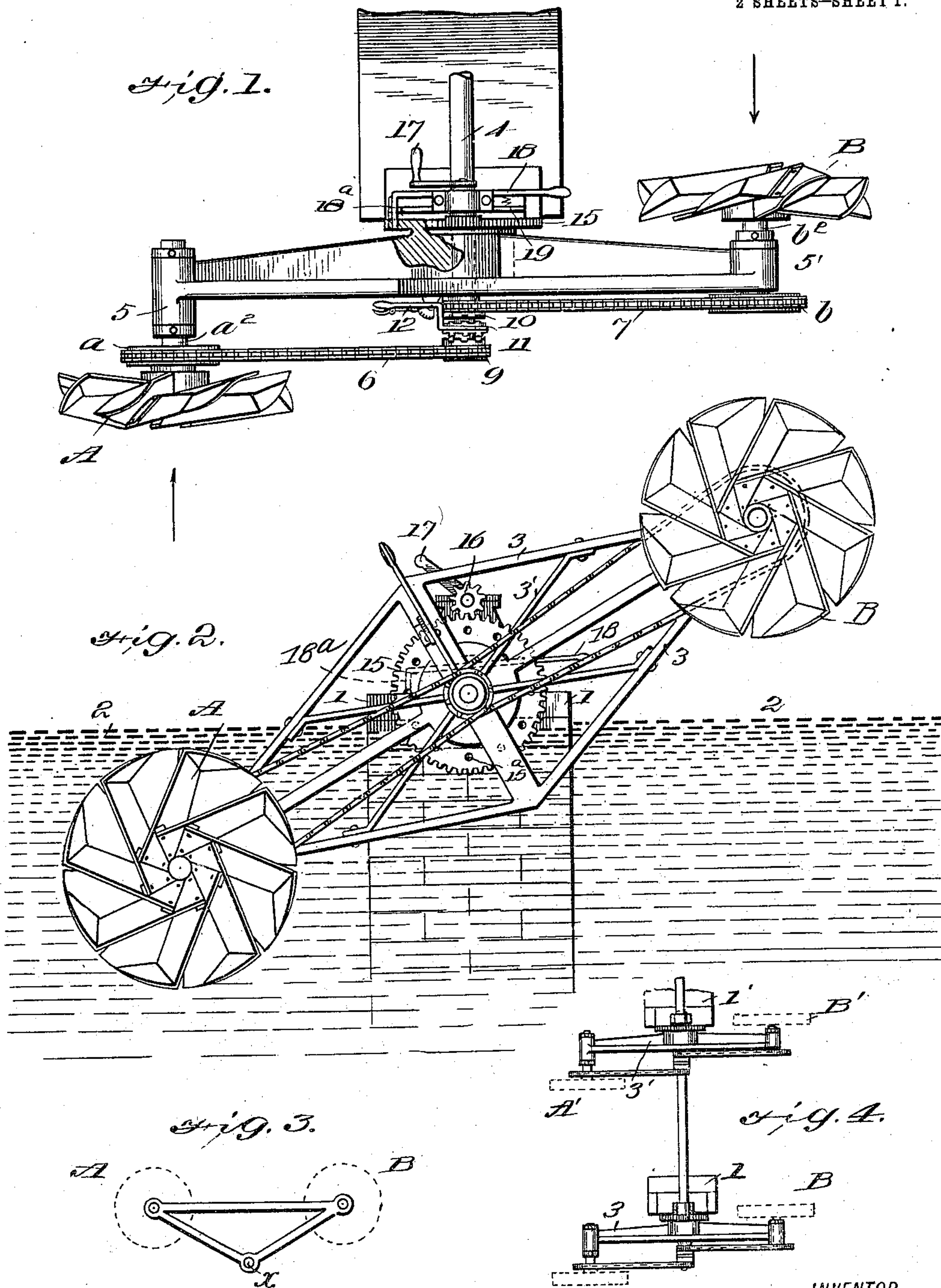


T. A. MACDONALD.
WATER WHEEL MECHANISM.
APPLICATION FILED AUG. 13, 1909.

982,079.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 5.

