R. H. MARTIN.

DRAIN WHEEL.

APPLICATION FILED JAN. 20, 1909.

924,684.

Patented June 15, 1909.

3 SHEETS—SHEET 1.

Fig. 2.

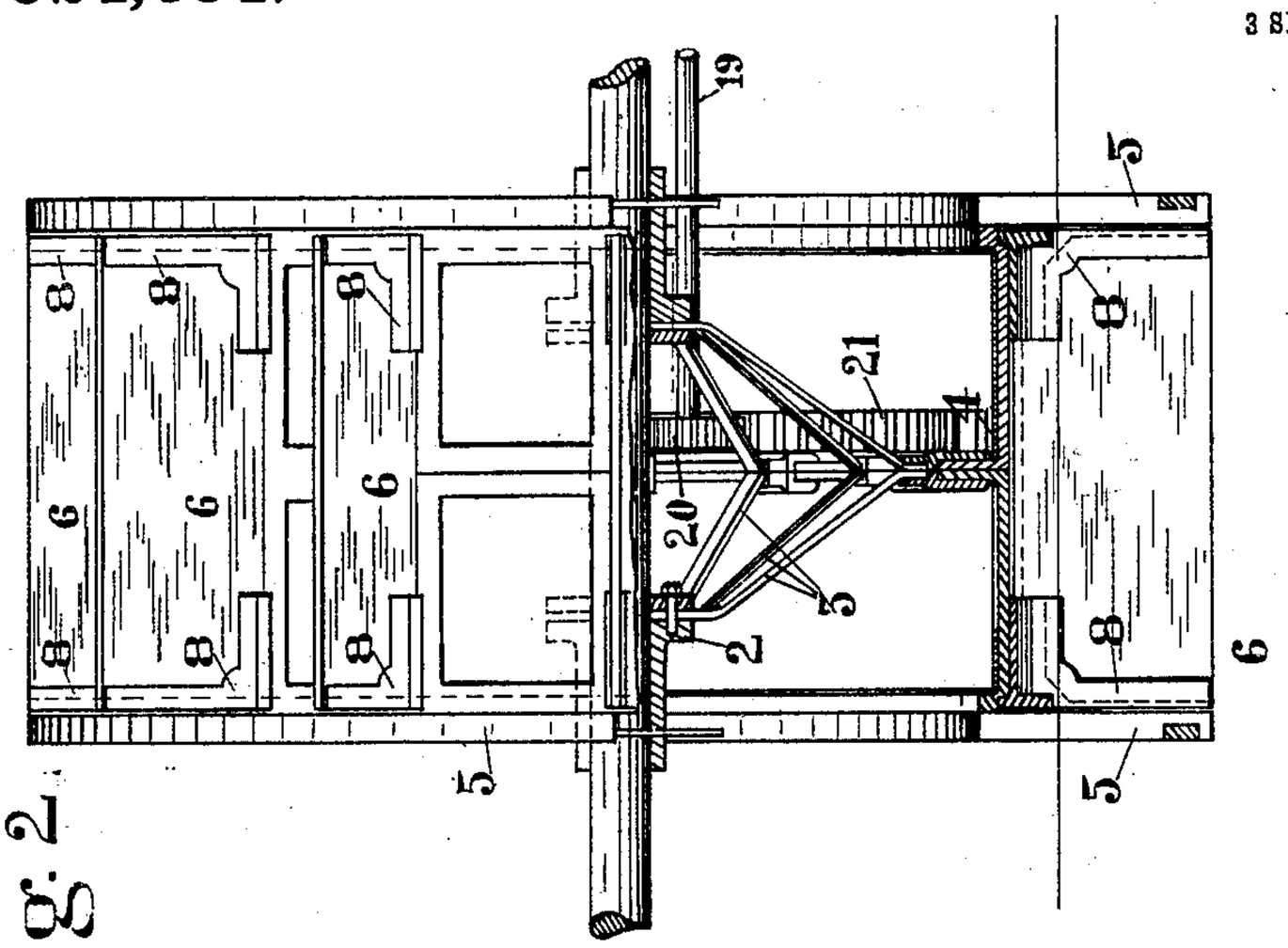
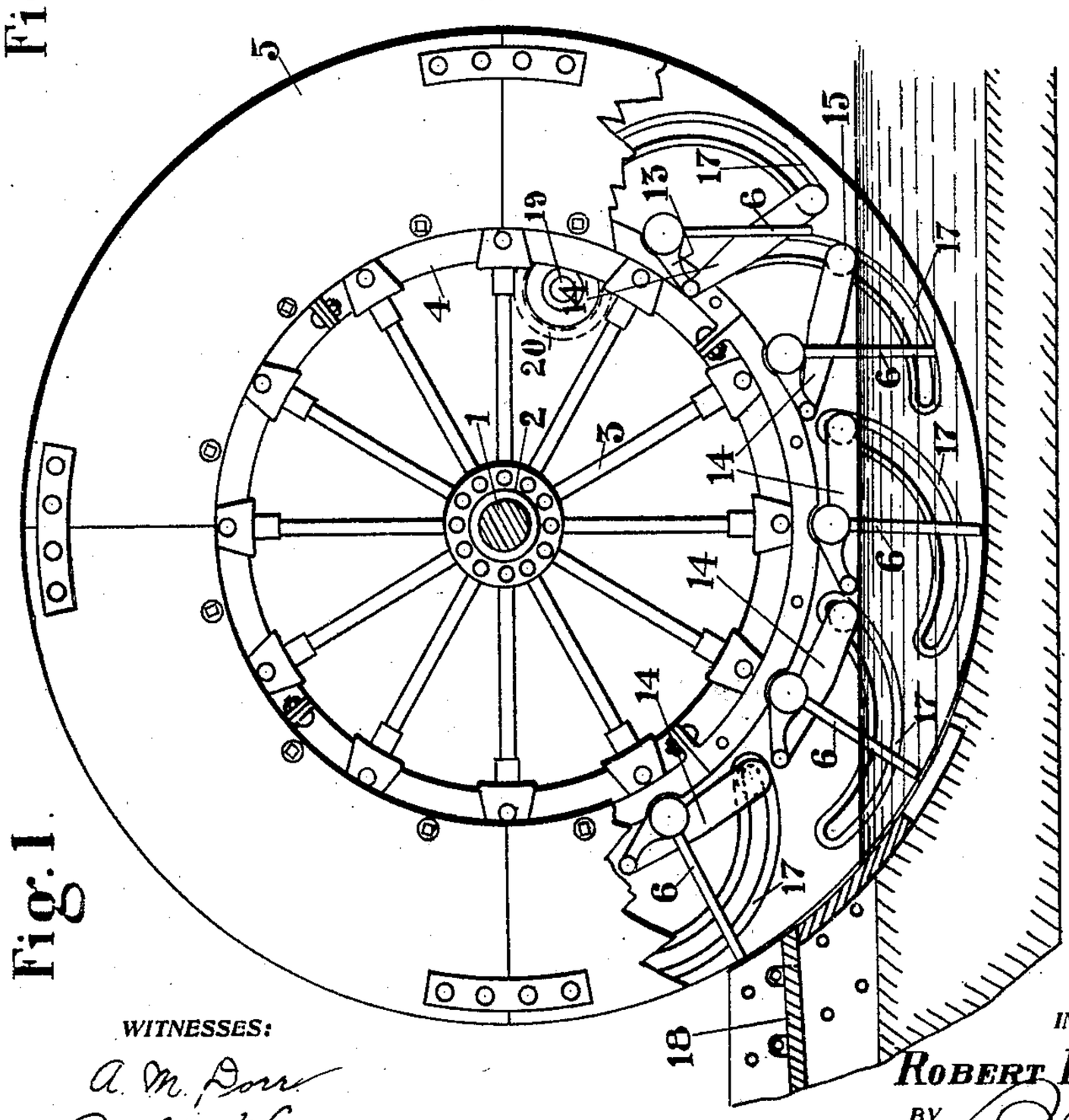


Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 3

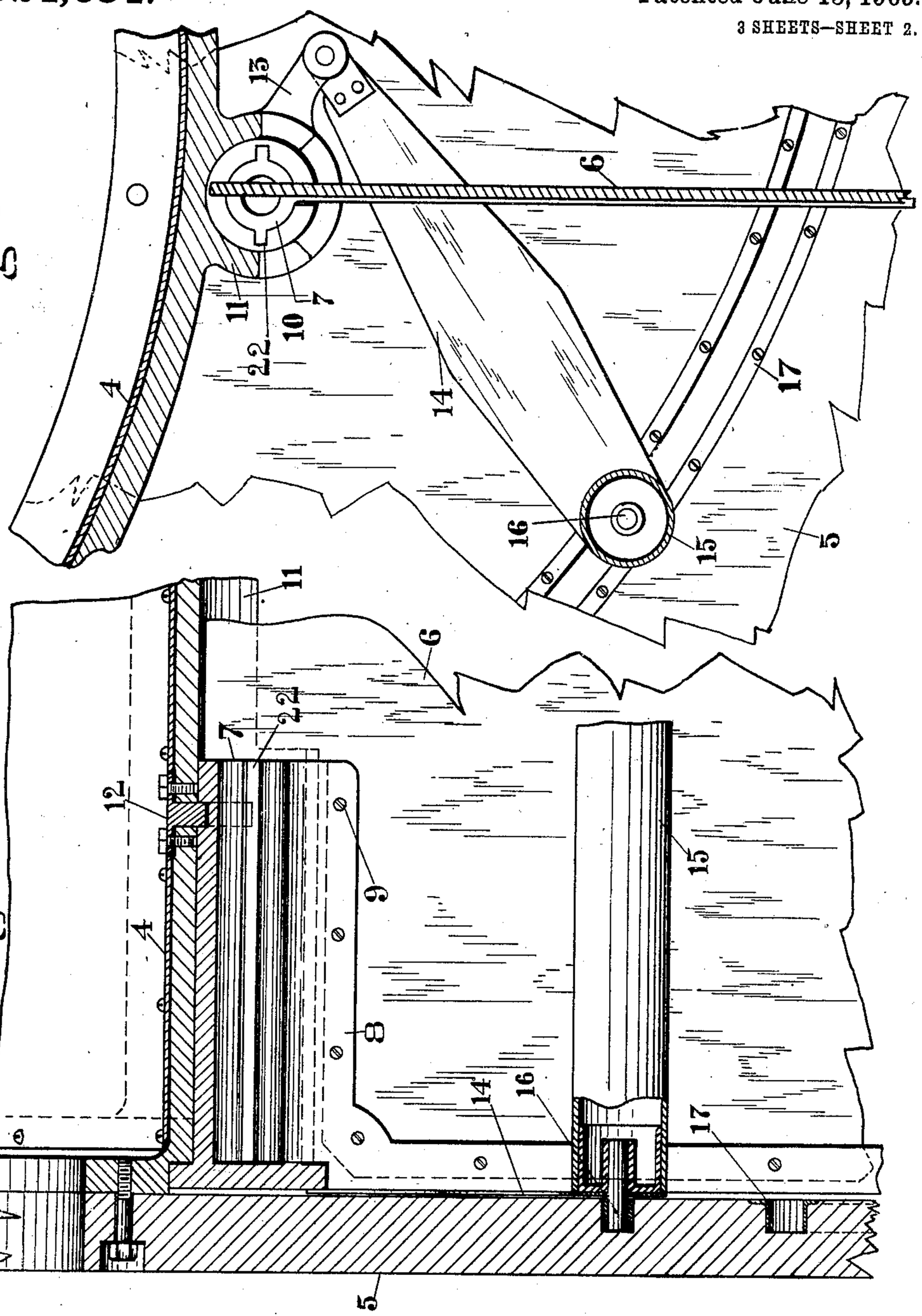

Fig. 4

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3 SHEETS—SHEET 3.

