A. SHIELDS.

WATER MOTOR.

APPLICATION FILED JUNE 29, 1911.

1,046,341.

Patented Dec. 3, 1912.

3 SHEETS—SHEET 1.

Fig. 1

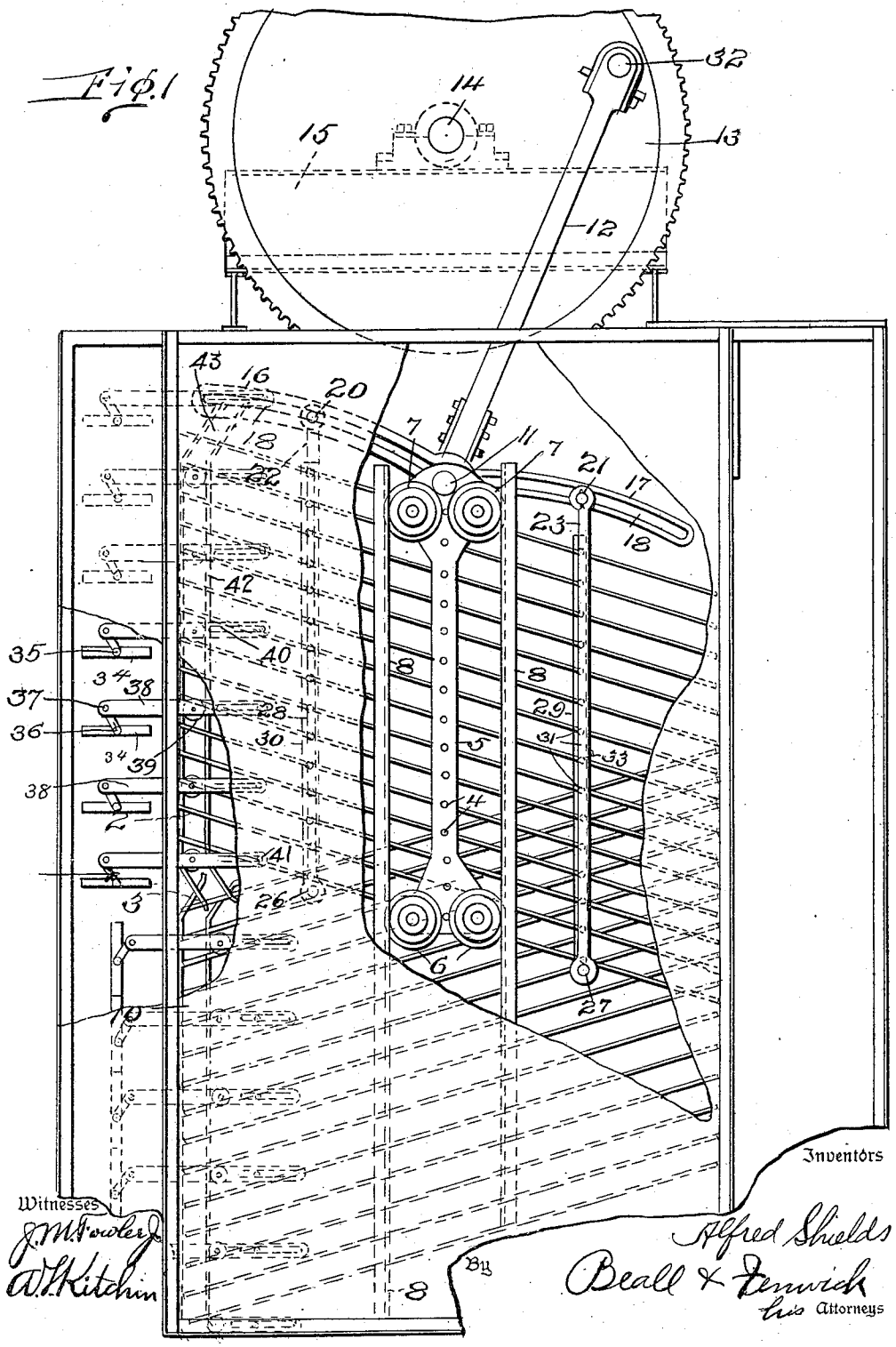

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Fig. 2.

