

(No Model.)

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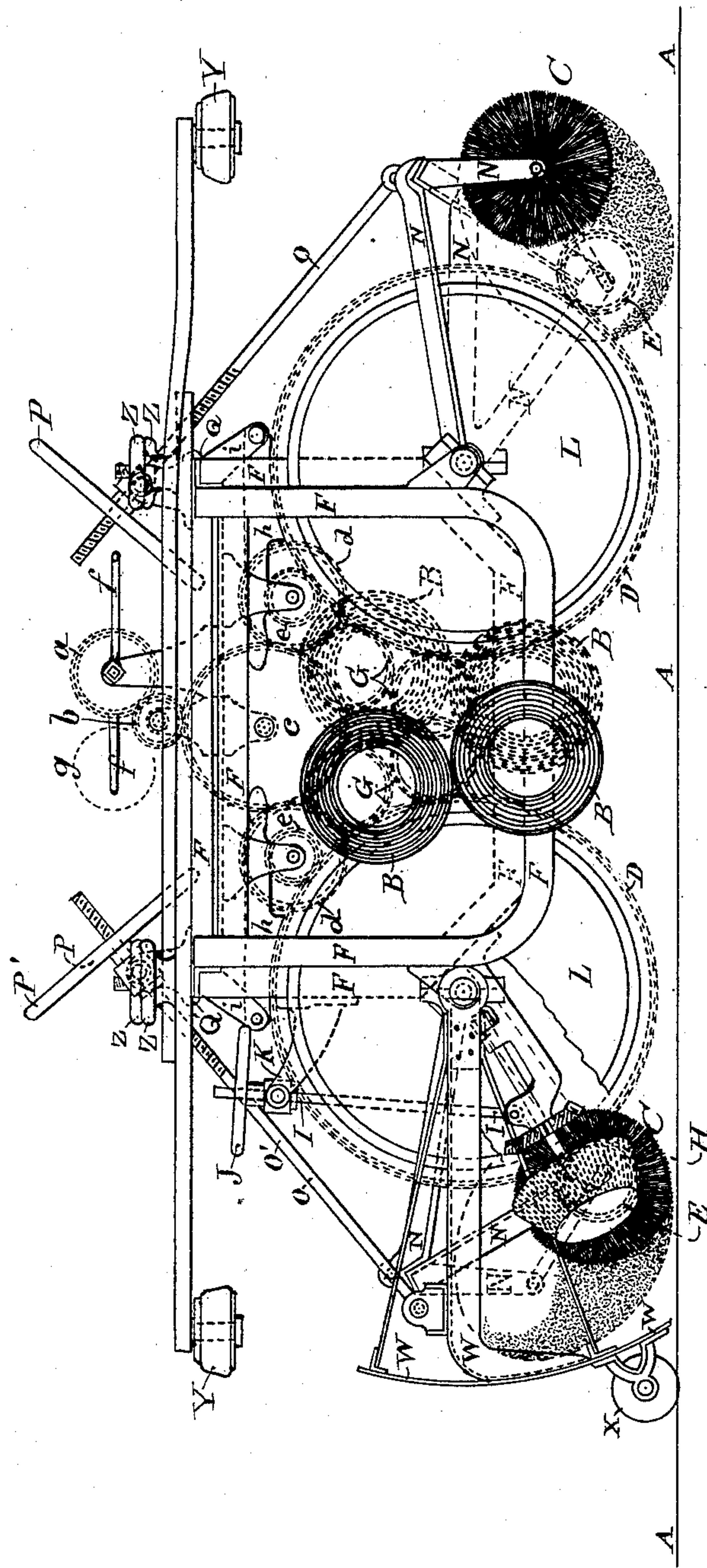
D. FITZ GERALD.

MACHINE FOR CLEANING CONDUITS, &c.

No. 362,153.

Patented May 3, 1887.

FIG. 1.



Witnesses.

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(No Model.)

