A. TSCHIRGI.

WATER WHEEL.

APPLICATION FILED JUNE 3, 1908.

906,754.

Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.

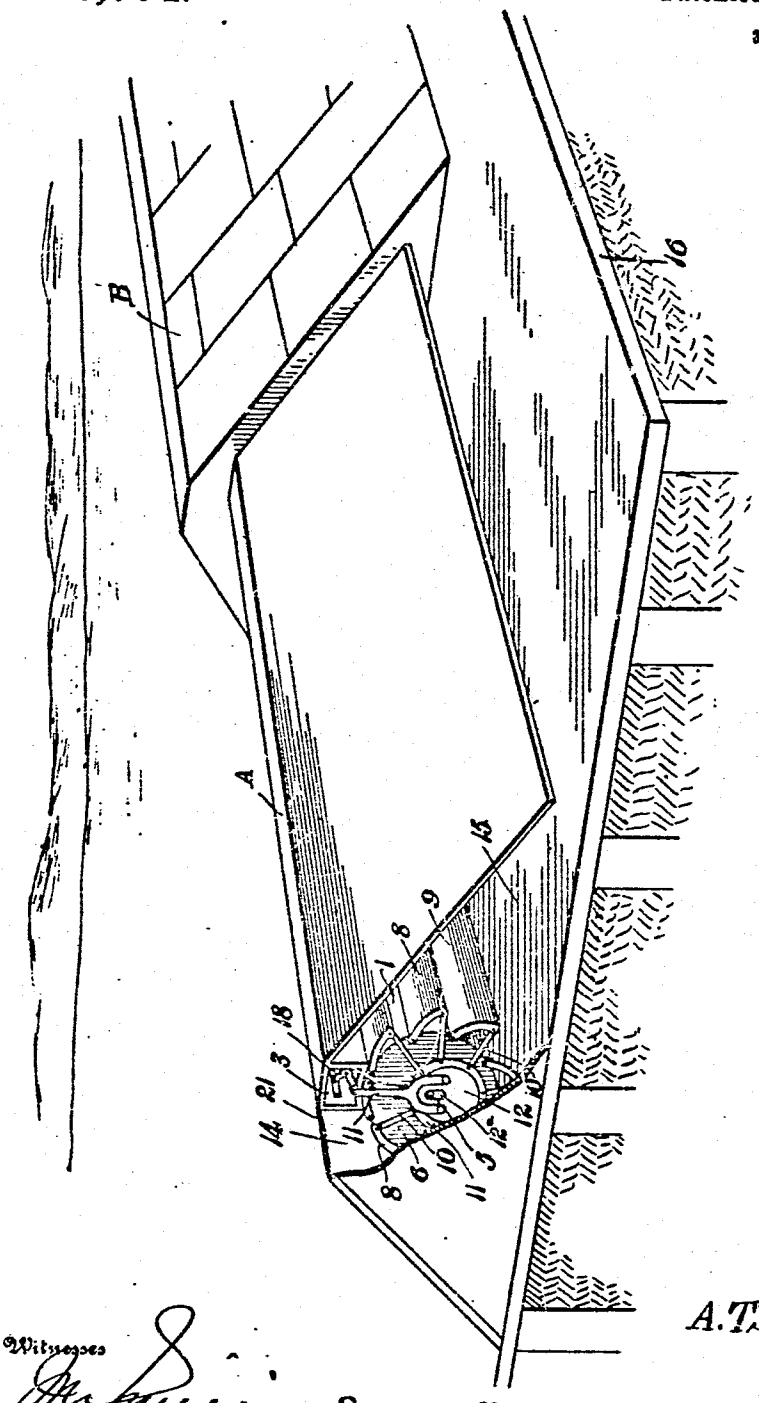


Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

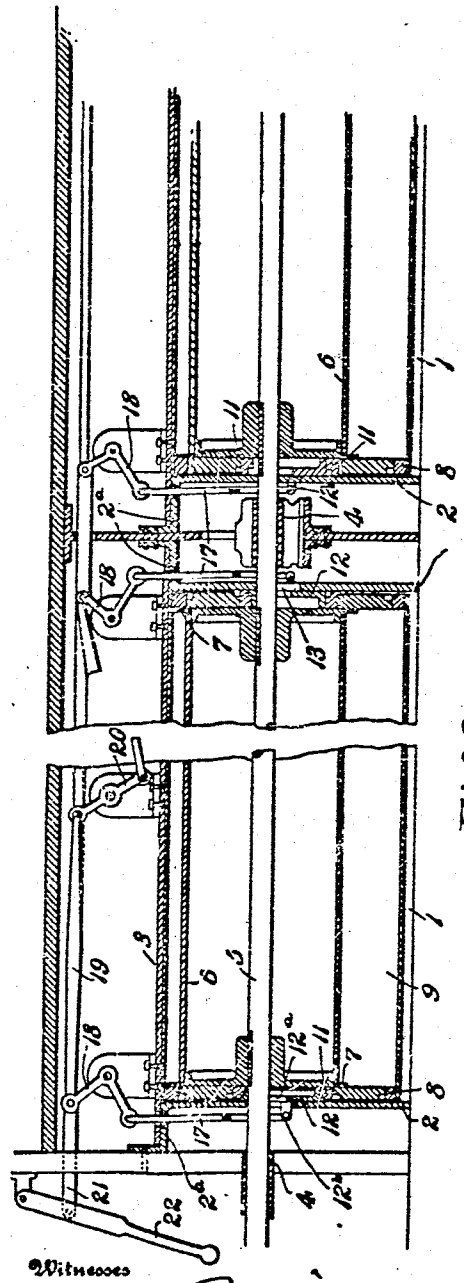


Fig. 2.

