No. 692,619. Patented Feb. 4, 1902.

M. CARSTANJEN.

FLOOD GATE DAM OR WEIR.

(Application filed Sept. 27, 1900.)

(No Model.)

Fig. I

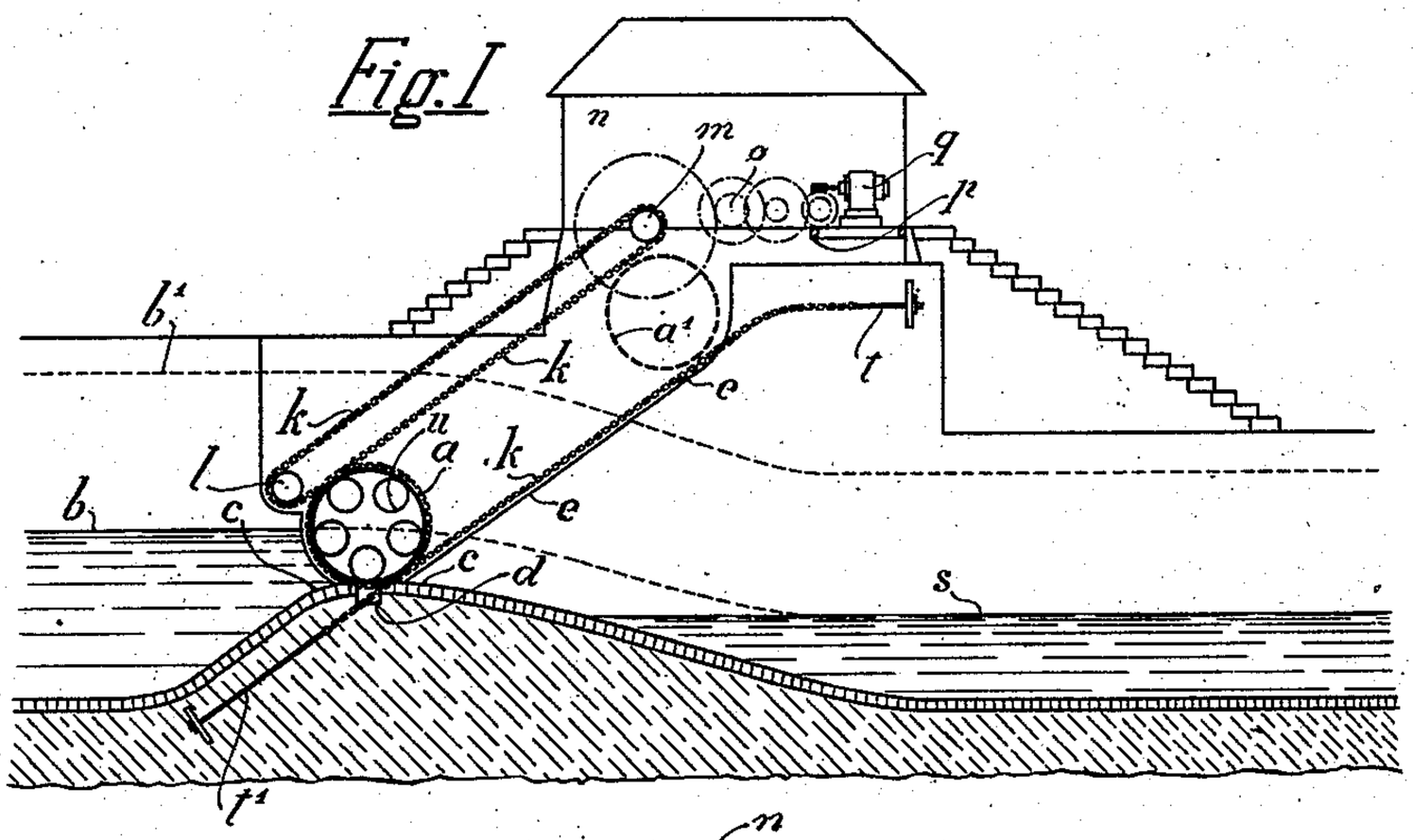


Fig. II

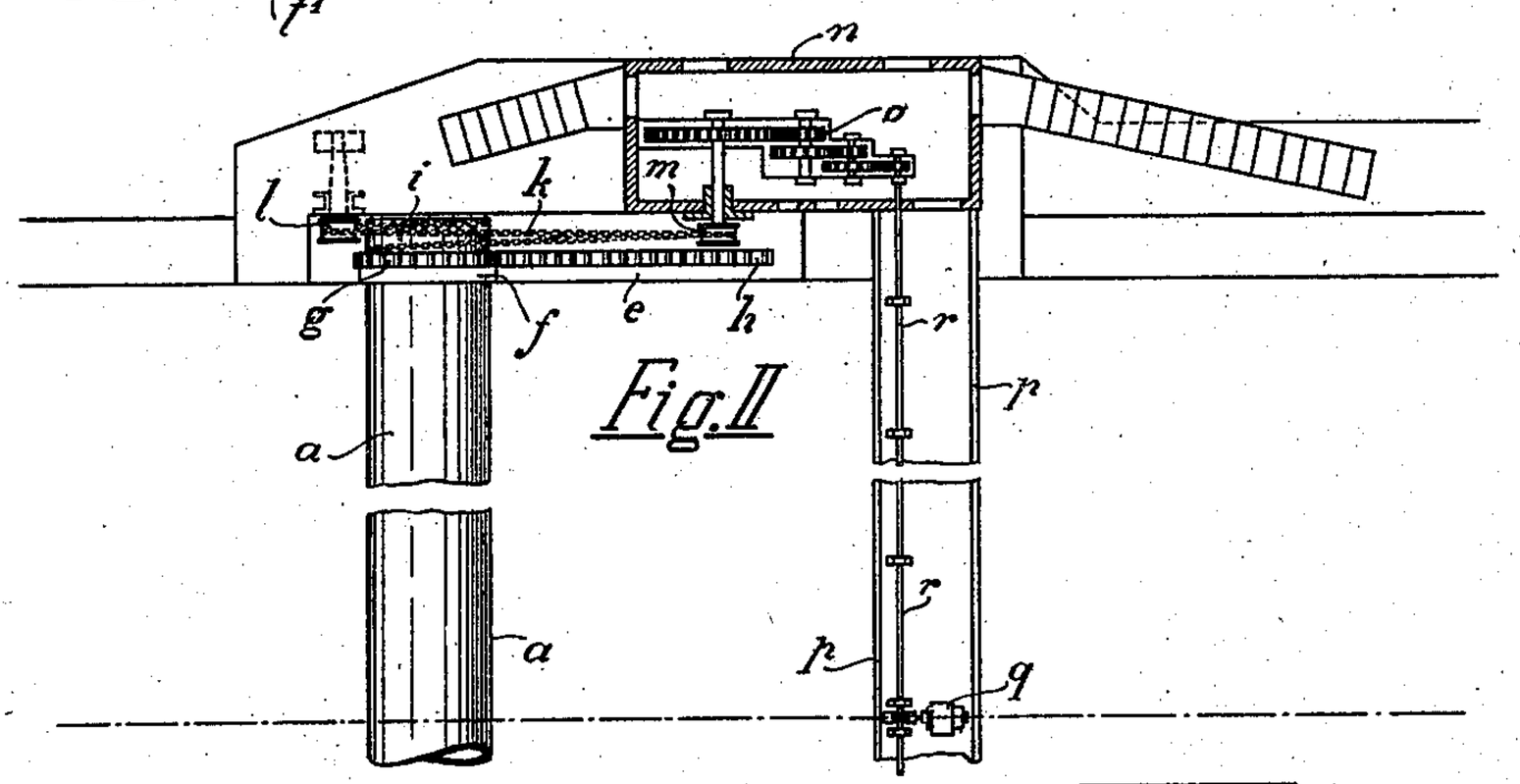
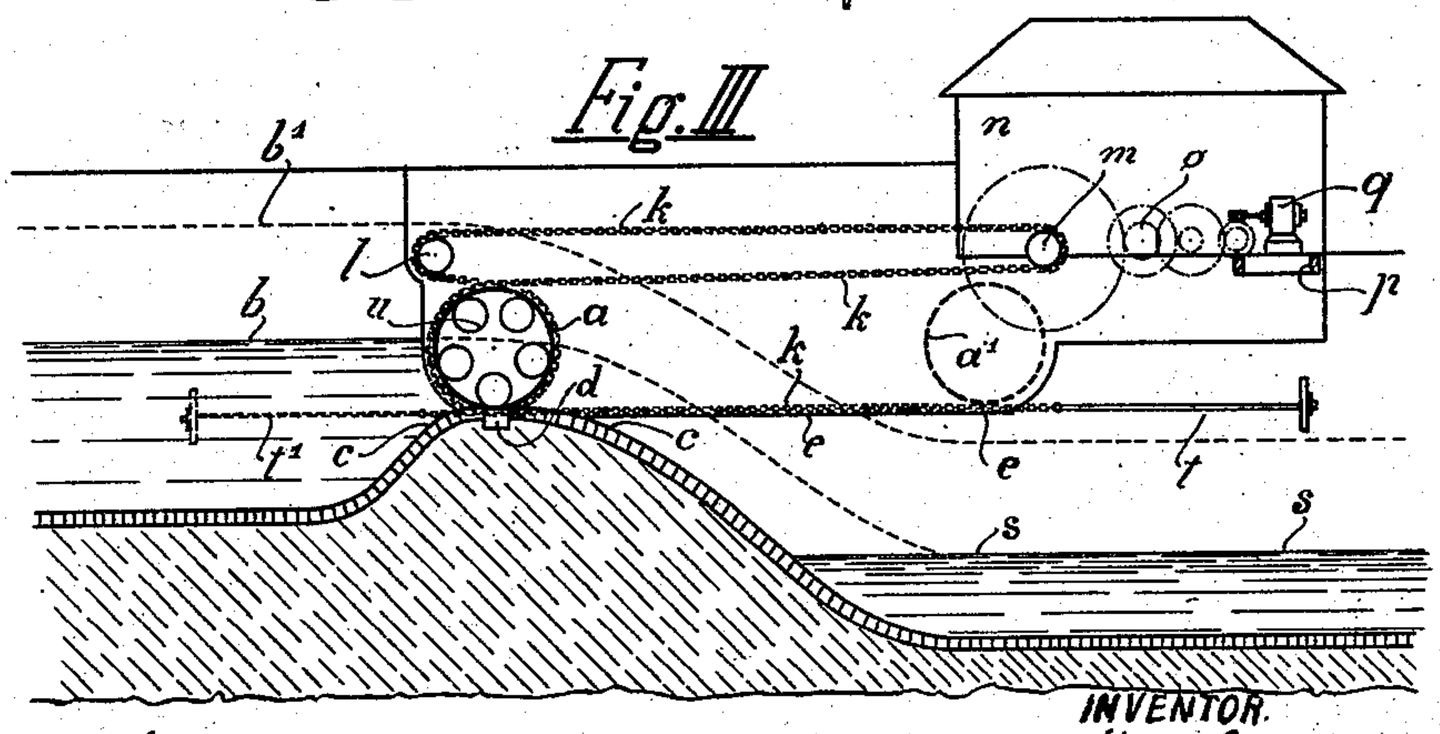