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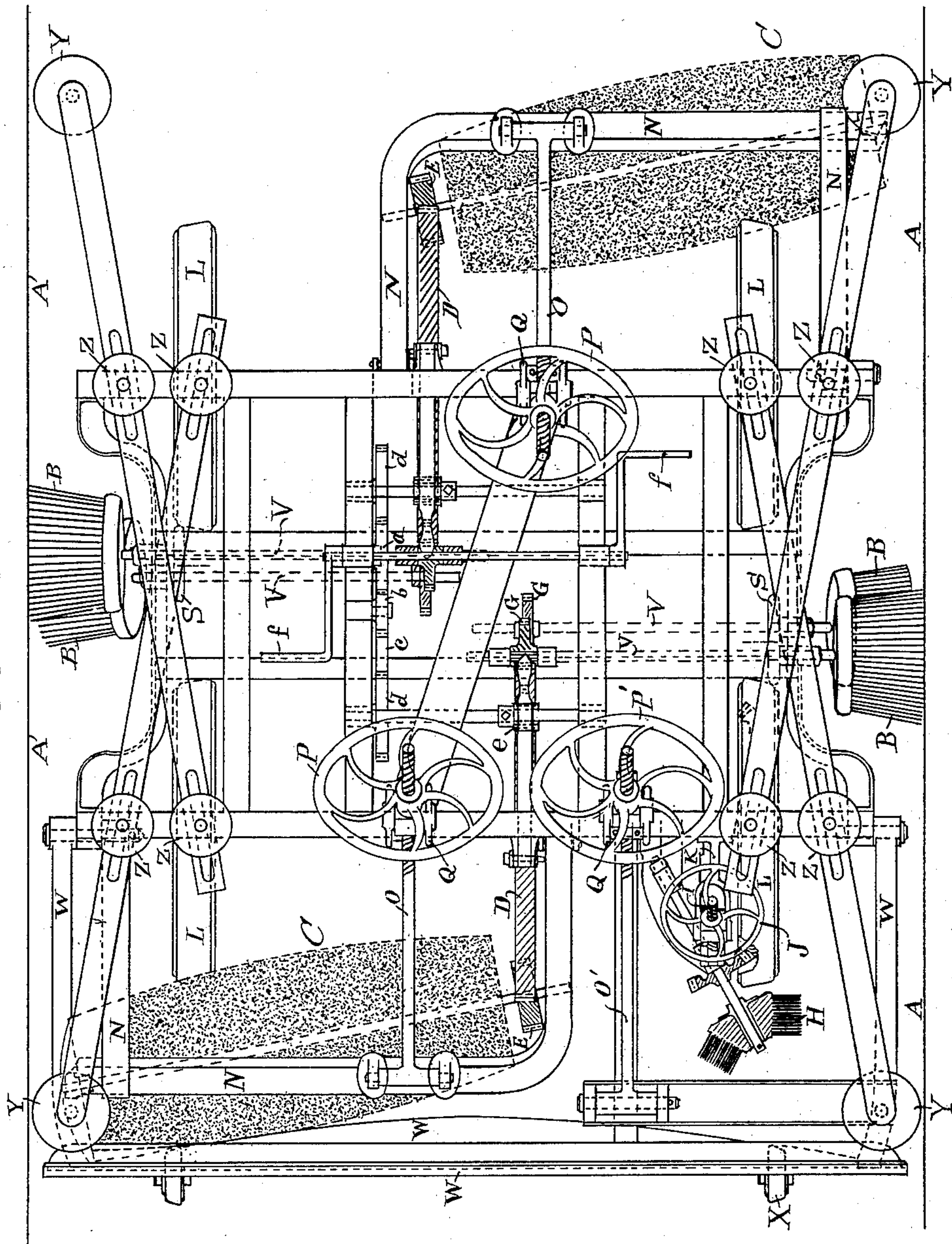
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FIG. 2.



Witnesses.

