description, the shafts of the wheels will be journaled in bearings in a suitably-arranged frame, and the tracks for the rollers, when the latter are used, will be suitably mounted in such frame. Power may be transmitted to either or both of the supporting-shafts from power of any suitable description. In like manner, when the device is used as a water-motor, power may be transmitted in any suitable manner from either or both shafts to the machinery that is to be driven.

It is obvious that motors or devices of this class are susceptible of many variations of form in different details, and we reserve the right to any such changes and modifications as may be resorted to without departing from the spirit of our invention.

Having thus described our invention, we claim and desire to secure by Letters Patent of the United States—

1. In a device of the class described, the spiders or skeleton wheels provided with sprocket projections at the outer ends of their radial arms, in combination with the endless chains mounted upon said wheels or spiders and carrying paddles provided at their inner edges with angular projections or flanges, substantially as and for the purpose set forth.

2. The combination of the flume having the closed end wall and provided with a gate in its bottom adjacent to said end wall, the shafts mounted upon the side walls of the flume and carrying skeleton wheels or spiders, the endless chains mounted upon the latter,

and the float-boards or paddles mounted upon said endless chains and extended beyond the front edge of the gate, from which the water begins to fall from the flume, substantially as set forth.

5 3. In a device of the class described, the combination of suitably-supported endless chains, the paddles mounted upon said chains and provided with inwardly-extending arms or brackets, the shafts mounted in the latter and carrying pairs of supporting wheels or rollers, and a track composed of a suitably-arranged plate or platform having downwardly and inwardly turned edges, forming
10 inclosed ways or tracks to receive the said rollers, substantially as set forth.

4. In a device of the class described, the combination of the flume, the wheels or spiders mounted upon shafts suitably journaled
20 in boxes upon the side walls of said flume, means for the longitudinal adjustment of said boxes at one end of the flume, an endless chain mounted upon the wheels or spiders and having the float-boards or paddles, the

pairs of supporting-rollers at the inner corners of said paddles, and the horizontally-arranged platform provided with grooves forming inclosed ways or tracks for the said supporting wheels or rollers, substantially as and for the purpose set forth.

5. In a paddle water wheel or motor, the combination of a flume having a bottom end outlet, the spider or skeleton wheels, and an endless chain provided with a series of paddles or float-boards mounted on said chain and arranged in parallel planes with the bottom of said flume and projecting over and beyond the point from which the water commences to leave said flume, substantially as specified.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

JUDSON B. HURD.
HIRAM H. McLANE.

Witnesses:

T. A. PHELAN,
HERMANN ALFF.