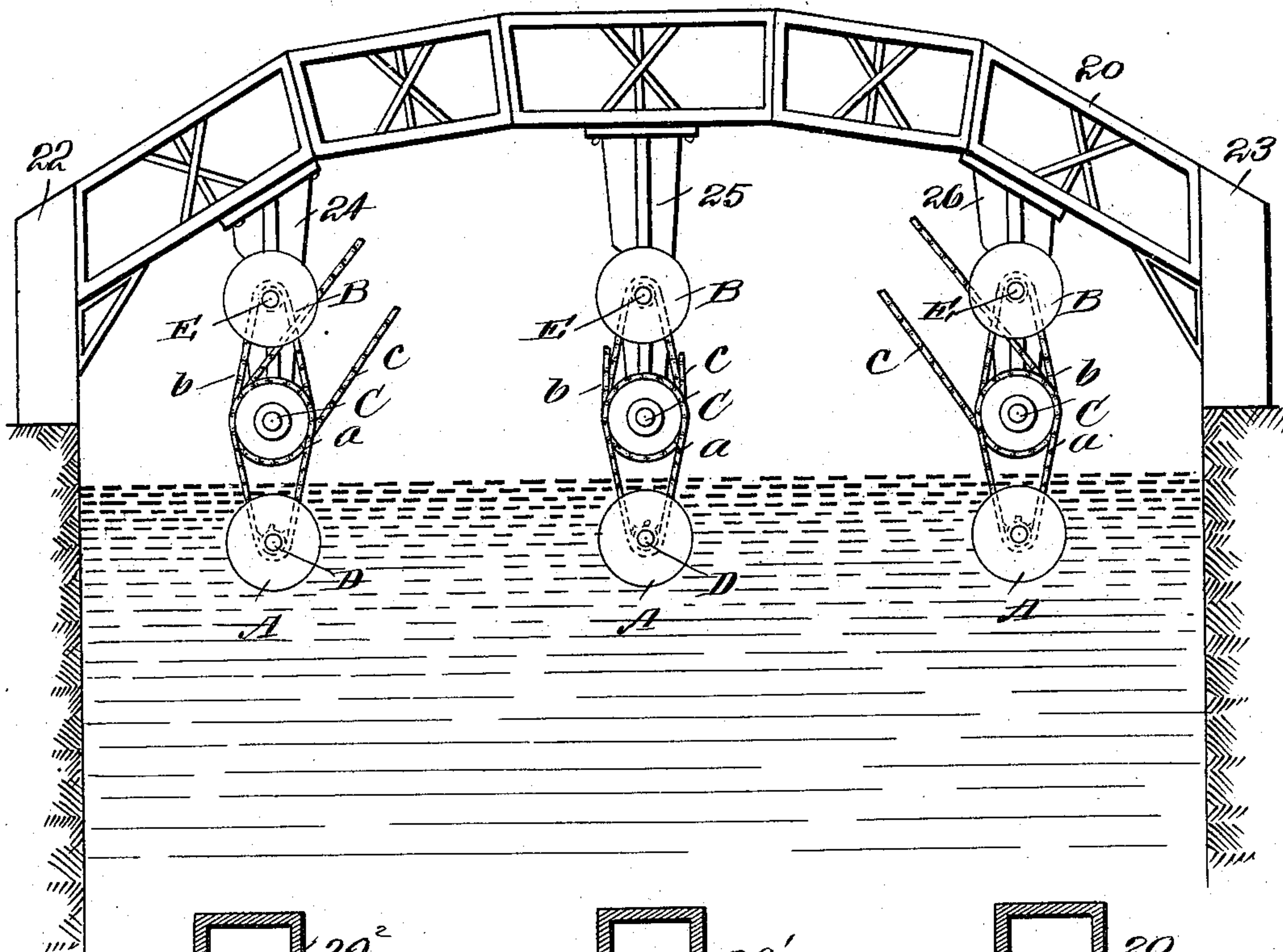


Fig. 6.