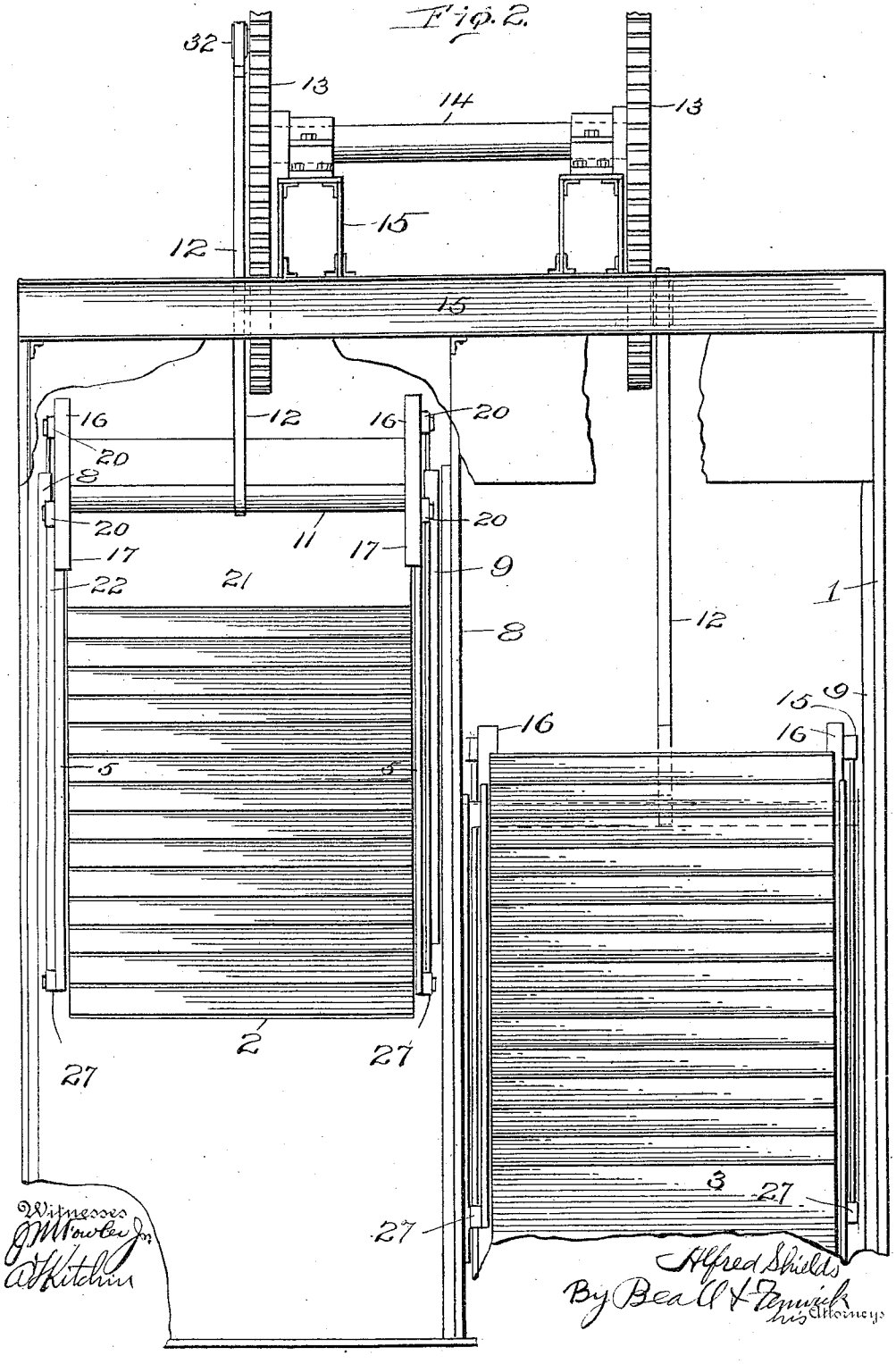

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Fig. 3.

