

A. GRUB.
FLOOR SCRUBBING MACHINE.
APPLICATION FILED FEB. 17, 1908.

909,084.

Patented Jan. 5, 1909.
4 SHEETS—SHEET 1.

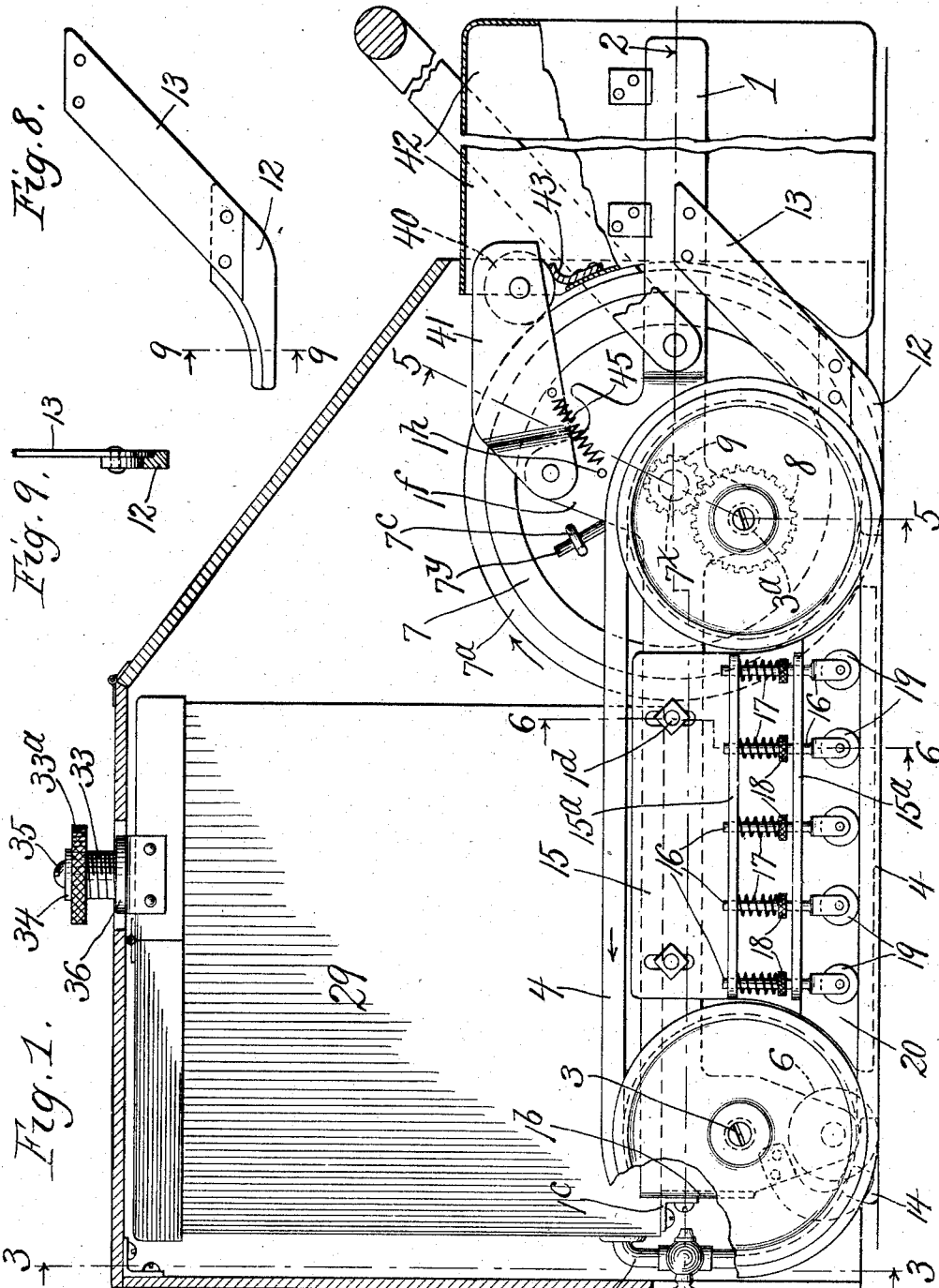


Fig. 8.