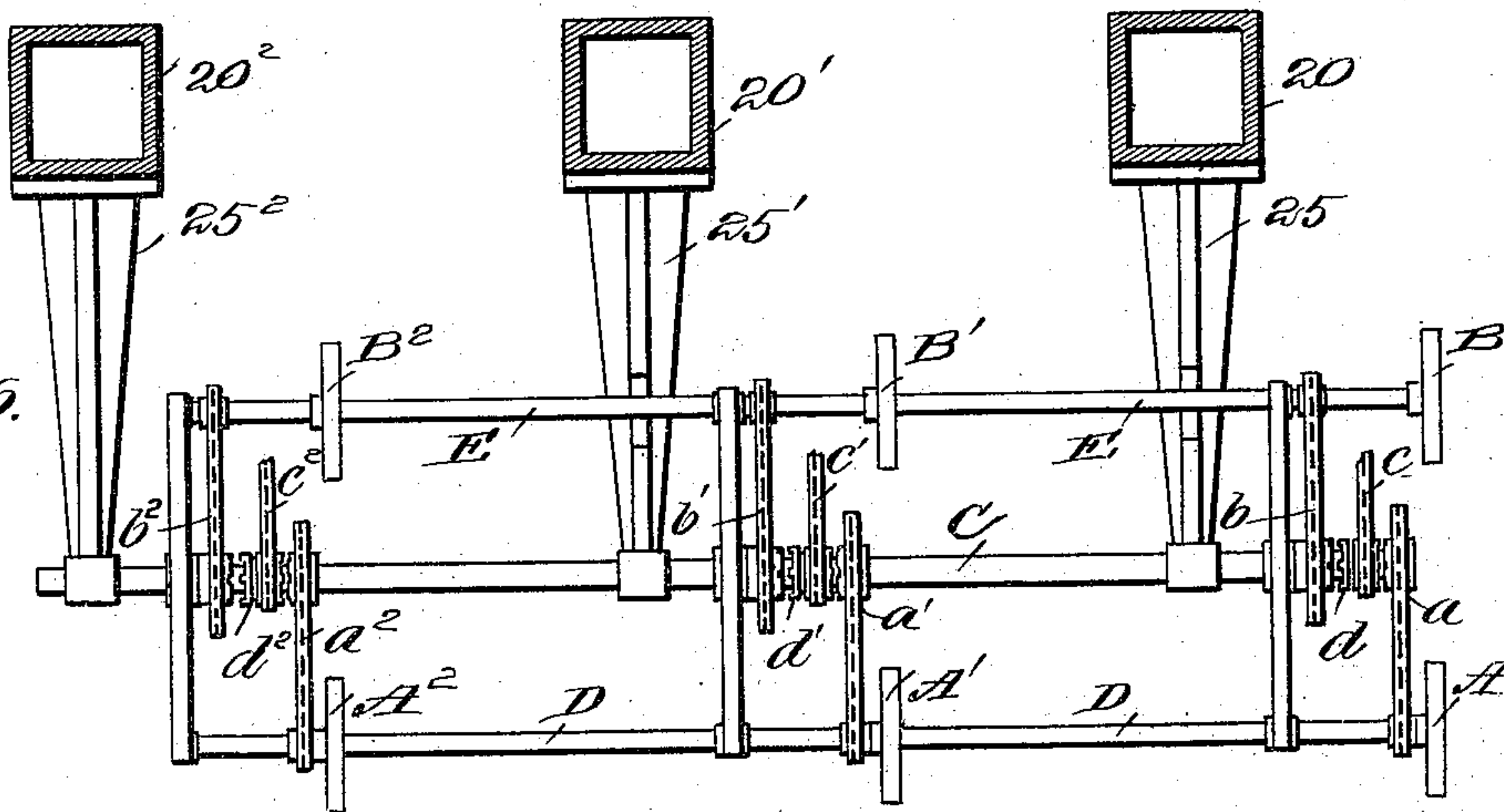
