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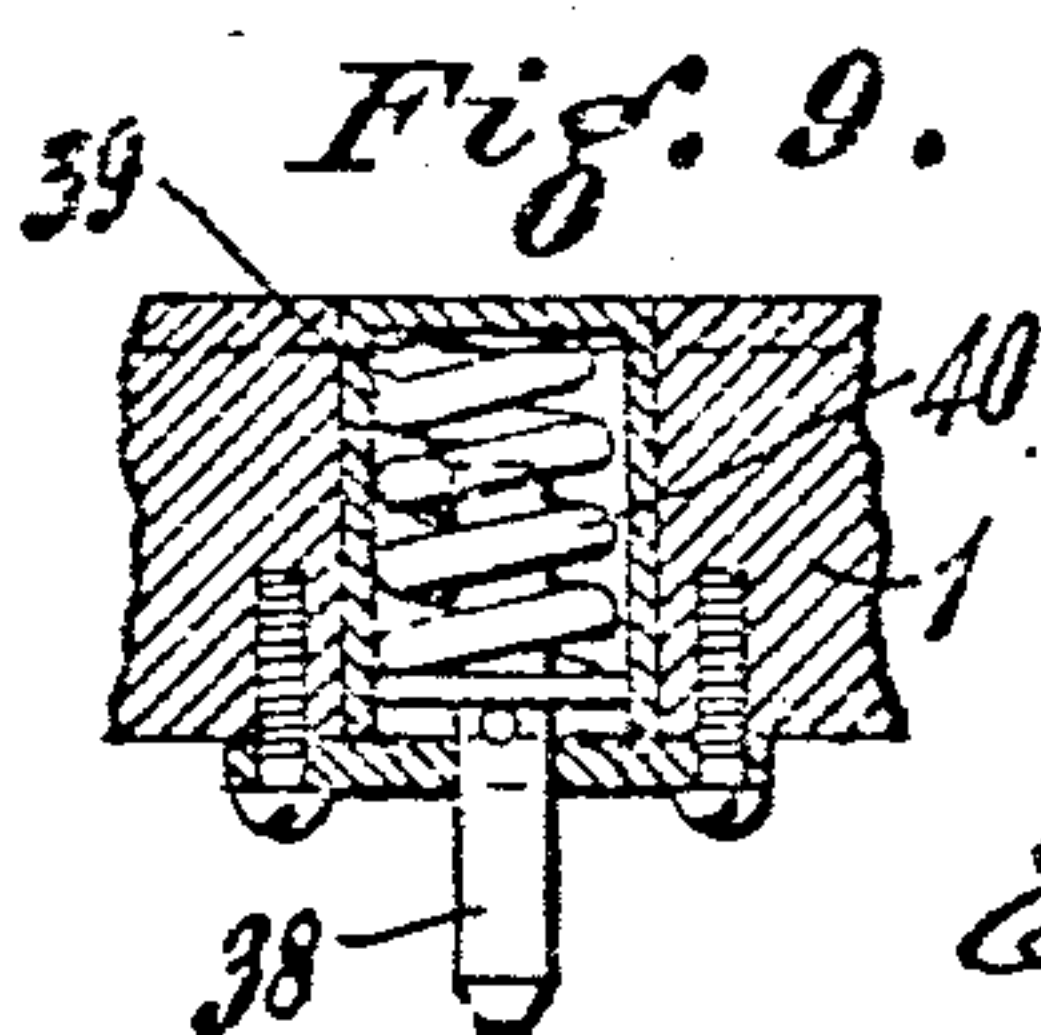