Fig. 9.

Fig. 1.

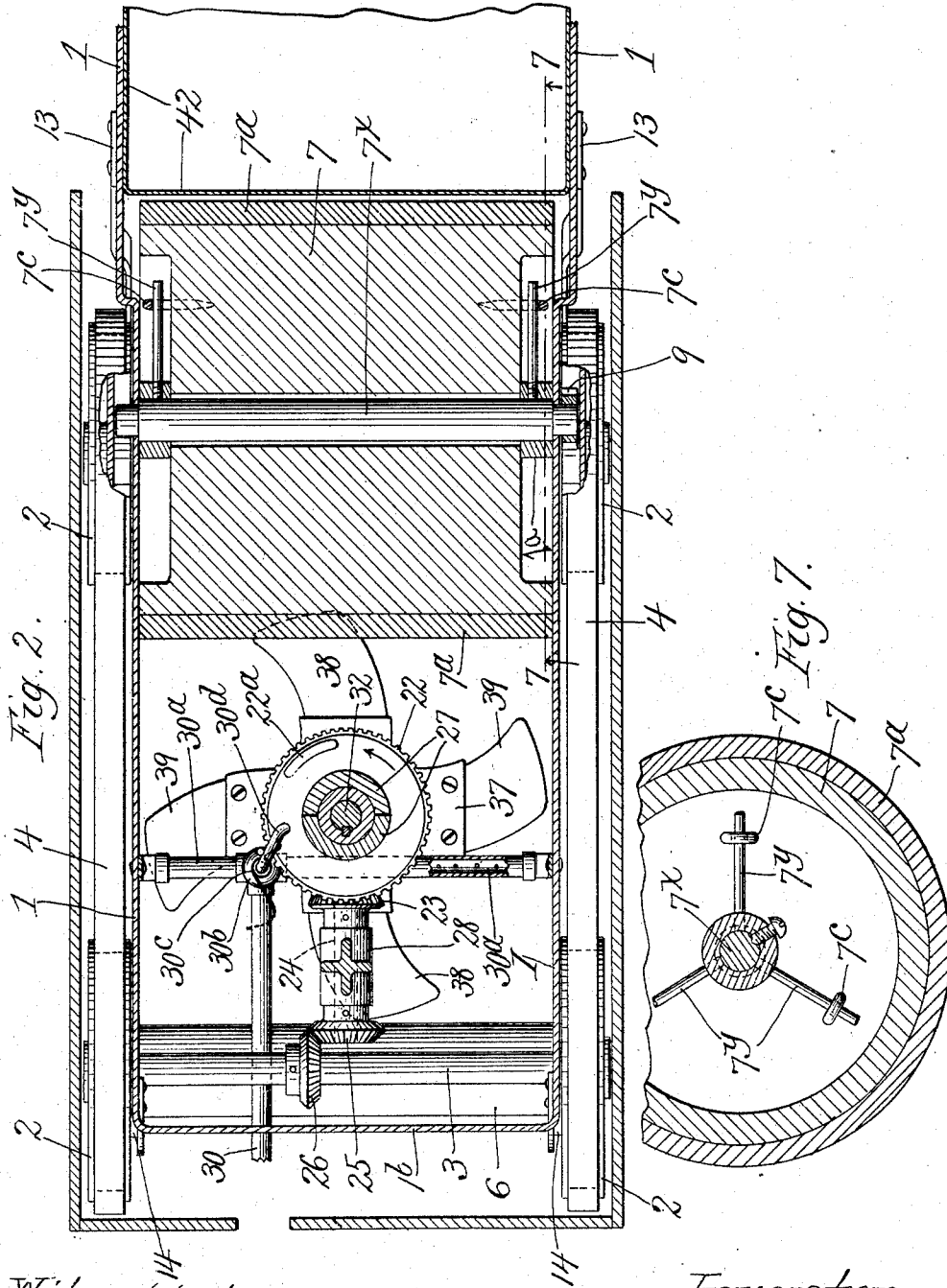
Witnesses.
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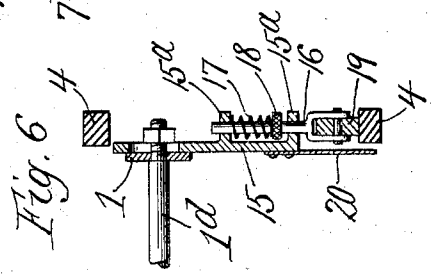