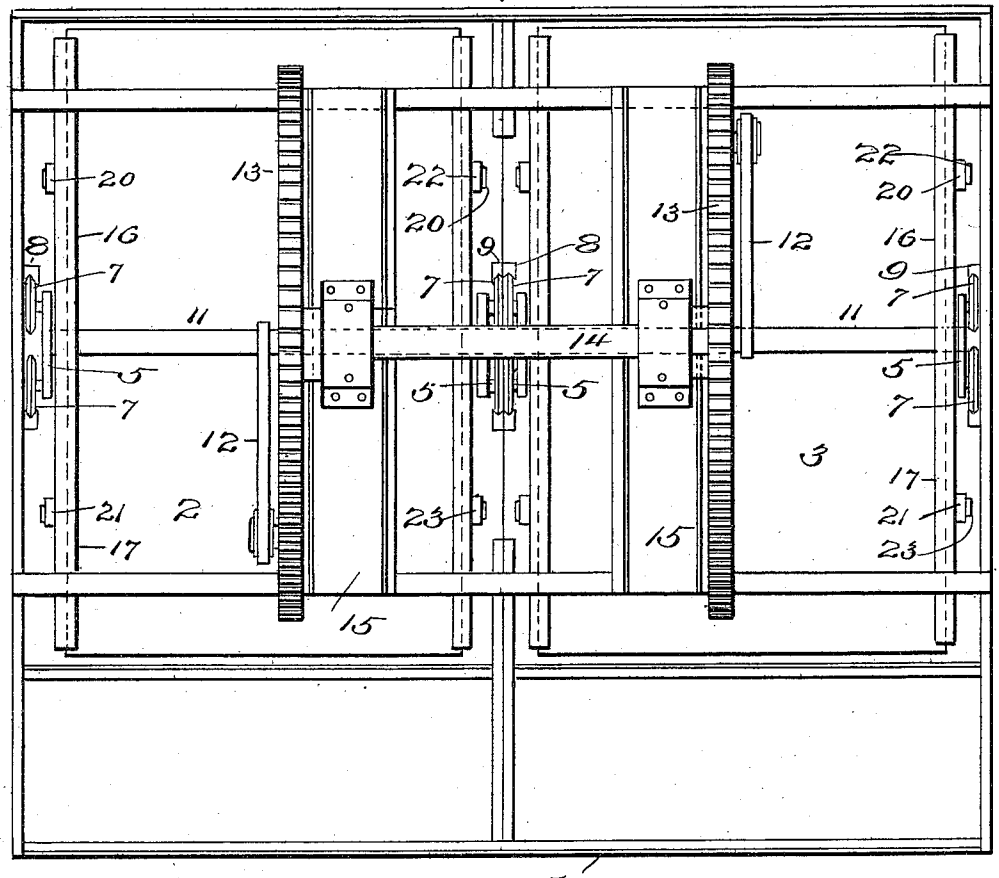


Fig. 5.

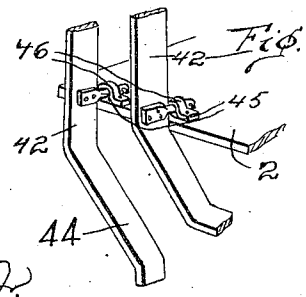
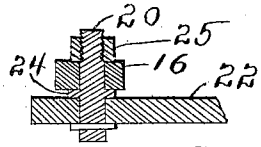


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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WATER-MOTOR.

1,046,341. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed June 29, 1911. Serial No. 635,970.