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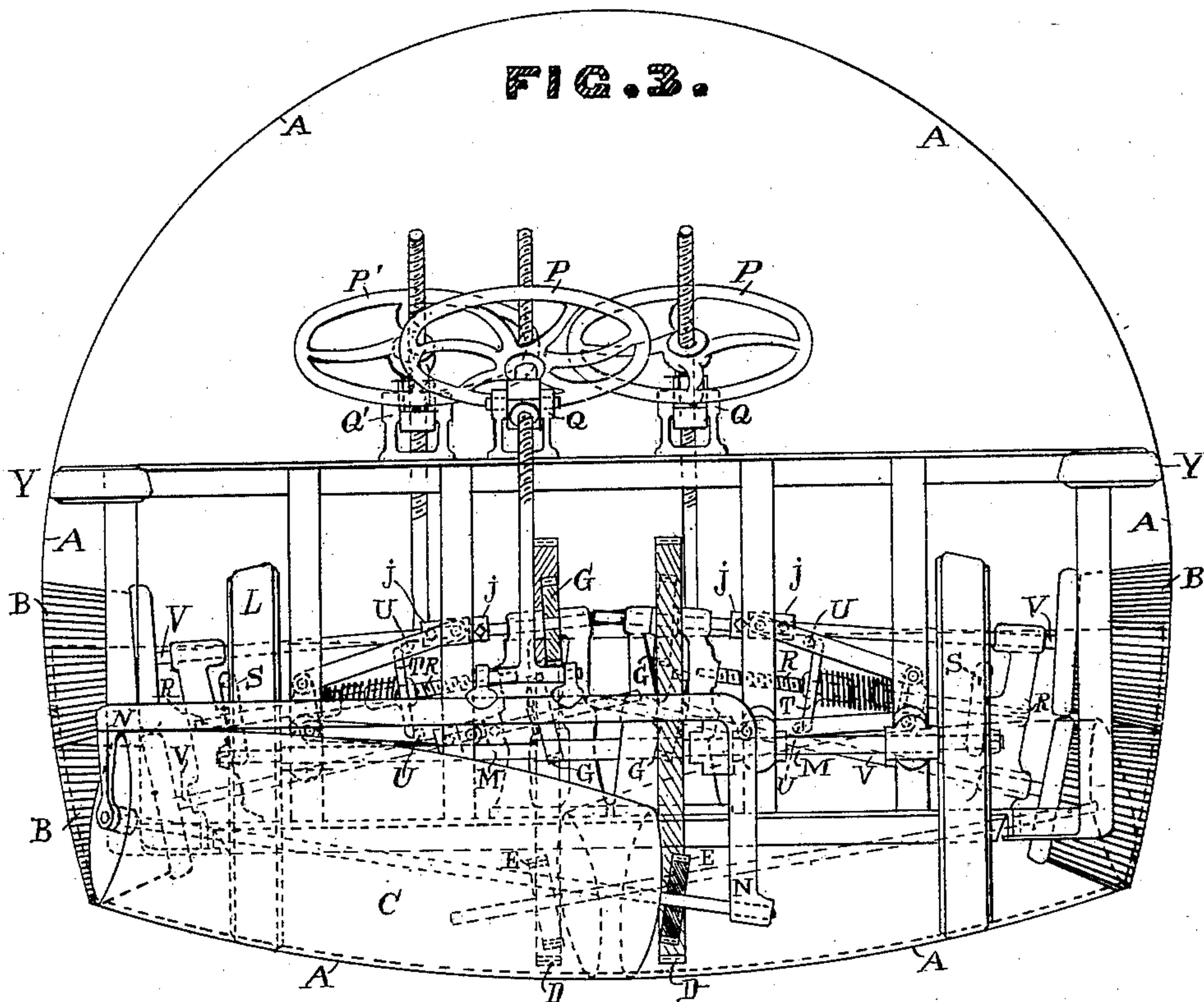
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UNITED STATES PATENT OFFICE.