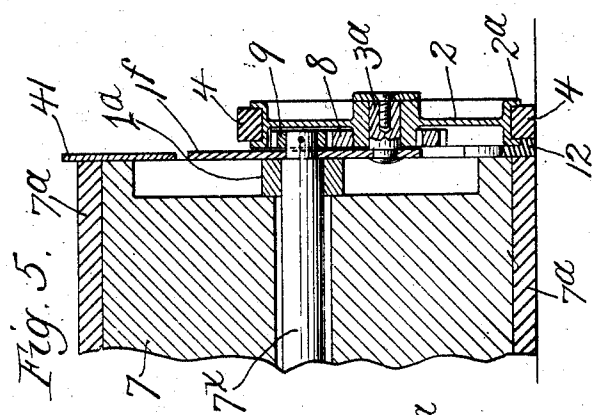
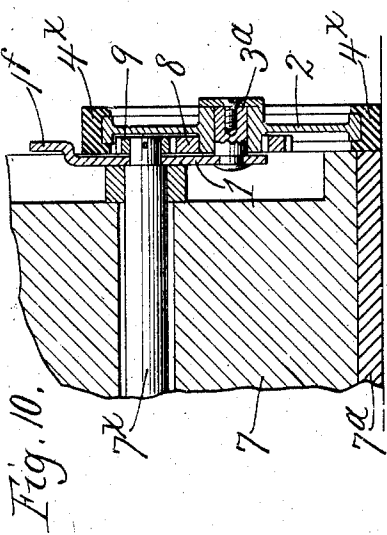
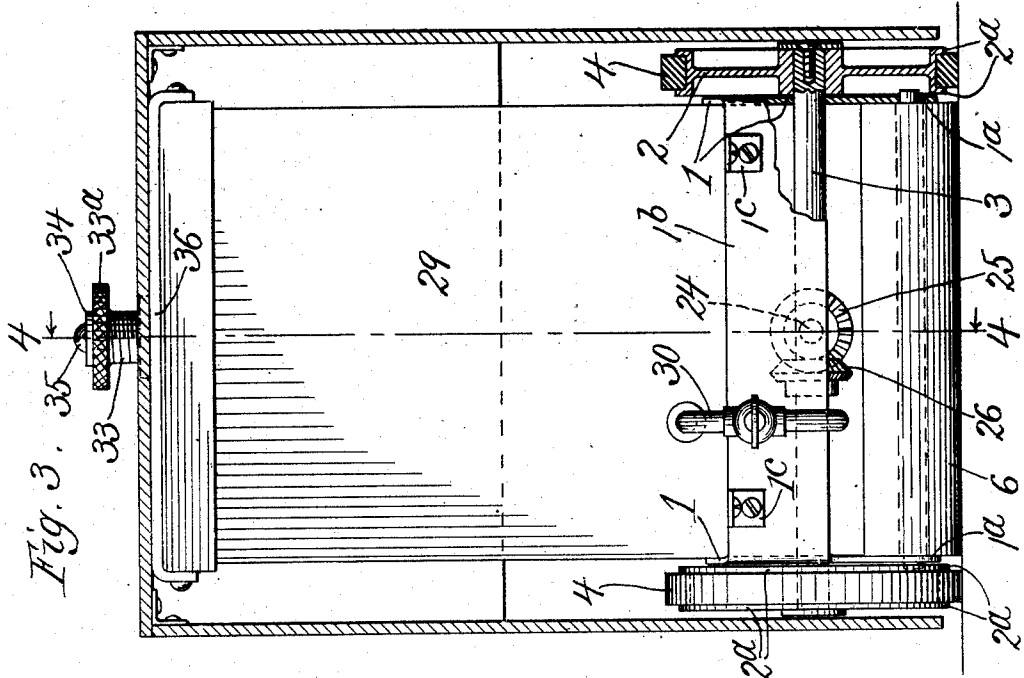