Fig. 5

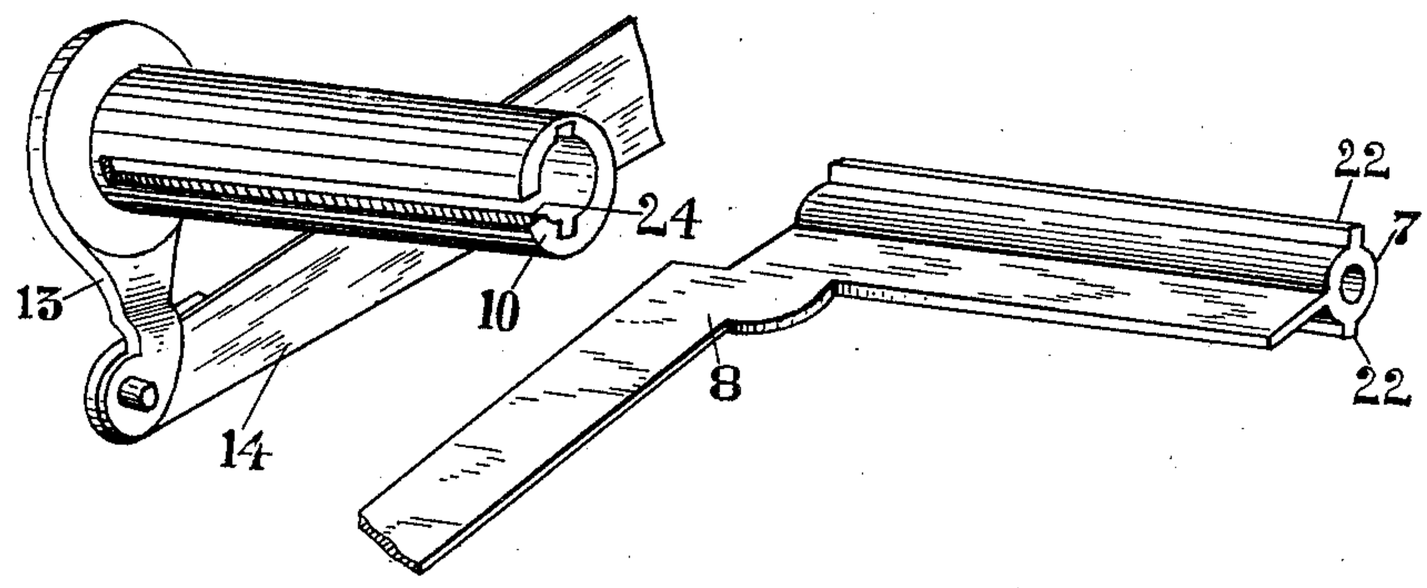
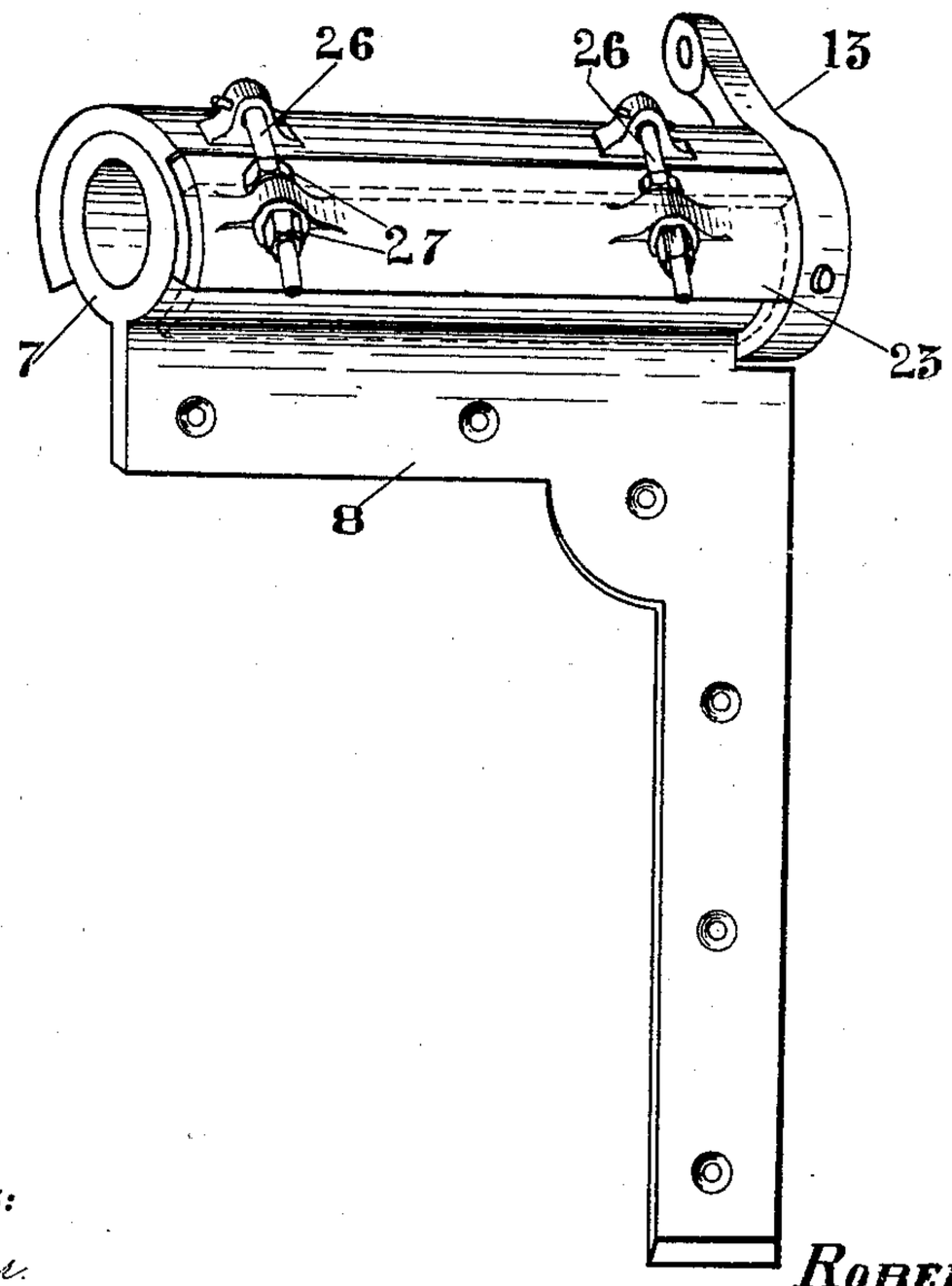