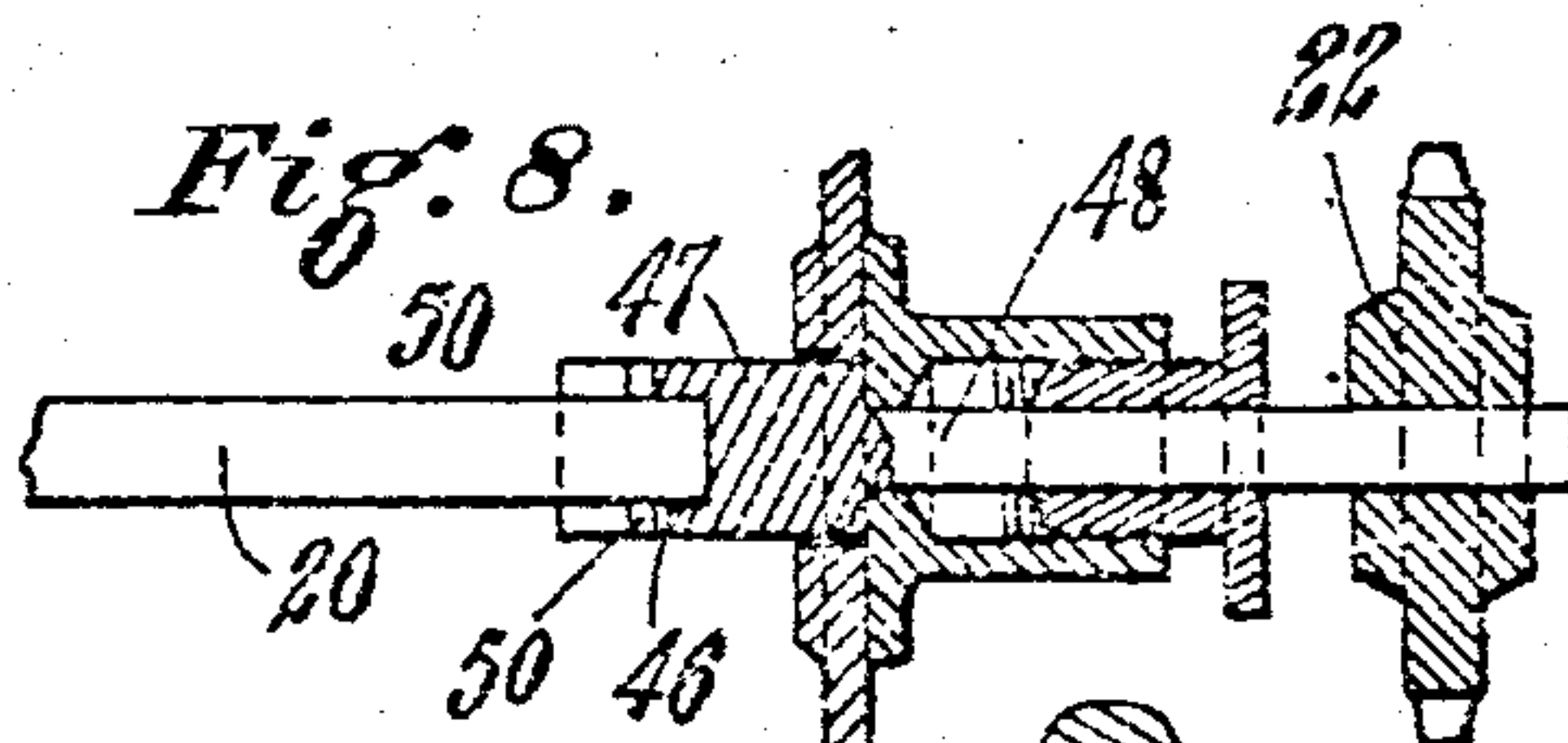
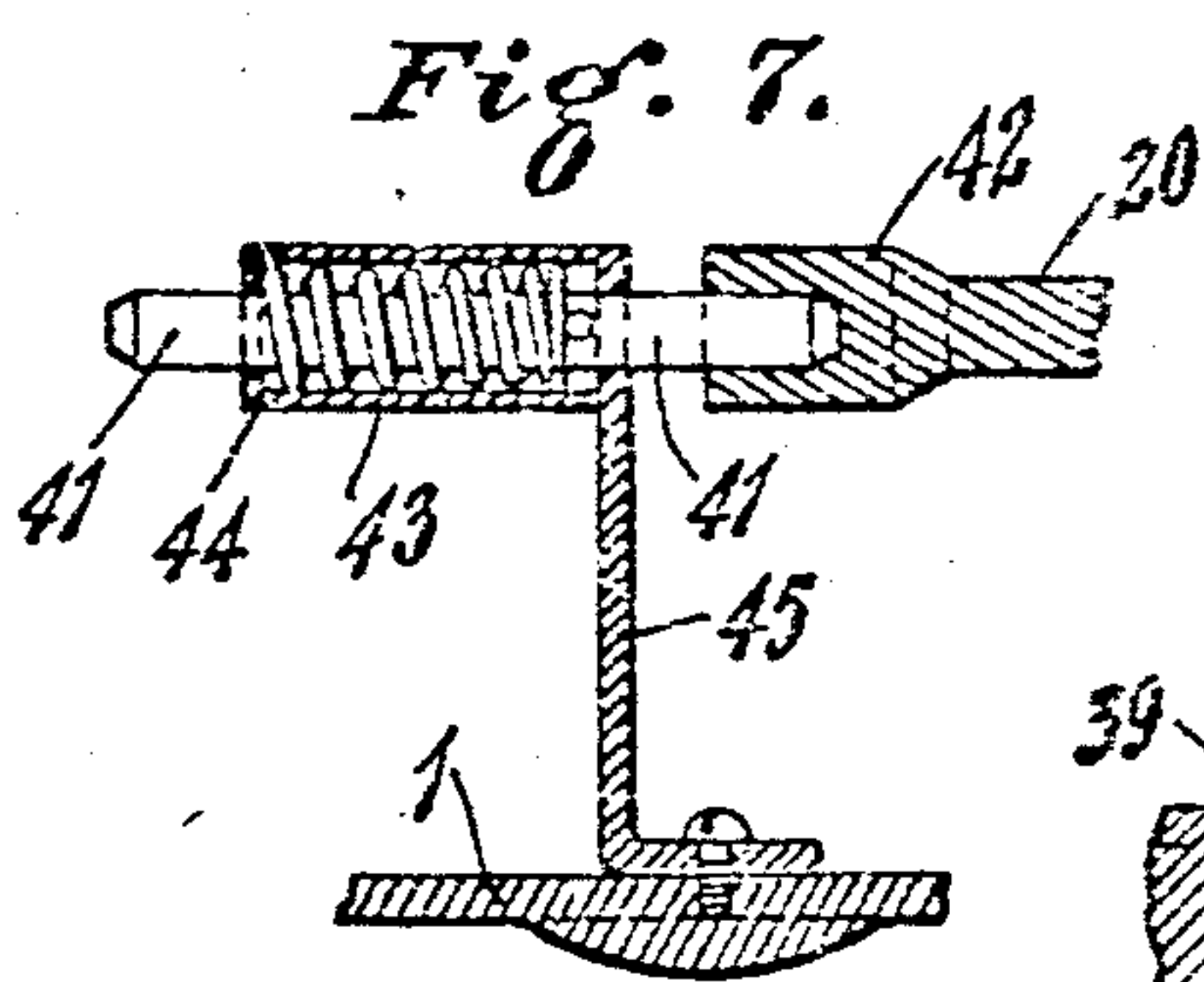
