No. 896,867. PATENTED AUG. 25, 1908.

W. P. SPOONER.

WATER WHEEL.

APPLICATION FILED MAR. 22, 1907.

3 SHEETS—SHEET 1.

Fig. 4

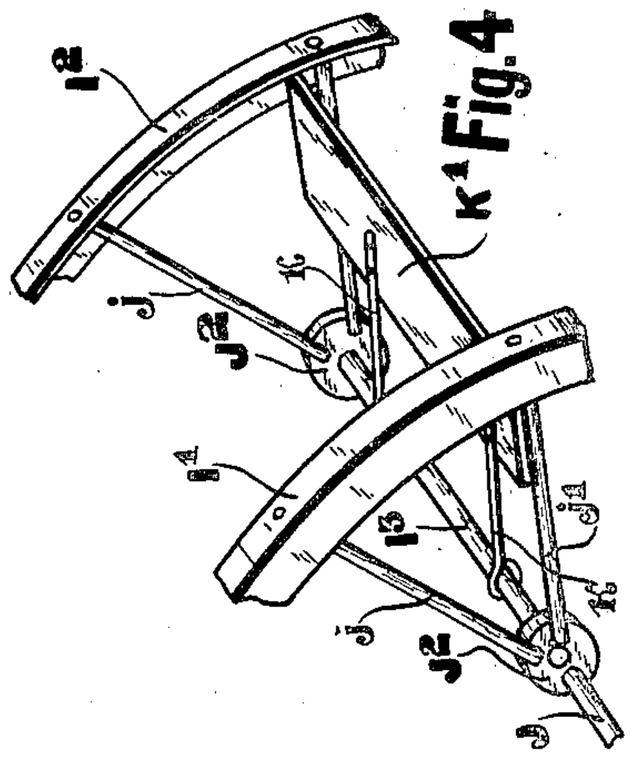
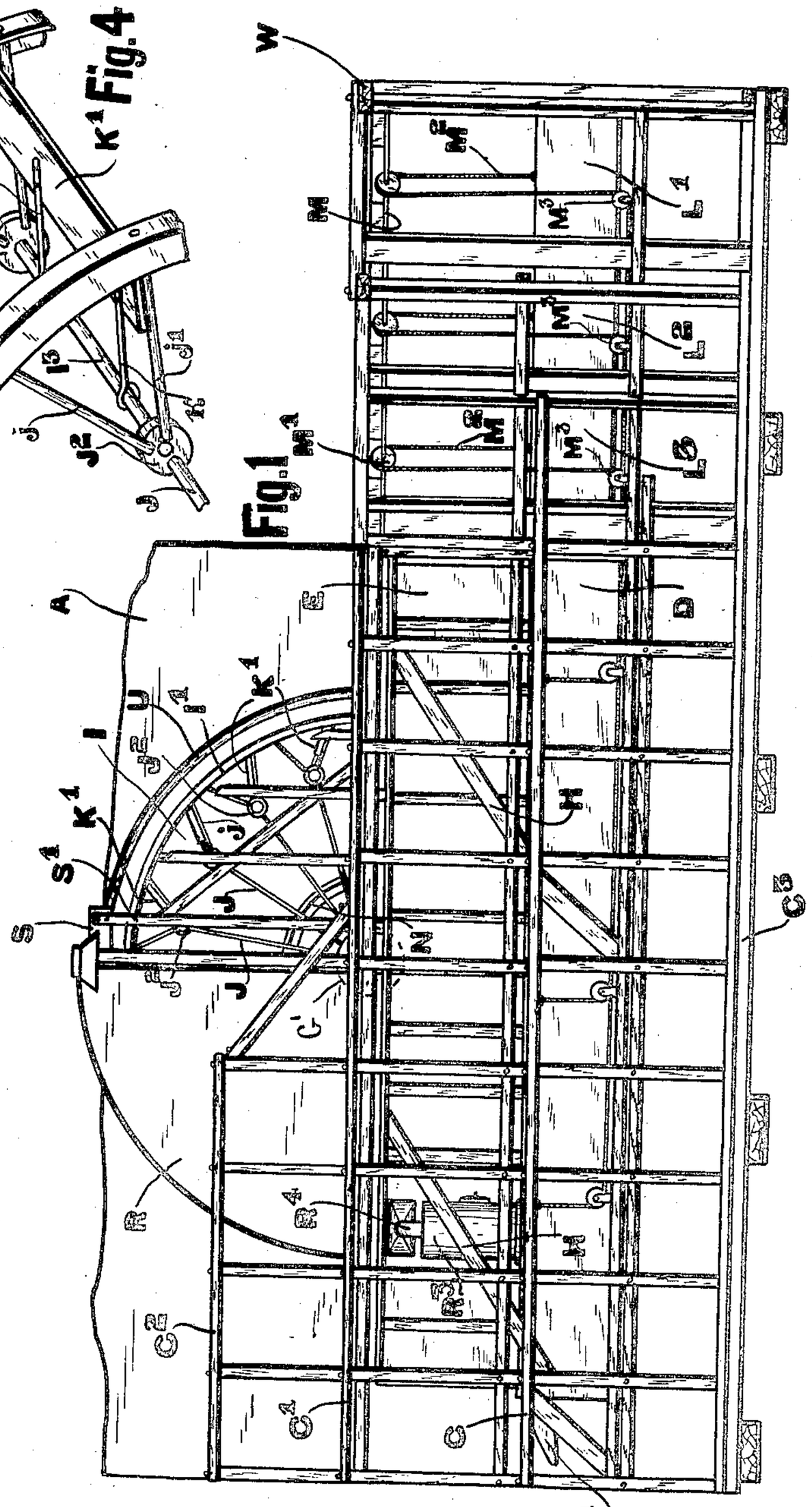