Fig. 6



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UNITED STATES PATENT OFFICE.

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DRAIN-WHEEL.

No. 924,684. Specification of Letters Patent. Patented June 15, 1909.

Application filed January 20, 1909. Serial No. 473,318.

To all whom it may concern:

Be it known that I, ROBERT H. MARTIN, a citizen of the United States of America, residing at Mount Clemens, in the county of Macomb and State of Michigan, have invented certain new and useful Improvements in Drain-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

In reclaiming waste tracts of lands where the natural fall will not permit of the usual drainage, and where it is necessary to permanently install means for lifting or forcing the water away, the question of economy of operation and up-keep of the drainage station becomes a very large factor in the value of the result achieved. When the amount of water to be removed is very large, and the lift is not great, slowly moving breast wheels of large diameter whose buckets carry the water up and discharge it over the top of a dike or weir, are used to great advantage.

This invention relates to a drain wheel of this class, adapted to present great efficiency of action with minimum expense of operation and maintenance.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

Referring to the drawings, Figure 1 is a view in side elevation, partially broken away, of a drain wheel embodying features of the invention. Fig. 2 is a view in detail, in section, showing the general structure of the wheel. Fig. 3 is an enlarged view in section, in detail, of a bucket bearing bracket, bucket sleeve and bushing of a controlling float. Fig. 4 is an enlarged view in transverse section, of the said bracket and coöperating parts. Fig. 5 is a view in detail of a bucket bearing, bucket sleeve, float bushing and controlling float connection. Fig. 6 is a view in detail of a modified form of bucket bearing with an adjustable stop therefor, together with a portion of a controlling float connection.