Fig. III



WITNESSES:
Isabella Waldron,
Mildred Ida Welch.

INVENTOR.
Max Carstanjen
BY
Richards & R
ATTORNEYS.

UNITED STATES PATENT OFFICE.

MAX CARSTANJEN, OF NUREMBERG, GERMANY, ASSIGNOR TO FIRM OF VEREINIGTE MASCHINENFABRIK AUGSBURG UND MASCHINENBAU-GESELLSCHAFT NÜRNBERG, A.-G., OF NUREMBERG, GERMANY.

FLOOD-GATE DAM OR WEIR.

SPECIFICATION forming part of Letters Patent No. 692,619, dated February 4, 1902.

Application filed September 27, 1900. Serial No. 31,292. (No model.)

To all whom it may concern:

Be it known that I, MAX CARSTANJEN, a subject of the German Emperor, residing at Nuremberg, Germany, have invented Improvements in Flood-Gate Dams or Weirs, of which the following is a specification.

In streams or rivers liable to strong flows of ice alluvium and having a considerable head of water the arrangement of movable dams or barriers offers peculiar difficulties, as it is impossible to arrange bearings, hinges, or other mechanical parts in the bed of the river. Roller or spar barriers with frames or supports capable of being rotated, movable flood-gate posts, the lower ends of which must be let into foot-steps fixed in the bed of the river, and other like arrangements are thus rendered useless. The local circumstances do not in most cases allow of the division of the total width of such a barrier or flood-gate into a number of smaller openings, and thus necessitate the use of very large and heavy closing devices, which are correspondingly cumbrous to move. In addition to their own weight other important resistances, as a rule, oppose the movement of these closing-bodies, which resistances in the apparatus at present employed consist of sliding friction or trunnion friction, as well as the friction of ice and solid bodies on the walls of the closing-body.

This invention has for its object a dam or flood-gate the closing-body of which is movable and so formed that even when of extraordinary dimensions the resistances to movement are reduced to a minimum and further hinges or other mechanical devices on the bed of the river are entirely avoided. The closing device for this object consists of a roller the diameter of which is about equal to twice the height of the water-level above the top of the weir at the point in which it is opened more particularly for the passage of ice and other solid matters. When the weir is closed, this roller rests along its lower face on a cross-beam arranged in the top of the solid weir. The opening of the weir takes place by rolling away the closing-body on a horizontal or inclined plane, the movement of the roller being produced by means of a rope, chain, or like driving-gear, which is operated from an engine-house, and thus when the weir is opened apart from the weight of the roller itself, which has to be raised up an inclined rolling track, there is only the resistance of the rolling friction to be overcome, which is no longer of any serious consequence. As the roller moves away from the ice pressing against it the friction of ice on the walls is entirely obviated.