Fig. 1



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3 SHEETS—SHEET 2.

Fig. 2

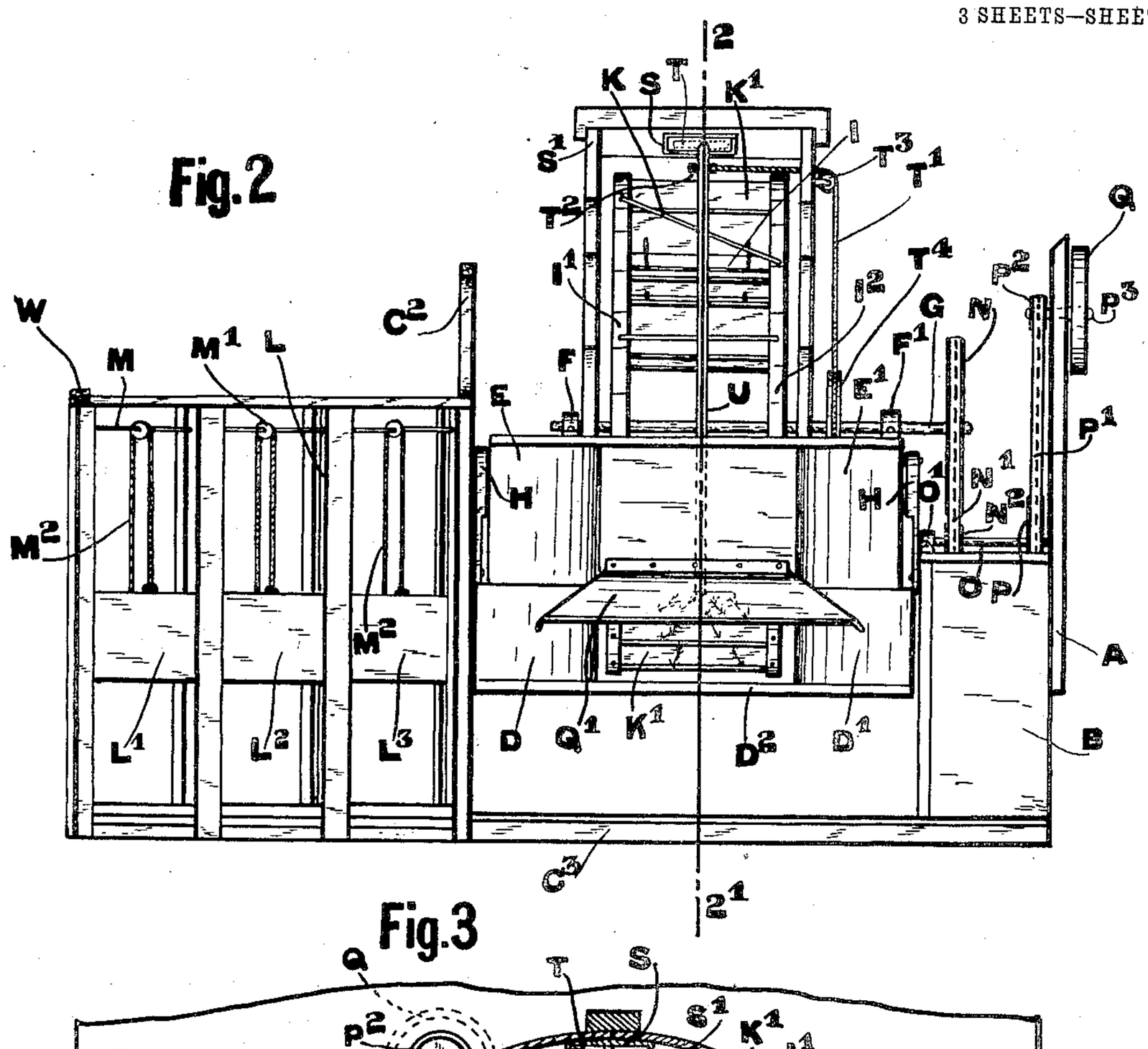
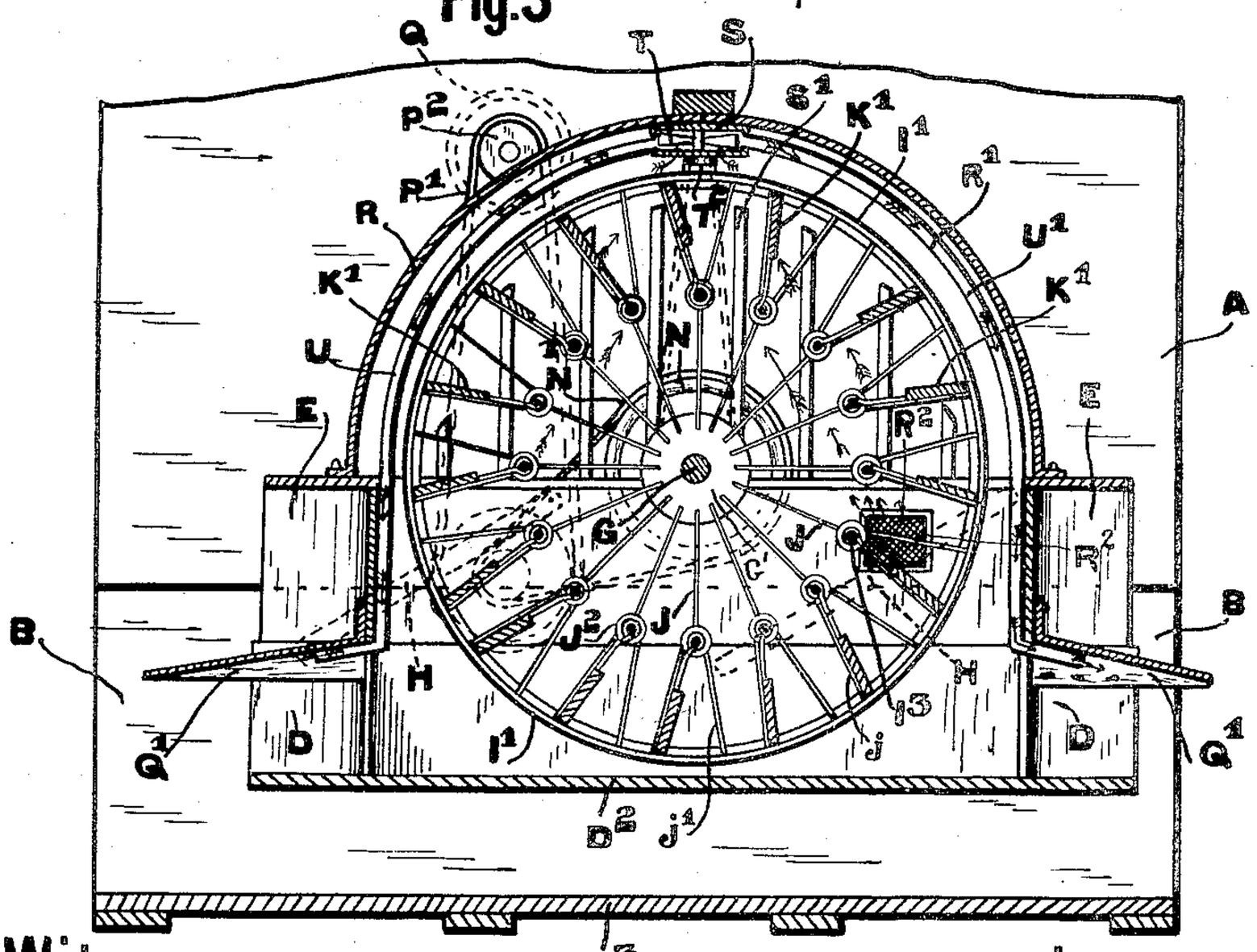