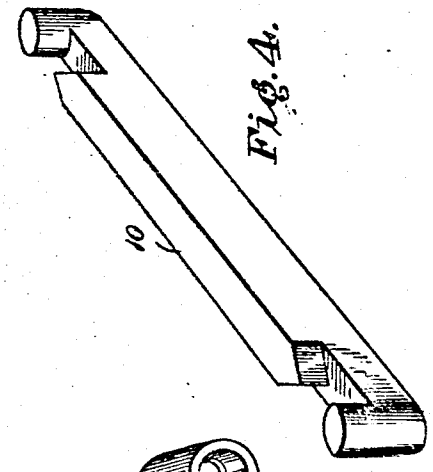


Fig. 4.

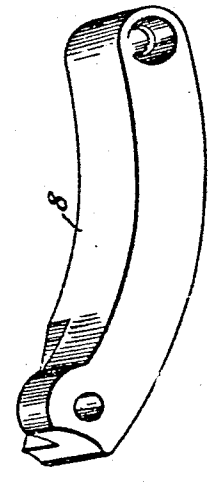


Fig. 3.

Witnesses

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3 SHEETS—SHEET 3.

Fig. 5.

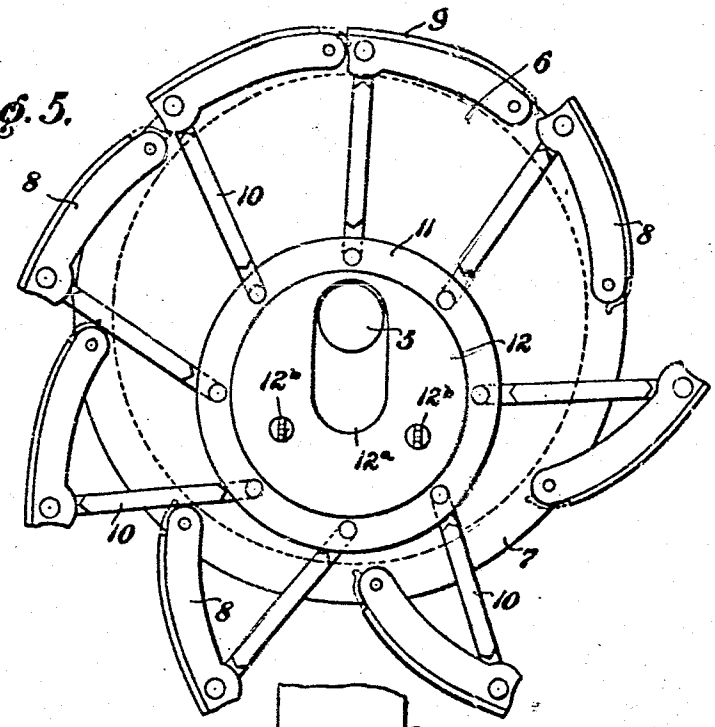
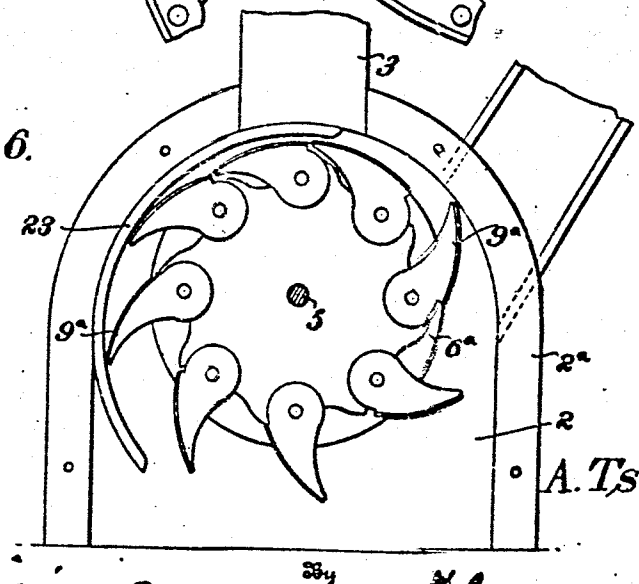


Fig. 6.