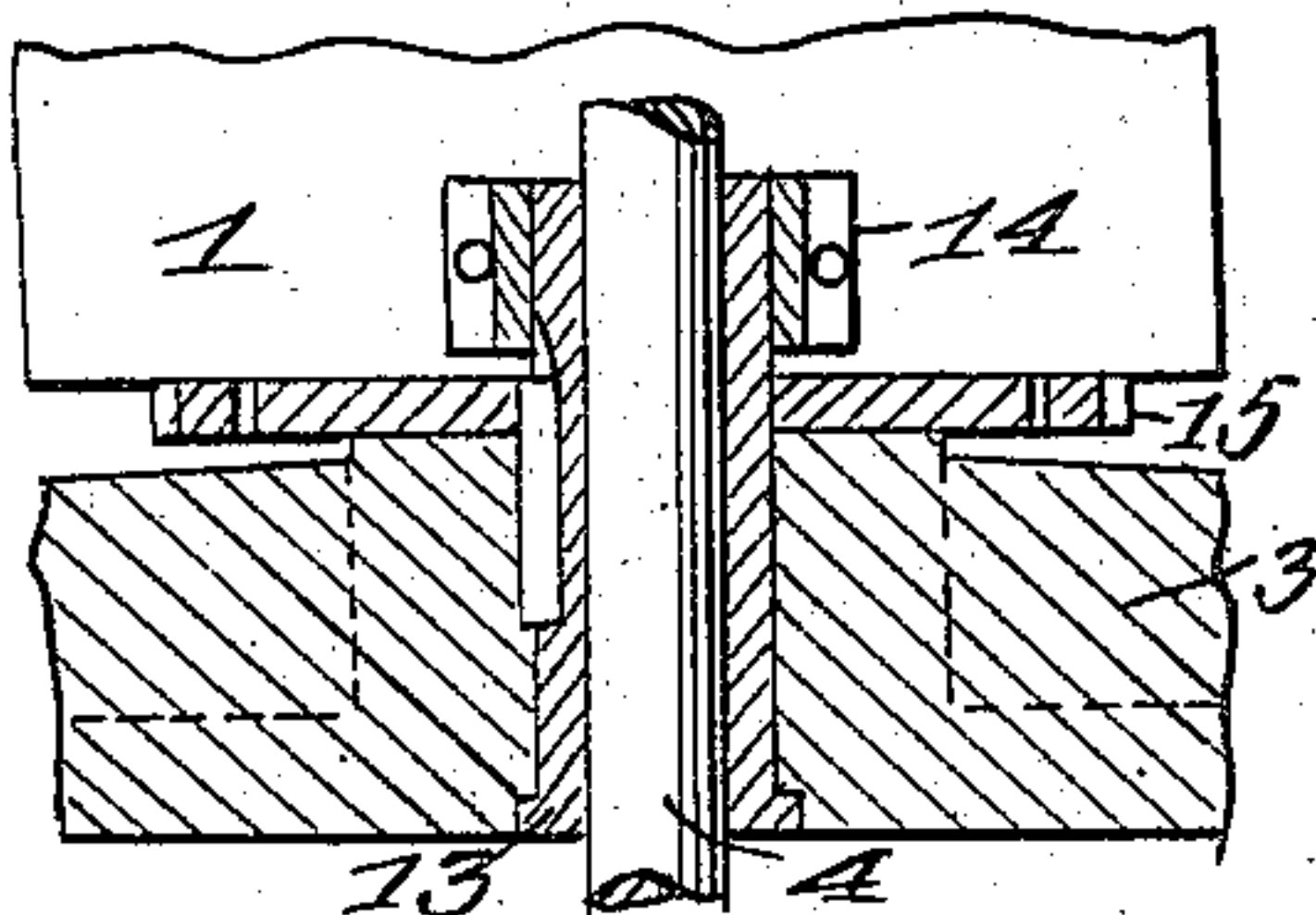