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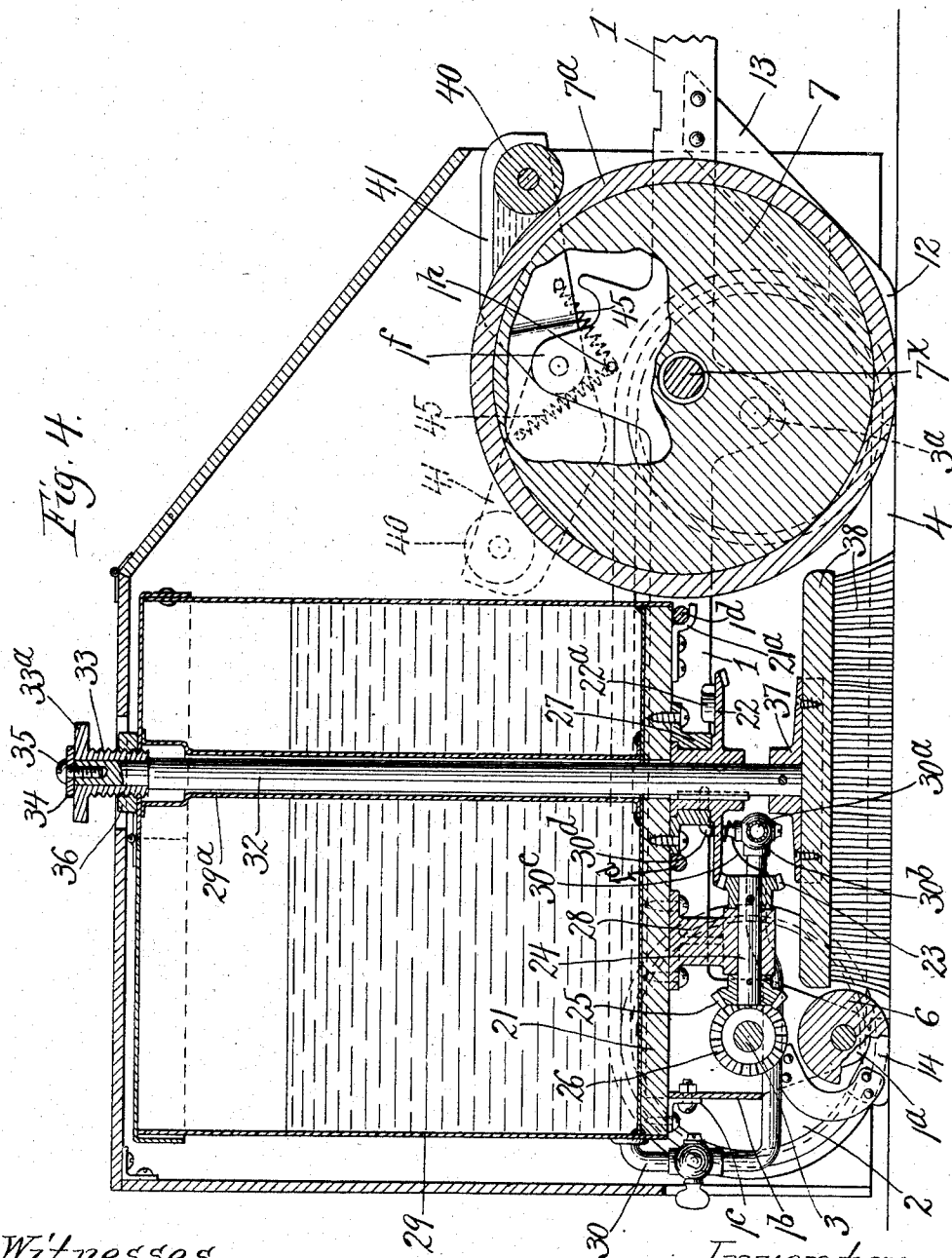
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