To all whom it may concern:

Be it known that I, ALFRED SHIELDS, a citizen of the United States, residing at Vicksburg, in the county of Warren and State of Mississippi, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

This invention relates to improvements in water motors, and particularly to improved structures which will utilize the pressure of water in flowing streams without necessarily providing dams or the like for directing the water toward the motor.

The object in view is the arrangement of an improved structure formed with one or more reciprocating blades adapted to receive the pressure of water in both its forward and rearward movement for transmitting power to any desired device.

A further object of the invention is the arrangement of a plurality of blades mounted in pairs and designed to operate in opposite directions at the same time, the blades being arranged either vertical or horizontal, and automatically shifted upon the extreme movement of the respective blades so that the blades will automatically move back and forth under the pressure of the water of a moving stream.

With these and other objects in view the invention comprises certain novel constructions, combinations, and arrangement of parts as will be hereinafter more fully described and claimed.

In the accompanying drawings: Figure 1 is a side elevation of an embodiment of the invention, certain parts being broken away for clearly disclosing the construction. Fig. 2 is a front view of the structure shown in Fig. 1. Fig. 3 is a top plan view of the structure shown in Fig. 2. Fig. 4 is an enlarged detail fragmentary sectional view through a clamping member embodying certain features of the invention. Fig. 5 is a perspective view showing means of securing the guides to the blades.

In constructing a motor embodying the invention the same may be arranged to operate vertically, as shown in Figs. 1 to 3 inclusive, or constructed to operate horizontally. A suitable framework is provided in which is arranged one or more pair of blades so positioned as to be acted upon by the water and caused to move longitudinally of the frame. Connected to these blades are power transmitting means, and also means for shifting the position of the blades so as to engage the water for permitting the water to force the blades in a return movement, and at the same time actuate properly the power transmitting means.

In order that the invention may be more clearly understood an embodiment of the same is shown in the accompanying drawings, in which 1 indicates the framework preferably made from angle iron in which is mounted a plurality of blades 2 and 3. Blades 2 and 3 are formed identical in construction, and the associated parts are identical, so that the description of one will equally apply to the other, the only difference being that the same are set to operate at opposite angles, as clearly shown in Fig. 1. Each of the blades 2 is formed with journal members 4—4. These journal members project into reciprocating guides 5—5, and are pivoted therein. The guides 5—5 are each provided with anti-friction and guiding wheels 6 and 7. These guiding wheels are mounted to operate in guideways 8 and 9. By this arrangement the guides 5—5 may be freely moved back and forth, and consequently the journal members 4—4 are moved in a line back and forth. Blades 2 are continuously maintained at an angle different from a right angle to the guide 5—5, except when the blades are at their extreme movements, and are shifting their positions. This will cause the water traveling through the motor, as indicated by the arrow in Fig. 1, to act against all of the blades, and continuously move the same. The set of blades 2 and 3 respectively are preferably not set to operate at an angle of 180° but at an angle different from 180°, so that while the blades 2 are turning, and consequently have no power exerted thereon, the blades 3 will be receiving power which power will be communicated to the machine being operated, and to the blades 2 for continuing the shifting thereof until the same have arrived at their new position or angle. The motor is preferably provided on the sides with a covering 10 so that the water when once entering the motor will be compelled to pass entirely therethrough and operate the respective blades 2 and 3. It will be evident that either open face or edge of the motor

may be pointed up-stream and the device will operate. Also if the stream should not have a sufficient volume or movement to operate the motor as fast as desired a dam could be provided, or means for directing all or part of the stream into the motor.