Fig. 3



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3 SHEETS—SHEET 3.

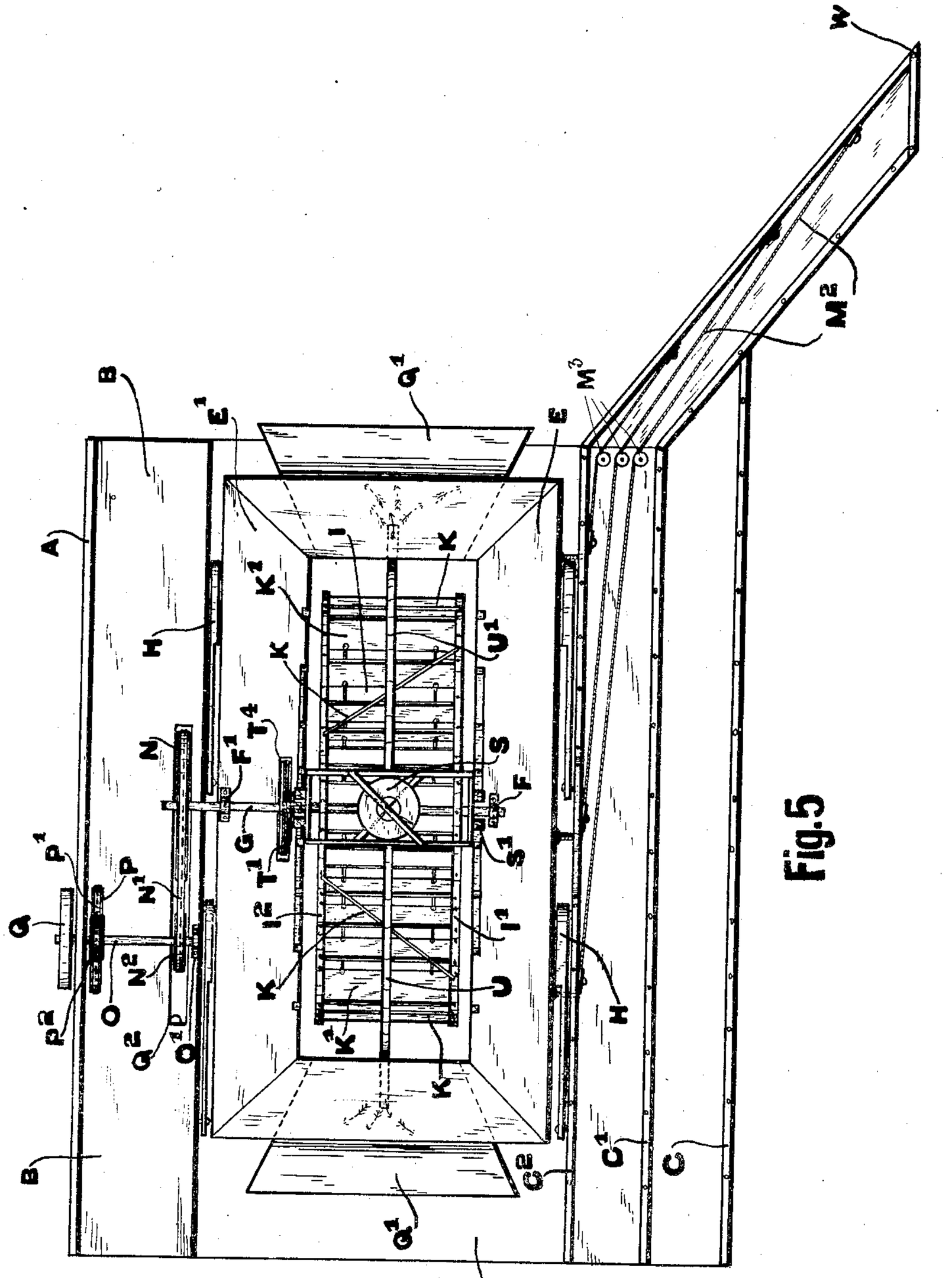

Fig.5

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UNITED STATES PATENT OFFICE

WILLIAM PERCY SPOONER, OF SHELLMOUTH, MANITOBA, CANADA.

WATER-WHEEL.

No. 896,867. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed March 22, 1907. Serial No. 363,907.

To all whom it may concern:

Be it known that I, WILLIAM PERCY SPOONER, of the village of Shellmouth, in the Province of Manitoba, Canada, clergyman, have invented certain new and useful Improvements in Water-Wheels, of which the following is the specification.

My invention relates to water wheels, or to that style of hydraulic motor, which is caused to revolve by the dynamic pressure due to the change in direction and velocity of a moving stream.

The objects of the invention are, first, to do away with the use of dams, secondly, to provide for the rise or fall of the moving stream, thirdly, to avoid the disadvantageous effect of frost, fourthly, to provide a wheel which always regulates itself to use the surface current, and lastly to improve the construction of the blades within the wheel.

The invention consists essentially of a set of floating pontoons, a water wheel mounted in a framework above the pontoons, a casing to the wheel, means for providing for a warm air circulation, side supports from which the pontoons are swung and means for adjusting the gates with the rise or fall of the wheel, the parts being arranged and constructed as hereinafter more particularly described.

Figure 1 is a side elevation of my invention, a portion of the casing being removed for the sake of clearness. Fig. 2 is an (upstream) end elevation, as in Fig. 1. Fig. 3 is a vertical sectional view in a plane, denoted by the line 2 2′, Fig. 2. Fig. 4 is an enlarged detailed perspective view of a portion of the wheel, and one of the blades. Fig. 5 is a plan view of my invention with the casing removed.

In the drawings like letters of reference indicate corresponding parts in each figure.

A represents the face of my mill, built on the side of a flowing stream; which is to be supplied with water power by my wheel.