DESMOND FITZ GERALD, OF BROOKLINE, MASSACHUSETTS.

MACHINE FOR CLEANING CONDUITS, &c.

SPECIFICATION forming part of Letters Patent No. 362,153, dated May 3, 1887.

Application filed September 4, 1886. Serial No. 212,766. (No model.)

To all whom it may concern:

Be it known that I, DESMOND FITZ GERALD, of Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and useful Machine for Cleaning Conduits, Aqueducts, Pipes, and Sewers, of which the following is a full and exact description, reference being had to the accompanying drawings, which form a part of this specification, and to the letters of reference marked thereon.

Figure 1 is a side elevation showing the main features of the machine. Fig. 2 is a plan of like character, and Fig. 3 is a rear elevation of the same.

Very few if any attempts have heretofore been made to apply machinery to the important purpose of cleansing the larger conduits for water-works or the larger class of sewers, pipes, &c. The work has only been done by hand, the men working with brooms, scrapers, &c., within the conduit. Much time is occupied in this way, and not always the most perfect work accomplished. This is a serious disadvantage, as the water-supply is thus interrupted.

The object of my invention is to produce a machine with which better work may be accomplished than is done by hand, and greater expedition secured.

The nature of my invention relates to the employment of rotating and other brushes to release the slime, refuse, growths, &c., and sediment from the surfaces within the conduit, and to the flushing, flooding, and washing by partially or wholly obstructing the flow of water, and thereby procuring a velocity in flow for washing and flushing, and power to be used in the process and in working the machine, and to the several devices and the construction and combination of parts, substantially as hereinafter more fully set forth.

Referring to the drawings, A indicates the surfaces of the conduit. The machine shown is specially designed to cleanse the bottom and sides of the conduit as high up as the usual flow of high water, viz., to the top of the side brushes. These brushes, four (more or less) in number, are in disk form, the rattan, bristles, or other brush material projecting from a flat side of the disk, in the direction of the axis of the shaft on which the brush revolves,

and are marked B. The two or more main brushes to operate on the bottom are marked C. One of these brushes is preferably hung in the front or fore part of the machine, and the other in the rear. The two cover the width of the bottom of the conduit, lapping somewhat in the middle to make sure that no part is left untouched. They are of barrel form, round, and rounded convexly lengthwise, to conform to the form of the surface of the conduit (whatever that may be) on the diagonal or angular line at which they are set. They are preferably made to rotate from the bottom contact forward with or in the direction of the water flow.

It will be observed that the forward brush C, being in advance of the truck or traction wheel, will clean the track for the wheel or truck on the side where it is located. It is desirable that the wheels on the other side of the machine should also have a clean track. This is necessary because the truck-wheels, by their adhesive contact with the track, are to rotate with sufficient force to rotate their axle, which is also the driving-shaft on which is keyed the driving gear D, which is made to drive the bottom brushes, C, through gear E, and the side brushes, B, through gear G. Therefore a track-cleaning brush, H, is located in advance of the truck-wheel, which is located on the other side of the machine. This brush is mounted in a frame which is hinged or journaled concentric to the forward axle, and the brush is in form the frustum of a cone, and on its shaft is a bevel gear wheel or pinion, which meshes into and takes its rotary motion from a bevel-wheel in the side of the truck-wheel, in advance of which it is located. A screw, I, is pivoted to the frame of brush H, and is operated to elevate and adjust the frame and brush by a wheel-nut, J, journaled in a swivel-bearing in the stand K, bolted to the main frame of the machine.

The traction or truck wheels are marked L, and are provided with rubber or other yielding tires, to render them adhesive to the track and to guard the track-surface from injury, as they will tread directly upon the conduit-surface. They are keyed to their axles, and the axles have suitable housings or bearing-boxes on the main frame. These bearings are pref-

erably anti-friction roller-bearings, and should be made of non-corrosive composition.