The upper ends of the guides 5—5 have pivoted therein a shaft 11 to which is rigidly secured connecting rods 12—12. The connecting rods 12—12 are pivotally connected with the gear wheels 13—13 from which power may be taken as desired. The gear wheels 13—13 are rigidly secured to a shaft 14 which is mounted upon a suitable support 15 connected with the framework 1. The shaft 11 is pivotally mounted in the ends of the guides 5—5, but has rigidly secured thereto a pair or blade shifting frames 16 and 17 at each end thereof. A pair of blade shifting frames, of course, are provided for each set of blades 2 and 3, and if for any reason it should be desired to have more than two sets of blades 2 and 3 there would be additional blade shifting frames. The frames 16 and 17 are provided with slots 18 and 19 respectively in which are mounted pins 20 and 21 which are preferably in the nature of bolts or thumb screws which will clamp the upper ends of the links 22 and 23 to the frames 16 and 17. This clamping arrangement is shown more clearly in. Fig. 4 in which the bolt 20 is shown provided with an enlargement 24 and a nut 25. When nut 25 is tightened the same will clamp bolt 20 firmly to frame 16, but will permit a free pivotal movement of link 22 which is journaled on the outer end of bolt 20, and is prevented from removal thereof by a suitable washer and cotter pin or other desired means. The links 22 and 23 extend down to, and preferably shortly below the lowermost blade 2, and are preferably connected at 26 and 27 to blade connecting bars 28 and 29. Bars 28 and 29 are provided with a plurality of apertures for accommodating pins 30 and 31 which are rigidly connected with the blades 2 and which project through the bars 28 and 29. These pins are loosely mounted in the bars so as to freely turn when the blades are shifting their position or when the blades are being manually adjusted. It will be evident that there are links 22 and 23 on each side of the blades 2, and consequently there will also be bars 28 and 29 on each side of the blades 2. By this arrangement when the blades 2 have moved to near their uppermost position, wrist pin 32 will be nearing what might be termed dead center, and passing from the right of wheel 13 to the left, and consequently tilting the connecting rod 12 at an opposite angle. This will, of course, tilt shaft 11 and all the frames 16 and 17 connected therewith. When the frames 16 and 17 are tilted at a different angle motion will be conveyed to the blades 2, through links 22 and 23 and the bars 28 and 29 for shifting the angle of the blades. When the blades are shifted in this manner the water entering in the direction of the arrow will move the blades in a reverse direction. If it should be desired to cause blades 2 to operate at a different angle from those shown in the drawings, the bolts 20 and 21 are adjusted longitudinally of the frames 16 and 17 for causing the blades to operate at a greater or less angle as desired. Where the flow of water is comparatively slow but large in volume the blades are preferably set at a considerable angle and the motor will give forth a considerable power but at a comparatively slow rate. If the blades are set at a greater angle and the flow of water is rapid though not of large volume, the motor will operate at a comparatively high rate of speed, but with a less power for each rotation of the wheel 13 than when moving slower under a high pressure. However, the higher rate of speed may be geared down and substantially the same power secured.

As shown in Fig. 1, there are arranged a plurality of water guards or guiding members 34 at the front of the motor for controlling and guiding the water against the blades. Guards 34 are rigidly secured to pivotally mounted supporting shafts 35, each of which have rigidly connected therewith an arm 36. Each of the arms 36 has pivotally connected therewith at 37 a reciprocating link 38. Each of the links 38 carries a roller 39 and is provided with a slot 40 into which pin 41 projects. The respective pins 41 are mounted in the side plates 10, and project into the slots 40 for guiding the links 38 in their movement. The blades 2 carry a guide 42 which is inclined at 43 and 44. As shown in Fig. 5 guide 42 has secured thereto pins 45 mounted in bearings 46, which are fastened to the blade 2. Guide 42 is designed to engage rollers 39 and move the same back and forth. The first movement is to cause the respective rollers to shift their respective guards 34 for opening the same, and then hold the rollers in such a position as to hold the guard open until the blades 2 have passed, and then the beveled or inclined part 44 will actuate the respective rollers and cause the same to close guards 34. In this way no water can enter the motor except directly in front of the blades, and by this means a minimum amount of water may be used for operating the motor. Preferably the respective guards 34 are pivoted slightly off center so that when moved to a closed position the pressure of the water will hold said guards in a closed position until positively removed therefrom.