ALBERT GRUB, OF CHICAGO, ILLINOIS.

FLOOR-SCRUBBING MACHINE.

No. 909,084.

Specification of Letters Patent.

Patented Jan. 5, 1909.

Application filed February 17, 1908. Serial No. 416,308.

To all whom it may concern:

Be it known that I, ALBERT GRUB, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Floor-Scrubbing Machines, of which the following is a specification, reference being had to the drawings forming a part thereof.

The purpose of this invention is to provide an improved apparatus for scrubbing floors, adapted, as it is advanced over the floor, to retain the cleansing liquid within a certain defined area within which the scrubbing is performed, and which is thereby cleaned and wiped as the machine advances, and to provide the desirable incidental and accessory features for a machine so operated.

It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:—Figure 1 is a side elevation of a machine embodying this invention, an inclosing case thereof being cut away in vertical section to disclose the machine within, and certain other parts being also broken away to show interior mechanism. Fig. 2 is a horizontal section at the line 2—2 on Fig. 1. Fig. 3 is a section at the line 3—3 on Fig. 1. Fig. 4 is a section at the line 4—4 on Fig. 3. Fig. 5 is a detail section at the line 5—5 on Fig. 1. Fig. 6 is a detail section at the line 6—6 on Fig. 1. Fig. 7 is a section at the line 7—7 on Fig. 2. Fig. 8 is a detail side elevation of a shoe for closing a gap between the tread-belt and the wiping drum or roller. Fig. 9 is a section at the line 9—9 on Fig. 8. Fig. 10 is a detail axial section at the same plane as Fig. 5 showing a modification in respect to the form of the tread-belt.

This machine comprises a truck frame, 1, carried on four wheels, 2, 2, 2, 2, the front pair mounted fast on an axle, 3, journaled in the frame, and the rear pair journaled on stud axles, 3^a, 3^a, projecting from the frame, the two wheels at each side being connected by a tread-belt, 4, said belts not only causing the wheels to revolve in unison, but also and especially constituting water barriers on the floor at the two sides of a quadrilateral area whose corners are under the four wheels respectively. The other two sides of this quadrilateral area are defined by two rollers which extend between the two tread-belts, 4, 4, one being a small roller, 6, at the for-

ward end of the area between the two front wheels, 2, 2, and the other a large wiping roller or drum, 7, which extends between the two rear wheels. Both these rollers are mounted for rotation on the truck frame, 1, the forward roller being designed to merely roll on the floor, deriving no motion except by its floor contact. The wiping roller, 7, is, however, connected for positive rotation in the opposite direction from the rear wheels, one of said rear wheels having a gear, 8, rigid with it which meshes with the pinion, 9, on the shaft or axle, 7^a, of the wiping drum or roller, 7, so that the wiping roller is revolved not only in the opposite direction, but at considerably higher peripheral speed than that of the carrying wheels and tread-belts.

It will be seen that the two tread-belts and the two rollers define the four sides of a quadrilateral area, around which they also constitute an inclosing wall (except as to slight crevices at the corners, hereinafter mentioned and provided for) within which area liquid may be retained by this inclosing wall and the scrubbing devices may be operated for cleansing the floors as the machine is advanced therealong, the rear roller wiping up the floor at the rear line of the scrubbed area as the machine thus advances.

In the simple construction, such as shown in the drawings, the bearings, 1^a, of the roller shafts space the ends of the rollers away from the lateral edges of the tread-belts, and the flanges, 2^a, on the wheels, which retain the tread-belts, also space the tread-belts from the rollers a little distance; so that in the absence of any provision to the contrary there would remain small crevices at the ends of the rollers through which the cleansing liquid would leak or flow out, especially at the rear. To close these crevices it is preferred to provide rubber shoes, 12, 12, carried on bracket arms, 13, extended from the truck frame down at the rear of the rear wheels, said shoes being shaped to fit and close the rear crevices as seen in Fig. 5. Similar shoes, 14, 14, may be provided at the ends of the forward roller, 6, and such shoes are shown in Fig. 1 closing the forward corner crevices, which however are shown without such closure in Fig. 3, and these forward shoes may be omitted without serious inconvenience because the machine, advancing, will follow up any escaping water, over-

taking it before it has opportunity to spread beyond the zone or path of travel of the device. If preferred, the tread-belts may be formed as shown at 4^a, to embrace the wheel rims instead of being lodged in peripheral grooves thereon, and when so constructed such tread-belts may extend into complete contact with the ends of the rollers, 6 and 7, obviating the necessity of the shoes.