B is a framework built out into the stream, and has its outer side vertical, to form a slide way for the pontoons supporting the wheels, as hereinafter described. Directly opposite the framework B, and further out into the stream, piles C C^1 C^2 are sunk into the bed of the stream, especial care being taken that the inner set be vertical, and their alinement parallel with the outer face of the framework B. The bed of the stream is denoted by C^3. It is to be understood that the piles and the framework B shall be firm enough to withstand any increased flow which might take place in case of a flood.

D D^1 are pontoons adapted to float in the stream, and joined by a bottom cross member D^2 running throughout the length.

E E^1 is a framework carried by the pontoons, and upon which is mounted bearings F F^1 supporting the shaft G of the water wheel.

H are swinging arms secured at their ends to the outer side faces of the framework E E^1, and to the faces of the framework B and the piles C^2 respectively. In the drawings I have shown four such arms, and they are all inclined at the same angle to the horizontal, and move together when the pontoons rise. In this way it will be seen that in event of the stream rising through flood or otherwise the pontoons are buoyed up with the stream, and the arms allow for such upward motion although still retaining the pontoons within limited positions.

I is the wheel which is formed from a set of angle bar rings I^1 I^2, secured by spokes J to the hub G′, and to each other by reinforcing rods K, and has a series of blades K^1 mounted between the rings. Referring to Fig. 4, J J represent spokes which pass to the hubs, and J^2 are annular rings, to which the outer ends of the spokes are fastened. *j* j^1 are rods passing from the rings to the angle bar rims I^1 I^2. I^3 is a shaft mounted in the rings J^2 from which shaft extend arms *k* secured at their outer ends to the blade K^1. The width of the blade is such that it rests upon the opposing set of rods j^1 j^1 in the position as shown. The object of so forming the wheel is that the blades may be free to move within the limits given by the rods *j j* and j^1 j^1 respectively, in order to avoid the splashing of the blades when entering the stream and the straight lift of the water when leaving. It will be noticed in referring to Fig. 3, that with the direction of the stream given, as shown by the arrow, the position of the blades will be practically as shown. When the blade enters the stream there is no splash, as is usual with a blade having no play, and when the blade leaves the stream it is free to fall from the forward set of rods j^1 to the rear set *j*. The ends of the pontoon are cut at an angle, slanting inwardly towards the wheel from both sides, and the piles C C^1 C^2 have guideways L at the upstream end, for flood gates L^1 L^2 L^3. The flood gates are placed at an angle to direct

the water to the bottom of the wheel between the pontoons.

M is a shaft supported from the piles, and has a wheel M^1 mounted thereon, directly above each flood gate. A rope or cable M^2 passes from each of the flood gates, over the wheel M^1, and through a set of loose pulleys M^3 to one of the pontoons. According to the rise and fall of the pontoons the gates rise and fall, in this way always directing the surface current to the wheel, and allowing the under current to pass beneath.

N is a pulley on the main shaft G and is connected by a belt N^1 to a second pulley N^2 on the shaft O, mounted in bearings O^1.

P is a pulley toward the inner end of the shaft O, which is connected by a belt P^1 to a pulley P^2 mounted on the shaft P^3, supported in bearings secured on the face of the mill.

Q is a drive wheel from which the machinery within the mill is operated.

It will be noted that the pulley N is supported from a movable part, *i. e.*, the framework of the pontoon, and that the pulley N^2 is stationary, and in order to allow for the vertical displacement of the pulley a slot Q^2 is cut in the framework B. According to the adjustment of the pulleys, the rise and fall of the stream makes no difference to the drive, as the pulley N is the only one which deviates and it is connected with the pulley N^2 on a center which swings with the arms H.

Q^1 are extending members secured to the front and rear cross pieces of the framework E E^1, the said members passing forwardly and downwardly from the framework, with their outer tip slightly above the surface of the water.

R R^1 are members forming a casing, completely inclosing the upper half of the wheel, and may be made of any suitable material.