Fig. 7.



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UNITED STATES PATENT OFFICE.

THOMAS A. MACDONALD, OF CLIFTON, NEW JERSEY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO MACDONALD HYDRAULIC POWER COMPANY, A CORPORATION OF NEW JERSEY.

WATER-WHEEL MECHANISM.

982,079.

Specification of Letters Patent.

Patented Jan. 17, 1911.

Application filed August 13, 1909. Serial No. 512,673.

To all whom it may concern:

Be it known that I, THOMAS A. MACDONALD, a subject of the King of Great Britain, and a resident of Clifton, in the county of Passaic and State of New Jersey, United States of America, have made certain new and useful Improvements in Water-Wheel Mechanism, of which the following is a specification.

My invention relates to improved devices for utilizing water power, and it consists in the constructions, combinations and arrangements herein described and claimed.

An object of my invention is to provide a device which is somewhat similar in character to that shown in my Patent No. 737,256 of August 25, 1903. In this patent a water wheel is rotatably mounted on a balance arm and is arranged to be swung downwardly into a running stream or upwardly out of engagement of the stream by means of a counter-balance on the opposite extremity of the arm. In the present invention I utilize a second wheel to act as the counter-balancing weight so that either wheel can be swung up or down as occasion demands, and use can be had of either wheel as a motive power.

A further object of my invention is to provide means for rotating the frame which bears the wheels upon its pivots and for maintaining the wheels in their operative or inoperative position.

A further object of my invention is to provide means for utilizing the inflow and outflow of tides by a swinging frame constructed similarly to that mentioned above but having oppositely directed wheels.

A further object of my invention is to provide means for suspending a number of wheels in a common channel so that a greater portion of the power of the stream may be utilized.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is a plan view of the supporting frame showing the wheels arranged for use with the tide; Fig. 2 is a side view of the device showing both wheels facing in the same direction; Fig. 3 is a diagrammatic view showing a modified form of the suspending

frame; Fig. 4 is a plan view showing a plurality of wheels for use with tidal currents connected to a common shaft; Fig. 5 shows a modified form in which a number of wheels are suspended from an arch; Fig. 6 is a plan view of a modified form showing the manner of mounting a plurality of wheels upon a series of piers; and Fig. 7 is a detail view partly in section, showing the mounting of the frame.

In carrying out my invention I use preferably the type of wheel disclosed in my pending application for patent Serial No. 512,361, filed August 11, 1909, although other wheels of similar construction might be used.

Referring now to Fig. 2, I have shown therein a pier 1 which is built in the stream. In this view the water 2 is supposed to be flowing at right angles to the plane of the paper. Mounted upon the pier in suitable bearings is the wheel bearing frame 3. This is preferably of a diamond shape as shown in the figure, but obviously may be of any convenient shape. The frame is rotatably supported as hereinafter described. The frame is composed of a skeleton framework suitably braced by braces 3' and terminates at the ends in bearings 5 and 5' respectively. In Fig. 2 I have shown both of the wheels A and B as facing the same way and being mounted in the bearings 5 and 5'. In Fig. 1 these wheels are faced in opposite directions so as to render the device available for use with tidal currents in either direction. The wheel A is provided with a sprocket wheel a on the shaft a^2 , while the wheel B is provided with a sprocket wheel b on the shaft b^2 . These sprocket wheels are connected to loose sprockets 9 and 10 on the shaft 4 by means of the driving chains 6 and 7 respectively. The sprockets 9 and 10 have teeth arranged to mesh with the teeth on a slide member 11 which may be thrown into and out of mesh with either of the sprockets by means of a locking lever 12.

The frame 3 is mounted upon the end of a sleeve 13, which is rotatably carried by the bearings 14 on the pier 1. The inner end of the sleeve 13 is provided with a gear wheel 15 arranged to mesh with a smaller gear 16, the latter being operated by the handle 17. In order to lock the device in its shifted positions I make a series of holes or perforations 15^a in the side of the gear 15 into

which the end 18^a of a lever 18 may project. The lever is mounted on the supports and the engagement of the arm 18^a in the holes keeps the device from rotating. The lever 5 18 is normally held in contact with the gear 15 by means of the spring 19.

The shaft 4 is carried by the hollow sleeve 13 at one end and may be supported at the other by bearings not shown.

10 From the foregoing description of the various parts of the device the operation thereof may be readily understood.

In the form of the device shown in Fig. 2, the frame 3 is rotatably mounted on a pier 15 with the ends of the arms projecting at right angles to the direction in which the stream is flowing. Either of the wheels may be lowered by holding the lever 18 so as to withdraw the arm 18^a thereby unlocking 20 the gear 15 and permitting its rotation by means of the handle 17 and gear 16 so as to bring either of the wheels, as for instance, A underneath the water and to lift the other wheel above the water as shown in the figure. 25 The rotation of the wheel A is transmitted by means of a chain 6 to the loose sprocket 9, the lever 12 having been previously operated to connect the clutch member with the sprocket 9 thereby imparting rotary move- 30 ment to the shaft 4. If it should be desired to use the other wheel B so as to repair the wheel A or for any other purpose the device is unlocked and shifted when the frame 3 may be swung so as to bring the wheel B 35 underneath the water and the wheel A above the water.