All working-joints and bearings should be protected from rust and corrosion by "Babbitt" metal, composition, &c.

The axles, which are marked M, are also the shafts on which are keyed the large driving-gear D, one on each axle.

The main bottom brushes, C, are journaled in suitable yokes or secondary frames. (Marked N.) These frames are journaled or pivoted concentrically to the axles, and are elevated, depressed, and held in the positions desired for working, rest, &c., by means of screws O.

These screws are pivoted to the brush-frame, and are operated by means of the hand-wheel nuts P, which have their swivel-bearings in stands Q, which are bolted to the main frame.

The side brushes, B, are on shafts mounted in suitable bearings, and are driven by gears G, which mesh into and receive their impulse from the main gear-wheels D. These shafts are splined and arranged to slide longitudinally and transversely to the machine for adjustment and control by means of screws R, operated by hand-wheels S. These screws have a traversing nut, T, with jointed links, also jointed to loose collars confined between collars *j*. The collars *j* are held by set-screws to shafts V. A spring is interposed between nut T and cross-head *l*, to secure an elastic action thereby, to make the pressure of brushes B upon the surface to be cleaned an elastic one. The spring may be a spiral one, as indicated by black lines in Fig. 3. Pins U are placed in the links *k*, so that the return movement of the nut against them may draw back the brushes. The operation and arrangement of brushes D, their screw R, links *k*, and the spring, &c., will be understood by reference to Fig. 3.

The conduit shown gives but one of the many and various forms of section to which the machine is adapted. The longitudinal face curves and disk-face curves of the brushes must be varied to conform to these various shapes, and the action and the application of the brushes need not be limited to anything short of the entire contour.

The retracting-pin in the links referred to is marked U. The side brush-shafts are marked V. These shafts slide freely endwise through their driving-gears G, as above noted. This enables the operator to press the brushes B with greater or less force, as occasion may require, against the surfaces to be cleaned, and to draw them back out of contact, and also for removing and replacing brushes upon the shafts. The brushes C may be operated to bear more or less forcibly upon the surface to be cleaned by means of screws O, and hand-wheel nuts P also may be lifted out of contact, as occasion requires.

To give motive power and impulse to the machine, a dam or bucket, W, is provided and hinged to the machine. When this dam is lowered into a flow of water—more or less,

as occasion demands—the machine, if permitted, will be driven as the water accumulates against the dam in a downstream direction. The truck-wheels, being somewhat adhesive by force of their weight and that of the machine, will be caused to roll regularly, in proportion to the velocity acquired by the dam and machine, thus causing their axles and the large gear D to rotate. The rotation of this gear rotates the brush-gears and the brushes, as before explained. This dam W performs other functions besides propelling this machine, and thereby rotating the brushes—viz., as the water accumulates behind it the brushes are furnished with water for the cleaning process. It permits, also, a thin film or sheet of fast flowing water to pass between its edges and the conduit-surface, proportioned in velocity to the head acquired. This flowing in close and forced contact with the surface to be cleaned removes the deposits and washes the dirt downstream. Stationary brushes fixed to the machine just ahead of the dam or disk, and bearing upon the surface thus preceding this jet of water, will leave only the finishing process to be performed by the rotary brushes. For this purpose—viz., the jet flushing—the dam may be expanded to conform to the entire sectional area of the conduit or duct to be cleaned. The brushes, both fixed and rotary, may be made to cover the entire sectional contour. When so extended, the machine may be controlled by a cable, line, &c., from the upstream gate-house. The dam is provided with elastic tired or surfaced rolls X, to gage its closeness of approach to the surfaces. These rolls may be adjustable, and may be used with or without adjusting-screws O or other dam-adjusting screws.