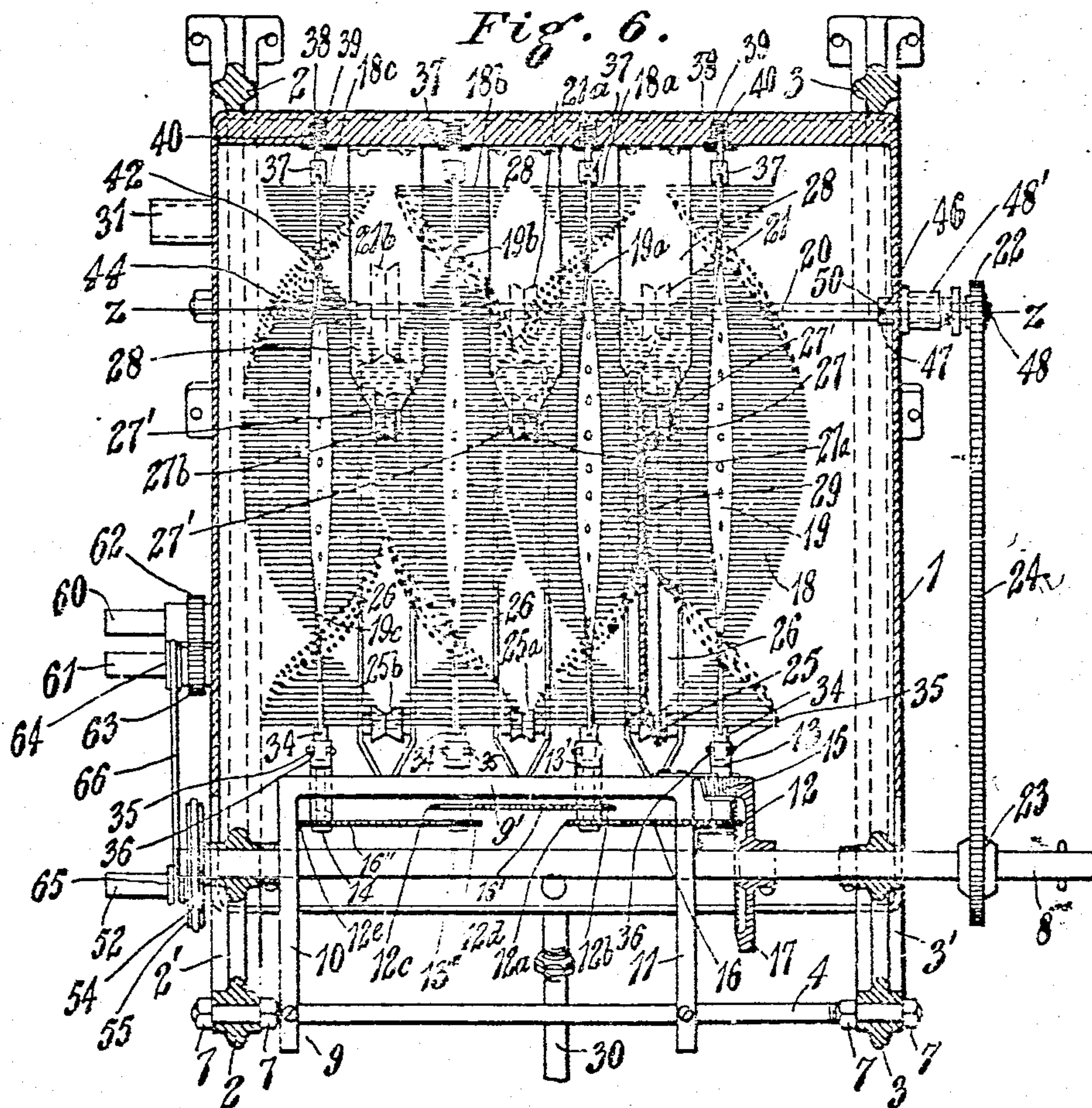
DISH WASHING MACHINE.