For holding the tread-belts snugly onto the floor surface, as necessary in order that they may perform their function of retaining the cleansing liquid, there is secured adjustably upon the truck frame at each side a bracket, 15, in which are mounted pressure devices, consisting each of a forked stem, 16, and a roller, 19, journaled in the fork bearing upon the upper surface of the lower ply of the tread-belts, the spindles or stems being mounted in flanges, 15^a, of the bracket, 15, springs, 17, being provided reacting between stop-collars, 18, on the trolley stems and the upper flange, 15^a, to hold the rollers, 19, pressed onto the tread-belt.

To prevent the water from being splattered over the tread-belts onto the lateral area of the floor outside the apparatus, guard curtains, 20, 20, preferably of sheet metal, are preferably hung from the bracket, 15, depending just inside the inner edges of the tread-belts and extending as close as convenient to the front and rear rollers, 6 and 7.

A platform, 21, extends from one side to the other of the truck forward of the wiping roller or drum, 7, being supported by and made rigid with the truck by resting on the forward sill or bar, 1^b, thereof, to which it may be secured by angle irons, 1^c, as illustrated, further support being afforded by transverse tie-rods, 1^d, with one of which said platform may be engaged by means of hook brackets, 21^a, taking under the tie rod. (See Fig. 4.) Upon this platform there is supported, depending from the lower side thereof, a gear train comprising a horizontal bevel-gear, 22, meshing with and driven by a bevel pinion, 23, on a longitudinal shaft, 24, having at its forward end a bevel gear, 25, which meshes with and is driven by a bevel-gear, 26, on the shaft on the forward axle, 3. The bevel-gear, 22, is journaled in and suspended from a bearing, 27, mounted upon the lower side of the platform, 21, and the shaft, 24, is journaled in a bearing hanger, 28, also mounted on the lower side of said platform.

On the platform, 21, there is mounted a tank, 29, for carrying the cleansing liquid, provided with a discharge pipe, 30, leading from the lower part and extending back under the tank, 29, terminating in a horizontal perforated discharge member, 30^a, which extends transversely of the line of travel of the device so as to deliver the cleansing liquid

over the whole width of said path as the machine advances. A valve, 30^b, controls the discharge of liquid and is held normally closed by a spring, 30^c, the valve stem having a short lever arm, 30^d, which is encountered by a stud, 22^a, which extends from the upper side of the gear, 22, for opening the valve once in each revolution of the gear, so that the liquid is discharged intermittently and only during the operation of the machine over the floor. A vertical shaft, 32, extends through the hub of the gear, 22, being feathered thereto for rotation therewith and sliding vertically therein. This shaft extends up through the tank, 29, which is provided with a sleeve or water-seal, 29^a, from top to bottom to accommodate the shaft. At the upper end of the sleeve at the top of the tank there is mounted on the latter an exteriorly threaded bearing, 33, through which the shaft, 32, extends, the shaft being reduced at its upper end for that purpose, forming a shoulder stopped against the lower end of the bearing, 33, and being provided at its upper end at the top of the bearing with a stop disk, 34, and secured by a screw, 35, set in at the end of the shaft so that the shaft is stopped vertically in both directions against the bearing, 33. The bearing, in turn, is screwed into a plate, 36, mounted on the top of the tank, 29, and made fast thereto by soldering or otherwise. The bearing, 33, has a knurled flange or head, 33^a, for rotating it to screw it up or down in the plate, 36, for adjusting the shaft, 32, vertically. At the lower end of the shaft there is made fast to it for rotation a scrubber-carrier, 37, having secured to it scrubbing brushes, 38, 39, 39, which face downward for operating on the floor as the shaft is rotated. Preferably the scrubbing brushes are curved horizontally forward in the direction of rotation, as seen in Fig. 2, so that they revolve with their concave side forward, and tend by their form to gather the water inward, counteracting thereby the centrifugal tendency which would result from the rotation, and tending to keep the water fairly distributed over the entire area reached by the brushes.