Witnesses

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Not to be taken from the Files.

UNITED STATES PATENT OFFICE.

ARNOLD TSCHIRGI, OF SHERIDAN, WYOMING.

WATER-WHEEL.

No. 906,754. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed June 3, 1908. Serial No. 436,519.

To all whom it may concern:

Be it known that I, ARNOLD TSCHIRGI, a citizen of the United States, residing at Sheridan, in the county of Sheridan and State of Wyoming, have invented certain new and useful Improvements in Water-Wheels, of which the following is a specification.

In many sections of the country where irrigation is desirable, the fall or slope of the land is not sufficiently great to admit of digging out ditches from the streams for the purpose of distributing water over the land, and the object of the present invention has been to obviate this difficulty by the provision of a novel means whereby the flow of the streams may be utilized for pumping or raising the water upon the lands to be irrigated.

The invention further contemplates a device of this character which will render it possible to derive a head of water from any stream having banks sufficiently high to allow of damming or raising the water, and which embodies a novel construction whereby the wheel or motor is housed within the dam, and the necessity of constructing a separate power house is eliminated. The peculiar construction provided in the invention also has the further advantage of preventing the lower stream from backing up against the dam, so as to reduce the effective head upon the wheel in times of flood.

With these and other objects in view that will more fully appear as the description proceeds, the invention consists in certain constructions and arrangements of the parts that I shall hereinafter fully describe and then point out the novel features thereof, in the appended claims.

For a full understanding of the invention and the merits thereof, and to acquire a knowledge of the details of construction, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a perspective view of a power dam having the water wheel mounted therein, portions being broken away; Fig. 2 is a longitudinal sectional view through a portion of the power dam; Fig. 3 is an enlarged detail view of one of the arms carrying the buckets of the wheel; Fig. 4 is a similar view of one of the links connecting the arms to the rings, mounted upon the plates at opposite ends of the wheel; Fig. 5 is an end view of the wheel; and, Fig. 6 is an end view of the modified form of wheel.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawings, by the same reference characters.

In general, the invention comprises a novel means for mounting a wheel within a dam, a portion of the water flowing over the crest of the dam, in the usual manner, while the remaining portion of the water flows through the dam and acts upon the wheel, the water flowing over the dam gaining a sufficient impetus or velocity so that when it strikes the apron, it tends to keep back the water in the lower stream, so as to prevent the latter from backing up against the dam and reducing the effective head upon the wheel. It may also be mentioned that the tail race leading the water away from the wheel discharges upon the apron through the down stream face of the dam, so that the water flowing over the dam tends to create a vacuum within the interior thereof and thereby increases the efficiency of the wheel. This power dam which is designated at A may be located either at one end of or at an intermediate point in the length of a main dam B which may be of any suitable construction, the crest of the main dam being somewhat higher than that of the power dam, so that the latter constitutes a main spillway. The interior of the power dam is provided with one or more wheel-receiving spaces 1 according to the length of the dam and the size of the wheels, and arranged at the opposite ends of each of the wheel spaces 1 are the end plates 2. In the present instance, these end plates are shown as spaced from the walls and are provided at their top and sides with the flanges 2^a which are secured to the wall. Resting upon the shoulders formed at the upper ends of these plates 2 are the bulkheads 3 which are located immediately over the wheels, and form a support for the crest or upper portion of the dam. Suitable bearings 4 are provided in the end walls of the wheel spaces and journaled within these bearings is a shaft 5 having a wheel or wheels mounted thereon. Each of the wheels comprises a cylindrical body portion 6 which is rigid with the shaft, the ends of the body portion being extended outwardly to form peripheral flanges 7 to which the