In the drawings, 1 indicates a main shaft adapted to be journaled in suitable bearings, not shown. A hub 2 and spokes 3, constituting a wheel navel that may be of any preferred construction, carries a rim 4 whose width is substantially that desired for the wheel face, and as herein shown, is preferably made of sheet metal. Annular side flanges 5 are provided between which buckets are independently journaled at their inner ends close to the rim.

The body of each bucket or blade is preferably a sheet metal plate 6 with sleeves 7 each removably secured by angle flanges 8 and bolts 9 or the like to an inner corner of the plate, the angle flanges forming stiffening ribs for the margins of the blade. The sleeves are adapted to telescopically engage and nonrotatably interlock with bushings 10 which in turn are oscillatory each in one of a pair of bearing brackets 11 oppositely disposed on the rim 4 and preferably directly connected to the wheel spokes 3 as indicated. Endwise movement of the bushings is prevented by stops 12 detachably secured on the rim 4, which engage peripheral grooves in the bushings.

A rock arm 13 extends from the outer end of each bushing, and links 14 connect the extremities thereof with a float 15 which is preferably cylindrical and has studs 16 on its ends each traveling in a guide 17 in the side flanges 5. The guide may be a groove as herein illustrated, or properly disposed angle or track irons, if preferred.

The guide float, links and rock arms are so disposed that, as indicated in Fig. 1, each of the blades or buckets hangs perpendicularly as it descends into the water and is held in that position by the float which is forced up along its guides by the water and thereby turns the bushing and sleeve and locks the blade against displacement. As the blade is leaving the water the parts are so disposed as to hold the blade at such relation to the wheel rim as to trap the water above it between the flanges and lift it up to the top of the weir, indicated at 18. At that point the blade is adjusted to assume the angle of greatest efficiency for discharge, so as to quickly clear itself and not carry any water to any height above the weir.

The wheel is preferably driven from any convenient source of power communicated to a countershaft indicated at 19, with pinion 20 thereon in mesh with a circular rack 21 on the rim, or flanges, if preferred, of the wheel.

As it frequently happens that the height of the weir above the water in which the wheel sets, may be varied from time to time, to meet changes in the conditions on the discharge side, the construction of the bucket bearing shown in Fig. 6 is preferable. The splines 22 which may conveniently be used to

lock the sleeve and bushing together are omitted, and the slot 24 is widened so as to permit limited oscillation of the blade in the sleeve irrespective of the float action. One side of the slot may be formed by a segmental plate 25 that is adjustably secured by properly disposed thrust bolts 26 and clamping screws 27 to act as a stop against which the blade drops. The angle of the buckets may then be changed in relation to the wheel rim so that they each assume the proper and most efficient inclination of discharge as the end of each registers with the top of the weir, while at the same time the floats hold the blades feathered as they enter the water. In other words, the float of each blade holds it in vertical position as it enters the water and maintains it there so that there is no power wasted in forcing the paddle down, as in the ordinary form of water wheel, while the adjustable stop in the bearing locks the bucket at the most efficient angle of discharge as it comes into register with the weir.

By the peculiar disposition of the float links and bucket arms, the buoyant effort of the float readily overcomes the resistance offered so that the float may be comparatively small. The rock arm to which the float link is pivoted may be connected directly to the bucket, but the form of construction herein indicated is preferable as it facilitates the erection of the wheel which may be easily built in sections and set up at the place of use.

Obviously, changes in the details of construction may be made without departing from the spirit of the invention and I do not limit myself to any particular form or arrangement of parts.

