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F. B. MARVIN.

CURRENT MOTOR.

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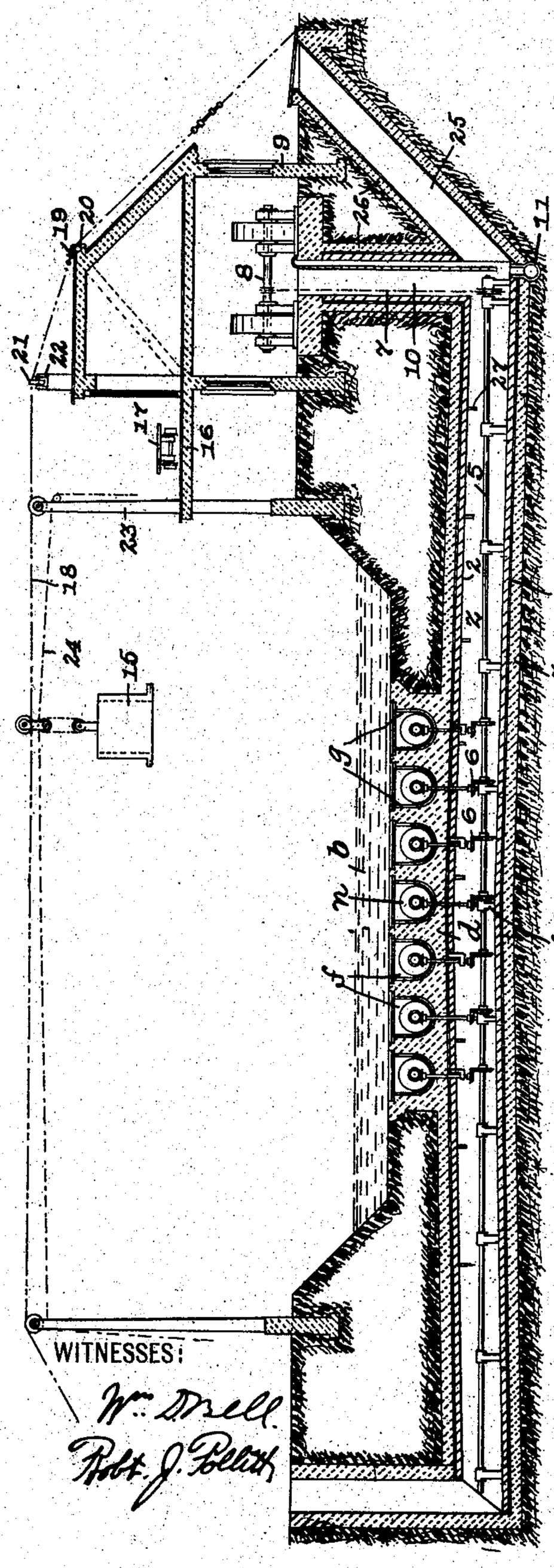

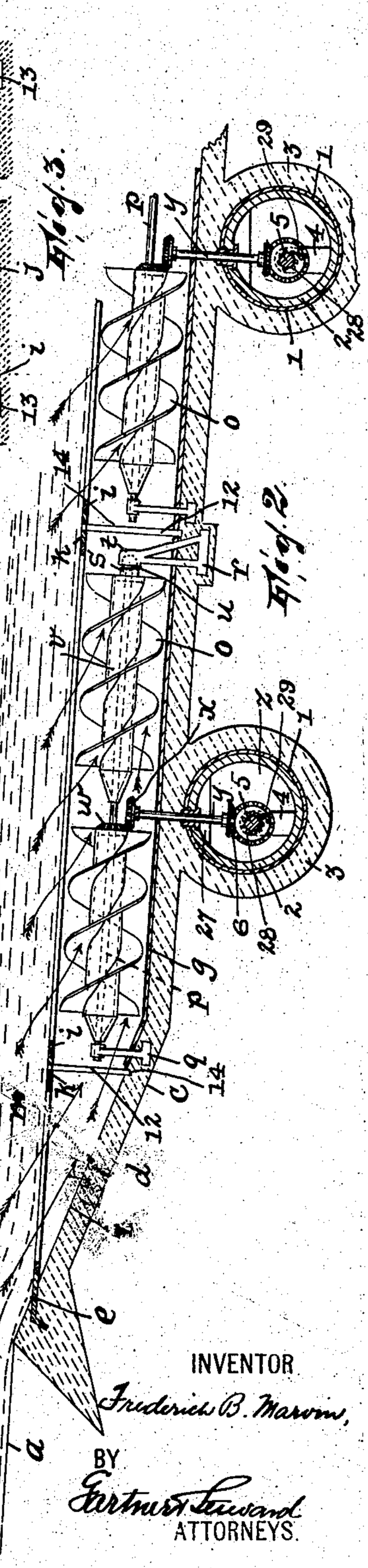

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CURRENT-MOTOR.