curved arms 8 are pivoted. Corresponding arms 8 at opposite ends of the wheel are connected by plates 9 which constitute the buckets and are designed to be swung either inwardly against the body portion 6 in an inoperative position, or outwardly away from the body portion into an operative position. The swinging end of each of the arms 8 is connected by a link 10 to a ring 11 which fits loosely upon a circular plate 12 adjustably secured to the corresponding end plate 2. In the present instance, the circular plates 12 are shown as provided with the slots 12^a which receive the shaft 5, and also with the lugs 12^b which project through slots 13 in the end plates 2. When the circular plates 12 are raised to the limit of their upward movement, they are concentric with the shaft 5, and the various buckets constituted by the plates 9 are swung inwardly into an inoperative position. However, when the circular plates 12 are moved downwardly so as to occupy an eccentric position with respect to the shaft 5, the various buckets upon the wheels are automatically moved inwardly into an inoperative position as they pass under the bulkhead 3 and are swung outwardly so as to be acted upon by the water flowing through the penstock 14 as they reach the lower portion of the wheel. This penstock 14 leads from the upper portion of the dam, the down stream wall thereof being constituted by the bulkhead 3. It will thus be obvious that when the circular plates 12 are moved downwardly, the water flowing through the penstock will act upon the buckets of the wheel, so as to revolve the same, the buckets being automatically closed at the upper portion of the wheel and opened when they are turned into coöperative relation to the penstock. After the water has acted upon the wheel, it is carried away by the tail race 15 which passes through an opening in the down stream face of the dam, and discharges the water upon the apron 16.

Each of the circular plates 12 is connected by an upwardly extending link 17 to one arm of a bell crank lever 18, the two bell crank levers at opposite ends of the wheel facing in opposite directions and having their remaining arms connected by second links 19 to opposite ends of the intermediate lever 20 which is pivoted at a central point. These bell crank levers 18 together with the intermediate lever 20 may be arranged within the bulkhead 3 which is shown as having a hollow construction, and one of the bell crank levers is connected by a rod 21 to an operating lever 22 at one end of the dam. It will thus be obvious that by suitably manipulating the operating lever 22, the circular plates 12 can be raised or lowered as desired, and the buckets of the wheel either held in an inoperative position or caused to open to the required degree as they are brought into coöperative relation with the penstock by the revolving of the wheel.

A modification of the invention is shown in Fig. 6, in which the plates 9^a carried by the body portion 6^a of the wheel are so mounted as to swing freely, and are designed to be thrown outwardly into operative position by the combined action of gravity and the force of the water as they are turned into coöperative relation with the penstock. For the purpose of swinging the buckets 9^a into a closed or inoperative position as they pass under the bulkhead, the end plates 2 are provided with the outwardly projecting curved guide ribs 23 which engage the buckets as they are being elevated at the rear side of the wheel. The construction of the dam is identical with that previously described, and it will be obvious that the water flowing through the penstock will operate upon the buckets of the wheel so as to impart motion thereto as heretofore described, and will then be discharged upon the apron of the dam by means of the tail race.

Having thus described the invention, what I claim is:

1. The combination of a dam provided with a wheel space, end plates arranged within the wheel space and formed with shoulders, a bulkhead supported upon the said shoulders, and a wheel mounted within the wheel space, the dam being provided with means for delivering water to the wheel and discharging it therefrom.

2. The combination of a dam provided with a wheel space, end plates arranged within the wheel space, the said end plates being spaced from the walls of the wheel space and formed with flanges which are secured thereto, a bulkhead supported by the end plates, a wheel mounted between the end plates and provided with swinging buckets, and means for moving the swinging buckets into an inoperative position as they pass under the bulkhead and into an operative position as they approach the opposite side of the wheel, the dam being provided with means for delivering water to the wheel and discharging it therefrom.

3. The combination of a dam provided with a wheel space, end plates arranged within the wheel space, the said end plates being spaced from the walls thereof and provided with flanges which are secured thereto, a bulkhead supported upon the end plates, a wheel mounted between the end plates and provided with swinging buckets, a circular plate slidably mounted upon one of the end plates, a ring upon the circular plate, links connecting the ring to the buckets of the wheel, and means for moving the circular plate into a concentric or eccentric relation with the axis of the wheel, the dam being provided with means for delivering water to the wheel and discharging it therefrom.

4. The combination of a dam provided with a wheel space and also with a penstock leading to the wheel space and a tail race leading therefrom, end plates arranged within the wheel space, a hollow bulkhead supported upon the end plates, a wheel mounted between the end plates and provided with swinging buckets, circular plates slidable upon the end plates, rings upon the circular plates, links connecting the rings to the buckets of the wheel, and means mounted within the hollow bulkhead for moving the circular plates.

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

ARNOLD TSCHIRGI. [L. S.]

Witnesses:
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J. H. BRADFIELD.