It will be understood that the vertical adjustment of the shaft effected by means of the threaded bearing, 33, is designed to vary the pressure of the brushes on the floor, and they may be adjusted so as not to touch the floor when, for any reason, the machine is to be moved along the floor without scrubbing it.

The outer covering, 7^a, of the roller or drum, 7, may be sponge, felt, cloth or other absorbent material for wiping up the floor and absorbing the cleansing liquid so as to leave the floor substantially dry behind the machine. When such absorbent material is used, means for wringing the liquid from it should be provided, and the drawings show a wringing roll, 40, in a swing frame, 41,

which is pivoted to upstanding arms, 1^f, of the frame, 1, at such point as to adapt the swing frame to swing to position to lodge the roll at the rear side and below the top, as seen in Fig. 4. When lodged in this position the weight of the roll and the angle at which the swing frame trends across the circumference of the drum causes the wringing roll to be drawn tightly onto the drum covering as the latter revolves, wringing the water therefrom so that it accumulates between the drum and the wringing roll at the forward side of the latter until it reaches the height of the wringing roll, when it will flow over the same into a slop receptacle, 42, which may be preferably mounted on the frame at the rear side in proper position to receive the discharge as described. The sides of the swing frame, 41, in which the wringing roll is mounted extend close to the ends of both the roller and drum, and are of such width that they extend upward beyond the highest point to which the water will rise between the roller and drum, and so prevent the escape of the water laterally. Preferably a wiper, 43, is mounted on the forward side of the slop receptacle, 42, at the upper edge thereof for wiping the wringing roll, 40, so that it will not carry water past the edge of said receptacle onto the drum, but will reach the drum substantially dry for its wringing action.

For operating upon some sorts of floors it may be preferred to make the covering, 7^a, of the drum, 7, of non-absorbent material, as rubber. Such covering will not carry up the water to any considerable extent unless the device is operated very rapidly, and in any case no wringing action would be required, but only a wiping action, and for that purpose the roll, 40, may be swung over to the forward side of the drum where it will rest upon the surface covering of the drum with a mere wiping effect, the tendency of the engagement of the drum and roller, in view of the changed angle of the swing frame to the circumference of the drum at the point of bearing thereon of the roll, 40, being to prevent the roll from being drawn tightly onto the drum instead of to cause it to be so drawn as in the other position. The roll, 40, may be operated in the position last described, even with a drum having absorbent covering, when it is not desired either to wring the water from the absorbent covering or to discharge it into the slop receptacle. When, for example, a floor is to be rinsed or merely moistened and dried and it is not considered necessary to maintain a constant change of water, but the same water may be retained within the scrubbing area and carried along by the machine, this may be effected by adjusting the roller to the forward position. If under such circumstances it is desired also to wring the drum covering more severely than will be effected by the

mere weight of the roller thereon at such forward position there may be provided at each side a spring, 45, engaged with a stud, 1^h, on the frame and attached to the swing frame intermediate its pivot and the wringing roll. Such springs will operate to hold the roll down onto the drum at either position, although the pressure afforded will usually be found unnecessary when the roll is at the rear position. The springs may be strong enough to afford wringing pressure when the roll is at the forward position without making the pressure excessive at the other position.

In order that the wiping roller or drum, 7, may at all times bear upon the floor with sufficient pressure for its function it is mounted loosely on its axle, 7^x, with enough play to accommodate the compression and variation in thickness of the outer covering, 7^a, of the drum, said drum being driven by the axle by means of radial fingers, 7^y, 7^z, 7^z, projecting from the axle and loosely engaging staples, 7^c, 7^c, driven into the heads of the drum.

I claim:—

1. A machine for the purpose indicated comprising a truck frame having four carrying wheels; tread-belts for traveling on the floor connecting the two wheels at each side; rollers traveling on the floor extending transversely between the tread-belts and cooperating therewith to define four sides of a quadrilateral floor area, and scrubbing devices carried by the frame overhanging the floor area.
2. A machine for the purpose indicated comprising a truck frame having four carrying wheels; tread-belts for traveling on the floor connecting the two wheels at each side; rollers traveling on the floor extending transversely between the tread-belts and cooperating therewith to define four sides of a quadrilateral floor area; shoes carried by the truck for closing the corner intervals between the tread-belts and the ends of the rollers, and scrubbing devices carried by the frame overhanging such floor area.