No. 815,302. Specification of Letters Patent. Patented March 13, 1906.

Application filed November 22, 1904. Serial No. 233,787.

To all whom it may concern:

Be it known that I, FREDERICK B. MARVIN, a citizen of the United States, residing in Paterson, Passaic county, New Jersey, have invented certain new and useful Improvements in Current-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to means for turning the power of moving bodies of water to practical use by mechanical means, in which a current-rotated part is the prime or initial element in the train of elements whereby the transmission of the power is effected. Many mechanisms of this sort have been proposed and patented; but I am not aware that any has gone into the extensive use which the opportunity offered for obtaining abundance of power comparatively inexpensively really warrants. Some of the reasons for this appear to be the following: The previous apparatuses were in the first place not so designed as that the various controlling conditions would permit their being constructed on a scale large enough to accomplish any material economy over other methods of developing power. In the second place, they were not constructed with a view to normally protecting them from and adapting them to thoroughly withstand the effects of ice, logs, and other bodies calculated to damage their mechanism. Again, in these previous apparatuses the primary power-transmitting elements were not separable from each other in the general contribution to the power transmission, with the consequence that if any one became disordered or inoperative the whole mechanism was crippled and must be stopped.

The object of this my present invention is to overcome these and other insufficiencies in previous apparatuses of this kind.

In carrying out my invention I take the power from the current-driven elements through a transmission means which is located no higher than, and preferably below, said elements, and I furthermore dispose said current-driven elements as low as possible in the watercourse without isolating them from the operative reach of the current's force. Thus a free way or course is left above for ice, logs, and debris to float past without danger of clogging up and damaging the mechanism and choking up the watercourse. In the preferred form of the invention a perforate artificial bed or bottom forms a substantially alined continuation of the portion of the natural watercourse which lies above or upstream, and this covers, and thus protects, the current-driven elements from any bodies of material size that would otherwise be drawn into and damage them. In order to concentrate the force of the current on the current-driven elements, the latter are disposed in longitudinally-extending flumes or channels arranged side by side across-stream and as long as is expedient. I find that the most simple, durable, and power-absorbing form of current-driven element is a screw.

My invention is fully illustrated in its preferred form in the accompanying drawings, wherein—

Figure 1 is a transverse sectional view through the watercourse and my apparatus. Fig. 2 is a longitudinal sectional view of the watercourse and my apparatus, and Fig. 3 is a fragmentary plan view showing the construction of the artificial perforate bed or wall for separating the course of the stream which ice and other debris take from the portion of the stream occupied by the current-driven elements.

In said drawings the natural bed *a* of the river or other watercourse *b* is shown as interrupted by an excavation or depression *c*. This excavation or depression is filled in with concrete or the like *d* up to a level approximating that of the natural bed. The top surface of this filling may be either horizontal or at a less grade than that of the natural river-bed, so that at the upstream end of the filling its level will stand a little below that of the natural bed, as at *e*. This concrete filling is formed with a series of parallel channels or flumes *f*, arranged side by side and each longitudinally of the stream. Said flumes are provided with cement linings *g*, and adjacent the top edges of these linings the concrete filling is rabbeted, as at *h*, to receive iron gratings *i*, having longitudinal slits or openings *j*, which cover said flumes. Alternating with the gratings are plates *k*. The whole group or series of iron gratings and plates thus form a perforate wall or artificial bed which separates that portion of the stream or watercourse *b* which forms the way or course

assumed by bodies of ice, logs, or other debris from the space beneath said gratings, being the spaces of the several flumes. The upstream end of each flume is formed with an incline *l*, which merges at its upper end with the natural river-bed and at its lower end with the bottom of the flume. These portions of the flumes may be covered by other gratings *m*, substantially like the gratings *i*. In the flumes under each grating is arranged a current-driven element *n*. Each of these is shown as two screws *o*, arranged in tandem on a common shaft *p*.

q r are two standards in which the shaft *p* is journaled, the downstream end of said shaft having a socketed bearing *s*, in which and a socket *t* in the standard *r* is arranged a ball *u*. The bodies *v* of the two screws are preferably cylindrical and air-tight, so that buoyancy is imparted to the screws and the friction on the bearings in standards *q* and *r* reduced.

On the shaft *p* between the two screws of each current-driven element is fixed a bevel-gear *w*, which meshes with a bevel-gear *x* on a vertical shaft *y*. The several vertical shafts *y* extend down through the linings *g* of the flumes and the filling of cement underneath the same and project into a tubular shaft-tunnel *z*, disposed transversely of the watercourse. This tunnel may consist of a steel tube 1, provided with an inside lining 2 (say of brick) and set in a cylindrical body of concrete 3. In this tunnel *z* are supports 4 for a shaft 5, which is connected with each transverse series of shafts *y* by bevel-gearing 6.