It will be observed that just as the motor reverses the blades 2 carrying the guides will swing around pivots 4 and carry the said

guides out in a direction toward plates 34. This action carries rollers 39 and consequently slotted links 38 in the same outward direction, which results in arms 36 and plates 34 being turned to a slight angle, just at the moment of the reversal. The links 38 and arms 36 are so proportioned and slot 40 is of such a length as to just accommodate this momentary outward movement.

What I claim is:

1. In a water motor, a housing, a plurality of pairs of guide ways, a guiding bar arranged to operate in each of the guide ways of said pairs, a plurality of blades pivotally mounted in each pair of said guiding bars, a plurality of connecting bars for connecting the blades, a link pivotally connected with each of said connecting bars, a blade shifting device pivotally connected with said links, means for moving said shifting device whereby movement is conveyed through said links and said connecting bars to said plates for shifting the angle thereof, a power wheel, and means for connecting said blades with said power wheel.

2. In a water motor, a housing, a plurality of sets of reciprocating blades, a pair of connecting bars pivotally connected with the blades of each set at each end, a link pivotally connected with each of said bars, a tilting frame pivotally connected with said links, a rock shaft connected with said frame for tilting the same, a connecting rod connected with said rock shaft, and a power wheel connected with said connecting rod, said connecting rod being designed to convey power to said power wheel and to rock said rock shaft.

3. In a water motor, a housing, a plurality of sets of blades arranged to move bodily back and forth through said housing, each of the blades of said sets being set at an angle, means for shifting the angle of said blades upon the completion of each stroke, a power wheel, means for transmitting power from said blades to said power wheel, and a plurality of guards arranged on one side of the housing for controlling the water entering the housing, said guards comprising a plurality of pivotally mounted gates, means for opening and closing said gates, and ways connected with said blades engaging said last mentioned means for operating the same in a predetermined relationship to the operation of said blades.

4. In a water motor, a housing, a plurality of sets of blades mounted in said housing and adapted to bodily reciprocate therein, a pair of guides for each set, means for pivotally mounting each of the blades in said guides, means connected with each of said blades for shifting the same upon a longitudinal movement thereof, a pivotally mounted shifting frame connected with said last mentioned means, a rock shaft connected with said pivotally mounted shifting means, and with each pair of said guides, a connecting rod rigidly secured to each of said rock shafts, and a power wheel connected with each of said connecting rods for receiving power therefrom and being rotated thereby, the rotation of said power wheels causing the oscillation of said connecting rods and the rocking of said rock shaft.

5. In a water motor, a housing, a plurality of sets of blades arranged to move bodily back and forth through said housing, each of the blades of said sets being set at an angle, means for shifting the angle of said blades upon the completion of each stroke, a power wheel, means for transmitting power from said blades to said power wheel, a plurality of guards arranged on one side of the housing for controlling the water entering therein, said guards comprising a plurality of pivotally mounted gates, an arm extending from each of said gates, and a reciprocating bar pivotally connected with each of said arms, and a cam-way connected with said blades engaging said bars for shifting the position thereof in order to open and close the gates in a predetermined relationship to the operation of the blades.

6. In a water motor, a housing, a plurality of sets of blades arranged to move bodily back and forth through said housing, means for shifting the angle of said blades upon the completion of each stroke, means for transmitting power from said blades, a plurality of guards arranged on one side of said housing for controlling the water entering into the housing, said guards comprising a plurality of pivotally mounted gates, an arm connected with each of said gates, a reciprocating bar pivotally connected with each of said arms, said bar being formed with a slot, a guiding member for each of said bars, and a cam-way engaging member connected with each of said bars, and a cam-way connected with each of said sets of blades for shifting the position of said bars and thereby causing said gates to be opened and closed in a predetermined relationship to the operation of the blades.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED SHIELDS.

Witnesses:
J. E. NELSON,
B. D. LANIER.