The above completely describes my water wheel, and its attachments to allow for any rise or fall of the stream, but in addition to this I apply a heating system, as I have found that in cold seasons considerable difficulty has been experienced in keeping the raceway clear from ice, or in other words, keeping ice from freezing to the wheel. To accomplish this end I provide heaters or furnaces R^3 fitted in the framework E E^1, and with their pipes R^4 opening at R^2 into the inside of the casing.

Within the casing and towards the top of the wheel is a circular box S supported from side scaffolds S^1 extending upwardly from the framework. Within the box is rotatably mounted a fan T driven by a rope T^1, passing from the pulley T^2 over a set of idlers T^3 to the drive pulley T^4 on the main shaft G. The bottom of the box is perforated or open at the center, and the edge or periphery has openings leading to pipes U U^1 passing downwardly within the casing to a position beneath the extending members Q^1. The rotation of the wheel rotates the fan, which causes a warm air circulation from the furnaces upwardly and out through the pipes, the warm air preventing ice from forming at or clinging to the outer tips of the extending members Q^1, and in this way leaving the wheel free to run regardless of the cold. The number of furnaces and fans is simply sufficient to give the necessary circulation.

To prevent ice and floating matter from reaching the wheel a boom could be secured between the upstream end W of the piles and the banks of the river. The downstream end of the pontoon is cut away to allow for ready clearance of the water.

It will be understood that although I show one method of forming the wheel proper, I wish it to be understood that it might be constructed in any other desirable form, it not being necessary that the rim be connected to the hub by substantially **Y**-shaped spokes. The same end, in so far as the movement of the blades is concerned, can be accomplished by having any form of spokes or side faces, which will allow for the mounting of the shafts I^3, and the play or movement of the blades can be limited by lugs on the inner side of the rim.

What I claim as my invention is:—

1. In a device of the class described, the combination with the inner framework and the outer piles forming side supports, of a set of opposing pontoons between the supports, united by an upper framework, the said pontoons having their ends flared outwardly, a water wheel mounted in bearings supported by the framework, swinging arms connecting the framework to the side supports, a casing to the wheel, a drive pulley on the main shaft connected to a stationary pulley on the inner support, and end members extending outwardly and downwardly from the ends of the framework, as and for the purpose specified.

2. In a device of the class described, the combination with the side supports, the pontoons, the framework above the pontoons supporting the wheel, and the arms connecting the framework to the side supports, of flood gates slidable within guides on the upstream end of the outer side support and means connecting the flood gates to the framework above the pontoons, so that the movement of the pontoons regulates the position of the gates, as and for the purpose specified.

3. In a device of the class described, the combination with the side supports, the pontoons, the framework above the pontoons, a wheel supported by the framework and means for preventing the freezing of the water at the entrance to the wheel and at the exit from the wheel.

4. In a device of the class described, the combination with the framework supporting the wheel, the wheel, the casing, and the for-

ward and rear members, of means whereby a circulation may be obtained upwardly within the casing, and downwardly beneath the forward and rear members, as and for the purpose specified.

5. In a device of the class described, the combination with the framework supporting the wheel, the wheel, the casing, and the forward and rear members, of heaters within the framework, and opening within the casing, a fan within a box at the top of the casing, there being openings from within the box to the casing, pipes extending forwardly and rearwardly from the box to a position beneath the extending end members, an endless belt connecting the main shaft of the water wheel with the shaft of the fan, whereby upon the rotation of the main shaft a circulation is maintained upwardly within the casing and downwardly through the pipes, as and for the purpose specified.

6. In a water wheel, the combination with the hub and the rim, of substantially Y-shaped spokes, having the main member passing to the hub and the extending arms to the rim, shafts passing across the wheel and mounted in bearings formed at the intersection of the arms in the Y form, arms extending from the shafts, blades secured to the arms and free to swing within the limits formed by the opposing sets of arms of the spokes, as and for the purpose specified.

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Witnesses:
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