Adjustable elastic tired or surfaced guide-rolls Y are furnished to keep the machine moving steadily in the exact line of the conduit. A convenient method of mounting these rolls is shown in Figs. 1 and 2. They are journaled on the outer end of outriggers or arms slotted on screw-bolts having hand wheel-nuts Z. These arms are arranged diagonally or transversely to the machine, and so may slide endwise for adjustment, and be held firmly in place by means of the hand wheel-nuts Z and their screw-bolts.

The frame-work can be made of angle-iron mainly and of the usual market shapes with cast bearings, housings, wheels, &c., as will readily be suggested to any well-informed machine-maker. The shafts are for the most part of steel, as thereby great stiffness with light weight is practicable. Such parts as are not of composition or Babbitt metal, where exposed, should be coated with asphaltum, paint, or with tin or zinc, by galvanizing or other process. Rattan inserted in wood or metal with hot pitch or resin furnishes a good brush material. Others, however, may be used.

The angular relations of the main gear D and the pinions E and G are provided for by making angularly-arranged teeth upon the

pinions adapted to bear evenly upon the regular right-angularly-arranged teeth of the large gear D.

For working the machine upstream crank-gearing is provided, gearing into the large wheels D. The cranks are marked *f*, and are mounted on a gear-shaft with intermediate stud and shaft-gearing. A pinion, *a*, on the crank-shaft plays into a stud-gear, *b*, which in turn gears into stud-gear *c*. This gears into the two pinions *d*, on whose shafts are pinions *e*, which gear into and drive the large gear-wheels D. This power may, if needed, be applied as an auxiliary to the water-power in the cleaning process.

Various other powers may obviously be applied by similar methods—as, for instance, a small turbine-wheel—when sufficient head of water can be used. The first use, however, of the crank and gears by hand-power is to move the machine upstream after a downward cleaning trip. It may also be drawn back by means of a cable from the gate-house. The cranks are marked *f*. The crank shaft and pinion *a* may be transferred to the position *g* for the men's convenience in working downstream, the stands being removable upon the frame for that purpose.

The frame-work of the machine is marked F. It is obvious that the barrel-shaped brushes might be applied to cleaning the sides or the disk shaped to the bottom; but this modification would involve a less simple and direct system of gearing to drive the brushes. Brakes *h* are provided and are applied to the large gear D, but may also, if preferred, be applied to the wheels L. They are pivoted in stands *i*.

With reference to the collars on the side brush-shafts, V, let it be noted that the fixed collars *j* are made fast to the shaft with set-screws, so that their position on the shaft may be changed as the brushes wear and become shorter. The gears G are provided with a fixed key or feather, which occupies the spline in shaft V, and by which the gear G is made to rotate shaft V.

To avoid marring the shaft V, the set-screws in collars *j* may find their bearing upon shaft V in the bottom of its spline. Between collars *j* are located the loose collars, to which the links *k* are pivoted. These links *k* are pivoted at their other end to the cross-head *l*, which slides freely on the screw R. Between this cross-head *l* and the nut T and about the shaft V is placed the spiral spring before alluded to, which secures an elastic force upon the brushes B to press them to their work. The nut bears on the spring, the spring on the cross-head, and the cross-head, through the links *k*, on the loose collars.

I claim—

1. A machine for cleaning conduits, pipes, and sewers, as constructed—viz., having a traversing dam or bucket for propelling the machine—in combination with a truck or traction wheel or wheels connected by gearing to

and giving impulse to cleaning-brushes, substantially as described.

2. In a machine for cleaning conduits, pipes, &c., a brush or brushes mounted on a frame-work in geared connection with the traction-wheels, in combination with hand-power co-operative gearing arranged to operate the wheels and brushes, substantially as described.

3. In a machine for cleaning conduits, pipes, and sewers, a frame-work mounted on traction-wheels and having barrel-shaped revolving brushes operated by means of intermediate gearing, in combination with said traction-wheels and a traversing dam, substantially as described.

4. In a machine for cleaning conduits, pipes, and sewers, a frame-work mounted on traction-wheels and having disk-shaped revolving brushes operated by means of intermediate gearing, said traction-wheels, and a traversing dam, substantially as described.