7 designates power-transmitting means connecting shaft 5 with a dynamo 8 or other power-distributing medium located above ground, as in the power-house 9. (Shown in the drawings.) The means 7 extends through a concrete wall 10. In order to drain the tunnel, which is inclined from its middle toward both ends, as best shown in Fig. 1, of water finding its way into the same, a drain-pipe 11 may be provided.

Should it be necessary in order to make repairs or for other reasons to cut off the supply of water from any one or more of the current-driven elements, gates 12 may be forced down through slots 13 in the plates *k* and in guides 14 in the flumes. To this end a coffer-dam 15 may first be lowered into the stream and allowed to rest on the artificial bed around the grating for the current-driven element to be cut off, whereupon the gates may be closed and the water then pumped out of the coffer-dam and the portion of the flume thus isolated, leaving the latter clear, so that the repairs can be accomplished.

16 is a platform extending parallel with the watercourse, on which is a car 17, which may be used to convey the coffer-dam and its accessories from one transverse series of current-driven elements to another.

18 is a cable having its ends attached to runners 19, running on guideways 20, the said cable being extended over other runners 21, running on guideways 22. Only one set of these runners and guideways is shown in the drawings.

23 represents auxiliary supports for the cable 18, arranged opposite each transverse series of gratings. These auxiliary supports are only employed when the cable has been shifted along its guideways 20 and 22 to the proper position, being then needed to sustain the weight of the coffer-dam when it is swung out over the stream.

24 indicates tackle for shifting the coffer-dam across-stream.

25 is an inclined well which communicates with the channel *z* and is adapted for introducing the shafting 5 to said tunnel. Both this and the well 10 may be formed of concrete 26. The top of the tunnel may be partitioned off, as at 27, to form a series of air-chambers or breathing-spaces for the workmen should the tunnel be flooded while they are at work therein.

In order to permit the rotation of any one of the current-driven elements to be stopped, a clutch may be employed. This is shown in Fig. 2 as a ratchet 28, fixed on shaft 5, and a spring-pressed pawl 29, pivoted on the member of the gearing which is carried by said shaft.

By depressing the artificial bed slightly below the natural bed, as at *e*, a downward impulse is given to the water at this point, so that the force of the current is brought in as great degree on the uppermost current-driven elements as on the remainder.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a watercourse structure having longitudinal and transverse spaces, of a rotary device adapted to be operated by the flowing body of water in said structure and located in the longitudinal space, power-transmitting means operatively connected to said device and having a portion thereof traversing said structure and located in said transverse space and below the horizontal plane of said device, and means for supporting said rotary device and the power-transmitting means, substantially as described.

2. The combination, with a watercourse structure, of a rotary device adapted to be operated by the flowing body of water in said structure, power-transmitting means operatively connected to said device and having a portion thereof traversing said structure and located below the horizontal plane of said device, means for supporting said rotary device and the power-transmitting means, and a perforate wall or partition extending over said device, substantially as described.

3. The combination, with a watercourse

structure having a depression formed therein and a transverse space beneath said depression, of a rotary device located in said depression and adapted to be operated by the flowing body of water in said structure, power-transmitting means operatively connected to said device and located in said transverse space, and means for supporting said rotary device and the power-transmitting means, substantially as described.

4. The combination, with a watercourse structure having a depression in its bed, of a rotary device adapted to be operated by the flowing body of water in said structure and located in said depression, power-transmitting means operatively connected to said device and located below the surface of said structure, and a perforate wall or partition disposed substantially in the plane of the surface of said structure over said depression, substantially as described.

5. The combination of a watercourse structure having an open flume or channel therein depressed below the surface thereof and a transverse space beneath said flume or channel, a rotary device adapted to be operated by the flowing body of water and located in said flume, power-transmitting means operatively connected to said device and located in said transverse space and means for supporting said device and the power-transmitting means, substantially as described.

6. The combination of a watercourse structure having a series of longitudinally-extending open flumes or channels therein arranged side by side and depressed below the surface thereof, rotary devices arranged in said flumes and adapted to be operated by the flowing body of water, power-transmitting means operatively connected to said devices and located below the horizontal plane thereof, and means for supporting said devices and the power-transmitting means, substantially as described.

7. The combination of a watercourse structure comprising an artificial bottom having a series of flumes, rotary devices adapted to be operated by the flowing body of water and located in said flumes, gratings covering said flumes, power-transmitting mechanism operatively connected to said devices, and means for supporting said devices and the power-transmitting means, substantially as described.

8. The combination of a watercourse structure having an open flume therein depressed below the surface thereof, a plurality of rotary devices adapted to be operated by the flowing body of water and located in said flume, a grating structure arranged over said devices, power-transmitting mechanism operatively connected to said devices, and means, guided in said grating structure, for cutting off any one of said devices from the action of the flowing body of water in said structure, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of November, 1904.

FREDERICK B. MARVIN.

Witnesses:
JOHN W. STEWARD,
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