What I claim as my invention is:—

1. A breast-lift drain wheel comprising a navel, a rim thereon, buckets pivotally secured to the rim, and adapted each to independently assume a vertical position as it passes below the horizontal plane of the center of rotation of the wheel, means for maintaining each blade in such perpendicular position during a predetermined portion of each revolution of the wheel, and means for locking each blade in a predetermined oblique position as it approaches the discharge point of the wheel.

2. A breast-lift drain wheel comprising a navel, a rim thereon, buckets pivotally secured to the rim, and adapted each to independently assume a vertical position as it passes below the horizontal plane of the center of rotation of the wheel, means for maintaining each blade in such perpendicular position during a predetermined portion of each revolution of the wheel, and means for locking each blade in a predetermined oblique position as it approaches the discharge point of the wheel, said locking means being adjustable for varying the bucket angle.

3. A breast-lift drain wheel comprising a navel, a rim thereon, buckets each pivotally secured to the rim by means adapted to lock it in predetermined position as the bucket passes the discharge point of the wheel, and means adapted to maintain each bucket in perpendicular position when it passes below the horizontal plane of the wheel center.

4. A breast-lift drain wheel comprising a navel, a rim thereon, buckets pivotally secured on the rim, and adapted each to swing into vertical position as it passes below the horizontal plane of the wheel center, a float for each bucket adapted to hold the bucket in said vertical position during a predetermined portion of each revolution, and means for holding each bucket in oblique position as it passes the point of discharge of the wheel.

5. A breast-lift drain wheel comprising a navel, a rim thereon, buckets pivotally secured on the rim, and adapted each to swing into vertical position as it passes below the horizontal plane of the wheel center, floats each operatively connected to a bucket and float guides on the wheel rim coacting with the floats to maintain the buckets severally in a vertical position into which they are adapted to swing as they pass below the horizontal plane of the center of revolution of the wheel during a predetermined portion of each revolution of the wheel.

6. A breast-lift drain wheel comprising a navel, a rim thereon, parallel flanges on the rim, buckets each pivotally secured between the flanges, a float for each blade, and guides on the flanges coacting with the floats to maintain the blades in perpendicular position during a predetermined portion of the wheel revolution.

7. A breast-lift drain wheel comprising a navel, a rim thereon, parallel flanges on the rim, buckets each pivotally secured between the flanges, adjustable means for severally locking each bucket in oblique position as it passes the discharge point of the wheel, a float for each blade and guides on the flanges coacting with the floats to maintain the blades in perpendicular position during a predetermined portion of the wheel revolution.

8. A breast-lift drain wheel comprising a navel, a rim thereon, parallel flanges on the rim, buckets each pivotally secured between the flanges, a float for each blade, a rock arm on each blade, a link connecting each float with the adjacent rock arm, and guides on the flanges engaging the floats, the floats, guides and connections coacting to maintain the blades each in oblique position as it passes the discharge point of the wheel.

9. A breast-lift drain wheel comprising a navel, a rim thereon, bearing brackets on the rim, bushings rotatable in the bearings, sleeves having limited angular movement in

the bushings, bucket blades secured to the sleeves, and means for maintaining each blade in perpendicular position during a predetermined portion of the wheel revolution.

10. A breast lift drain wheel comprising a navel, a rim thereon, bearing brackets on the rim, bushings rotatable in the bearings, sleeves in the bushings, adjustable stops limiting the movement of each sleeve in its bushing, bucket blades secured to the sleeves, and means for maintaining each blade in perpendicular position during a predetermined portion of the wheel revolution.

11. A breast-lift drain wheel comprising a navel, a rim thereon, bearing brackets on the rim, bushings rotatable in the bearings, sleeves in the bushings, adjustable stops limiting the movement of each sleeve in the bushing, bucket blades secured to the sleeves, and means for maintaining each blade in perpendicular position during a predetermined portion of the wheel revolution consisting of floats each connected to a bucket, and guides for each float coacting therewith to hold each bucket in perpendicular position during a predetermined portion of the wheel revolution after it passes below the horizontal plane of the wheel center.

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

ROBERT H. MARTIN.

Witnesses:

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C. R. STICKNEY.