This improved weir is shown in the accompanying drawings.

Figure I is a sectional side view; Fig. II, a plan view of the arrangement with an inclined plane for the roller-track, while Fig. III is a side view of the arrangement where the water-level below the weir is considerably lower than that above the weir.

A roller *a* extends over the whole width of the watercourse and is constructed, preferably, of strong iron plates, after the manner of a boiler; but in some circumstances it may be constructed of any other suitable material—for instance, of cast-iron, cast-steel, or the like—having a diameter of almost double the height of the water-level *b* above the solid weir-face *c* and capable of being opened when required for the passage of ice. At the highest point of the weir-face a beam *d* is arranged, which extends across the entire width of the weir-flow, on which the lower face of the roller rests to form a tight joint along this line.

In order to open the weir, the roller *a* is rolled away along a track *e e*, which in the present instance is inclined. In order to obtain the rolling movement, the circular rolling-surface *f* at each end of the roller rests on the rolling-track *e*, while at the same time a toothed ring *g*, mounted beside the rolling-surfaces *f*, engages with a rack-bar *h*, arranged along the rolling-track in order to guide the roller. The roller is consequently forced to roll up the inclined track *e* without slipping when it is caused to rotate. This rotation of the roller is produced in the following manner:

A chain-wheel *i* is mounted on each end of the roller *a* beside the toothed ring *g*, over

which chain-wheel a chain *k* is wound, anchored in the ground at both ends. The chain *k* has been led at first downward from the upper place *t* near the machine-house *n*, where it is fastened with grappling-irons parallel to the rolling-path *e*, and is then wound around the left half of the circumference of cylinder *a*. Thereupon it is guided again obliquely upward and around the cylinder *m*, thence obliquely downward and around the cylinder *l*, to be wound around the right half of the circumference of cylinder *a*. The lower end *t'* of the chain has been finally fastened with grappling-irons in the solid back of the dam. This chain is also carried around two pulleys *l* and *m*, arranged at the ends of the rolling-track, the latter of which pulleys is rotated by a driving apparatus provided with a very strong transmission-gear arranged in an engine-house *n*. Such an engine-house with suitable driving apparatus is arranged on each of the two ends of the weir, the driving apparatus of both houses being capable of being operated from a motor *q*, arranged in the center of the watercourse on a cross-piece *p*, which motor drives a cross-shaft *r*, running right across the watercourse to each engine-house. This rotation is, as already stated, converted into a slow one by means of suitable gearing to the chain-pulley *m*, and from this by the intermediary of the chain *k* to the roller *a*, so that the latter is forced to roll up the track *e*. The roller *a* may thus be rolled up the track to the highest position *a'*, corresponding to the highest water-level *b'*, in which position no resistance is opposed to the passage of the water. In order to again close the weir, the chain is operated in the reverse direction. When the roller has become immersed to a certain depth, the water penetrates into the interior of the roller through openings formed in both ends, and thus forms a ballast which prevents the roller from floating and through which the water can flow in and out whenever the dam is opened or closed. It then lies firmly in its lowest position on the solid weir-face, while by further straining the chain the roller is firmly pressed against quadrant-shaped washering-surfaces in the side niches. By means of suitable locking devices it may be retained in this position and the strain may then be slackened.

The water runs away from the interior of the roller after the weir is closed, so that there is no danger of its freezing. On the reopening of the sluice in similar manner the water will again temporarily fill the roller and again run out of same automatically when the roller is raised out of the water.

In the form of construction shown in Fig. III, where the level *s* of the water behind the weir is considerably lower than the water-level *b* above it, the rolling-track *e* for the roller may run in a horizontal direction, the advantage of which is that when the roller is moved its own weight has not to be overcome, and thus the resistance to the movement is reduced to a minimum.

I declare that what I claim is—

1. In combination a flood-gate, a weir, a roller *a*, a track extending away from the said weir and upon which the roller is adapted to move, and by which it is supported, and means for positively moving the roller along the track, substantially as described.

2. In combination in a flood-gate, a weir, a roller *a*, a track extending away from the said weir and upon which the roller is adapted to move, and by which it is supported, and means for positively moving the roller along the track, said means consisting of the chain *k* extending around a part of the roller having its ends anchored and its intermediate portion passing around rollers *l* and *m*, substantially as described.

3. In combination, the weir, a roller, the tracks *e* extending away from the weir, and upon which the roller is supported, a rack alongside the track, a gear on the roller meshing with the rack and means for moving the roller along the track, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

MAX CARSTANJEN.

Witnesses:

ANDREAS STICH,

OSCAR BOCK.