In the form shown in Fig. 1, the wheel A may be submerged when the tide is going 40 in the direction indicated by the arrow at the left of the figure thereby bringing the wheel B out of the water. At the reversal of the tide, the wheel B may be submerged and thus both the backward and forward movement of the current may be utilized. 45 It is obvious that more than one set of wheels may be connected to a common shaft, thus in Fig. 4 I have shown the wheels A and A' on one side of a common shaft and B and B' on the other side. These wheels 50 being located upon the frames 3 and 3' carried by the piers 1 and 1'. Each wheel will then receive the entire force of the stream and since they are all connected to a common shaft this force will be augmented in propor- 55 tion to the number of wheels.

In Fig. 3 I have shown an arrangement by which the wheels A or B may be both raised entirely clear of the water. In this figure the centers of the wheels are shown 60 considerably above the pivotal point X which itself is above the level of the water, therefore both wheels may be lifted clear of the water, as for instance, in high water or if the wheels are intended to remain idle.

65 In Fig. 5 I have shown an arch support-

ing member 20 spanning a stream 21 and being secured at the ends to the uprights 22 and 23. The wheels are suspended by means of the depending arms 24, 25 and 26 70 so that more than one set of wheels may be used with a stream of the width shown. In this figure the operative position is that of a wheel submerged in the water directly underneath the supporting member, while the other wheel is directly above the submerged 75 one. Obviously a series of arches might be used in which the wheels might be mounted on a common shaft extending between the depending arms as shown in Fig. 6, this figure showing in section a series of arches 80 and wheels. With this construction each set of wheels gives additional power to the common shaft.

In Fig. 6 I have shown different means of transmission of the power. In this figure 85 the central shaft C is stationary, being supported by the arms 25, 25' and 25². The loose sprockets *a* and *b* are arranged to be engaged by a slidable clutch sprocket *c* having a power chain *c*² which may be led 90 to any convenient point for the transmission of power. Each of the wheels A, A' and A² is connected by a common shaft D while the wheels B, B' and B² are connected by a common shaft E. It will thus be seen that 95 A, A' and A² may be swung downwardly into the water while the other set are raised out of the water. The arrangement of chains and sprockets permits the shafts D and E to be in any position without inter- 100 fering with the transmission of power through the sprocket chains.

A further advantage which may be derived from the arrangement of the device 105 as shown by Fig. 2, is that by means of the gears the balance arm may be swung upwardly or downwardly, thereby bringing a greater or less portion of the wheel in contact with the water. It will thus be seen that by raising or lowering the arm, more 110 or less power may be taken up by the wheel in a manner similar to the change of power where a head-gate shuts off more or less water from an ordinary water wheel.

I claim:

1. In a water wheel mechanism, a support, a frame pivoted on said support, a water wheel at each end of said frame, a common shaft, means for raising or lowering 120 either end of said frame and means for transmitting the motion of the water wheels to said common shaft.

2. In a water wheel mechanism, a support, a frame pivoted on said support, a water wheel rotatably mounted at each end 125 of said frame, said water wheel counterbalancing the other, means for rotating said frame to submerge one water wheel and to raise the other, means for locking the frame in its shifted positions, a common shaft and 130

means for transmitting the power of the water wheels to said common shaft.

3. In a water wheel mechanism, a support, a frame pivotally mounted to said support the pivotal point being above a flowing stream, a gear carried by said frame a second gear arranged to mesh with the first named gear and provided with a locking handle and locking means for said first named gear, a water wheel rotatably mounted at each end of said frame each of said water wheels being counter-balanced by the other, a sprocket connected with each of said water wheels, a common shaft, sprocket chains for transmitting the movement of each of said wheels to said common shaft and means for throwing either wheel out of operation.

4. In a water wheel mechanism, a support provided with a bearing, a sleeve rotatably mounted in said bearing, a frame secured to said sleeve at one end, a gear secured to said sleeve at the other end, a water wheel at each end of said frame, means for rotating said gear, means for locking said gear in its rotated position, a common shaft rotatably mounted within said sleeve, means for transmitting the movement of said water wheels to said common shaft and means for the disconnecting one or both of said wheels from said common shaft.

THOMAS A. MACDONALD.

Witnesses:

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SOLON C. KEMON.