3. In a machine for the purpose indicated, in combination with the frame, carrying wheels, front and rear rollers and tread belts connecting the two wheels at each side for inclosing a quadrilateral area on the floor; means for supplying cleansing liquid to such area; means for rotating the rear roller upward at the forward side; a wringing or wiping roll, and a frame in which it is mounted for lodgment upon the upper side of the rear roller at one side of the vertical plane through the axis of said rear roller, the sides of said frame extending in close contact with the ends of said rear roller and of said wringing or wiping rolls for closing at the ends the trough or cavity between the two.

4. A machine for the purpose indicated comprising a truck frame having four carry-

ing wheels; tread-belts for traveling on the floor connecting the two wheels at each side; rollers traveling on the floor extending transversely between the tread-belts and cooperating therewith to define the four sides of a quadrilateral floor area; means for supplying cleansing liquid to such area; means for rotating the rear roller upward at the forward side; a frame pivoted to the truck frame for swinging between a point in the rear of and a point forward of the vertical plane of the axis of said rear roller; a wringing or wiping roll mounted in such swinging frame in position for lodging upon the upper side of said rear roller at either the forward or rear side of such vertical plane, the sides of such swinging frame extending in close contact with the ends of said rear roller and said wringing or wiping roll for closing at the ends the trough or cavity between the two.

5. A machine for the purpose indicated comprising a truck frame having four carrying wheels; tread-belts for traveling on the floor connecting the two wheels at each side; rollers traveling on the floor extending transversely between the tread-belts and cooperating therewith to define the four sides of a quadrilateral floor area; means for rotating the rear roller upward at the forward side; a frame pivoted to the truck frame for swinging between a point in the rear of and a point forward of the vertical plane of the axis of said rear roller; a wringing or wiping roll mounted in such swinging frame in position for lodging upon the upper side of said rear roller at either the forward or rear side of such vertical plane.

6. A machine for the purpose indicated comprising a truck frame having four carrying wheels; tread-belts for traveling on the floor connecting the two wheels at each side; rollers traveling on the floor extending transversely between the tread-belts and cooperating therewith to define the four sides of a quadrilateral floor area, and pressure devices carried by the frame overhanging and bearing upon the upper side of the lower ply of the tread-belts to hold them pressed upon the floor.

7. In a machine for the purpose indicated,

in combination with the frame, carrying wheels, front and rear rollers and tread belts connecting the two wheels at each side; means for supplying liquid to the inclosed area, the rear roller being provided with a cover of absorbent material for taking up the liquid, and means connecting said rear roller with the rear traction wheels for revolving said roller upward at the inner or forward side; means for taking the liquid from the absorbent covering of said rear roller, and a receptacle for receiving the liquid so taken therefrom.

8. In a machine for the purpose indicated comprising a truck frame having carrying wheels; means for defining four sides of a quadrilateral floor area, comprising a roller having its shaft geared to one of the carrying wheels, said roller being mounted loose on its said shaft with range of play in all directions thereabout, and driving fingers extending from the shaft loosely engaged with the heads of said roller for rotating the same.

9. In a machine for the purpose indicated comprising a truck frame having carrying wheels; means for defining four sides of a quadrilateral floor area comprising a roller mounted loosely on its shaft with a range of play in all directions thereabout, said shaft having means for engaging the roller throughout the entire range of such play, and means connecting the shaft with the drive wheel for rotation in the opposite direction therefrom.

10. In a machine for the purpose indicated, comprising a truck frame having carrying wheels, a roller mounted loosely on its shaft with a range of play in all directions thereabout, said shaft having means for engaging the roller throughout the entire range of such play, and means connecting the shaft with the drive wheel for rotation in the opposite direction therefrom.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 13th day of February, 1908.

ALBERT GRUB.

Witnesses:

M. G. ADY,
J. S. ABBOTT.