5. In a machine for cleaning conduits, pipes, and sewers, a frame-work mounted on wheels and bearing both barrel-shaped and disk-shaped revolving brushes operated by means of intermediate gearing, traction-wheels, and a traversing dam, substantially as described.

6. In a machine for cleaning conduits, pipes, and sewers, the combination of a barrel-shaped brush, a hinged or pivoted yoke, N, in which it is hung, a pivoted adjusting and supporting screw having a journaled T-shaped head, and a rotating nut, substantially as described.

7. A disk-shaped rotary brush made controllable and adjustable under elastic pressure, in combination with intermediate gearing, traction-wheels, and a traversing and propelling dam, substantially as described.

8. In a machine for the purpose aforesaid, and in combination with a propelling-dam, traction-wheels, and intermediate gearing, front and rear revolving brushes, covering each an opposite half of the bottom surface of the conduit, substantially as described.

9. In a machine for the aforesaid purpose, side disk-shaped brushes arranged one mainly above the other and one partly in advance of the other, substantially as described.

10. In a machine for said purpose, side disk-shaped brushes as arranged approximately opposite to each other, substantially as described.

11. In a machine for said purpose, a disk-shaped rotary side brush, in combination with a barrel shaped rotary bottom brush, substantially as described.

12. In a machine for the purpose named, the combination of a series of barrel-shaped bottom brushes and a series of adjustable disk-shaped side brushes, substantially as described.

13. In a machine for cleaning conduits, pipes, and sewers, a traversing propelling-dam and traction-wheels, in combination with rotary brushes and intermediate gearing, substantially as described.

14. In a machine for the aforesaid purpose, a propelling-dam or water-stops made adjust-

able to a small remove from or approximate contact with the surface to be cleaned, in combination with brush-operating mechanism and cleaning-brushes, substantially as described.

5 15. The dam, in combination with the adjusting screw and nut, the jointed connections, and frame, substantially as and for the purpose set forth.

10 16. The combination of barrel-shaped brush, brush-yoke N, elevating and adjusting screw and nut, jointed connection, and frame, substantially as and for the purpose set forth.

15 17. In a machine for aforesaid purpose, the disk-shaped brushes having sliding shafts, gears, and elastic screw-adjusting gear, in combination with the traction-wheels, axles, and gears D, substantially as described.

20 18. In a machine for conduit, &c., cleaning purposes, the track-clearing brush mounted in its hinged frame and pivoted concentrically to the main axle, its bevel-gears, and operating screw and nut, in combination with the intermediate gearing and traction-wheel, substantially as described.

25 19. The combination of the adjustable propelling-dam, traction-wheels, intermediate gearing, and brushing mechanism, substantially as described.

30 20. In a machine for aforesaid purposes, and in combination with traction-wheels giving impulse to operative mechanism for cleaning, the adjustable dam or stop-water, for the

double purpose of propelling and flushing, substantially as described.

21. In a machine for cleaning conduits, 35 pipes, and sewers, the truck or traction wheels, axle, and driving-gear D, in combination with brush-rotating gears and other power mechanism—such as turbine wheel, hand-crank, &c.—co-operative for said purpose, substantially as described. 40

22. In a machine for like purpose having truck-wheels and rotating brushes, the adjustable rollers and arms for side guides, substantially as described. 45

23. In a machine for said purposes, the dam W, the traction-wheels L, and axle and gears D, with the rotary brush gear and brushes, substantially as described.

24. In a machine for cleaning conduits, 50 pipes, and sewers, the dam W as applied and controlled by the rolls X and screw O', substantially as described.

25. In a machine for said purposes, the combination of trucks, axles, gears, bottom and side brushes, and side roller-guides, substantially as described. 55

26. The combination of the elastic-tired wheel, its axle, gearing, and brushing mechanism, substantially as described.

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Witnesses:

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