APPLICATION FILED APR. 14, 1909.

952,592.

Patented Mar. 22, 1910.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE

EGIDIO VILLANI, OF CINCINNATI, OHIO.

DISH-WASHING MACHINE.

952,592.

Specification of Letters Patent.

Patented Mar. 22, 1910.

Application filed April 14, 1909. Serial No. 489,760.

To all whom it may concern:

Be it known that I, EGIDIO VILLANI, a subject of the King of Italy, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Dish-Washing Machines, of which the following is a specification.

My invention relates to washing apparatus, and has for its object the cleaning of dishes and glass ware, as well as other table articles in a convenient, efficient and hygienic manner, both as regards the condition of the articles cleaned and the prevention of injury to the hands of the user, thoroughly scrubbing and rinsing the articles and avoiding the necessity of putting the hands into the hot soapy water, as is ordinarily required.

My invention consists in the combination of a basin, a plurality of separately mounted and independently moving juxtaposed brushes rotatable in the basin adapted to impinge upon articles placed between them, means for rotating the articles between the brushes, and means whereby said articles may be removably supported and guided during their rotation.

My invention also consists in the parts and in the details of construction and arrangement of parts as will hereinafter be more fully described and claimed.

In the drawings: Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is a partial rear elevation of the same. Fig. 3 is a sectional detail view, enlarged, on a line corresponding to the line $x-x$ illustrating the construction of the brushes. Fig. 4 is a detail perspective view, enlarged, of the two twisted plates forming the shaft of a brush, as I prefer to construct it in my improved device, having a flexible shaft. Fig. 5 is a view of an auxiliary cleaning attachment. Fig. 6 is a section on the line $y-y$ of Fig. 1. Fig. 7 is a detail view, enlarged, in section on a line corresponding to the line $z-z$ of Fig. 6, illustrating the construction of the yieldable support for the supporting and rotating shaft. Fig. 8 is a similar view illustrating the construction of the detachable rotating mechanism for the supporting and rotating shaft, as I prefer to construct it in my improved device. Fig. 9 is a detail view, enlarged, on a line corresponding to the line $y-y$ of Fig. 1, illustrating the construction of the yieldable support on each of the brush shafts.

Constructed as illustrated, and as I prefer to embody my invention, the basin 1 is supported by two laterally disposed frame members 2 and 3, held in their proper spaced apart positions by the transversely extending rods 4, 5 and 6, the rods 4 and 5 extending along the upper sides of the basin and the rod 6 extending thereunder. Said rods are rigidly attached to the frame members by nuts 7 screwed onto the rods against the sides of the frame members. The front of the basin, at its top, is flared forwardly, and the frame members 2 and 3 are inclined forwardly to conform to the basin and extend upward above the upper edge thereof, the transversely extending rod 4 being secured to these frame members near their extreme upper ends where they extend above the basin, each of the frame members 2 and 3 has a rearward extension 2' and 3', respectively, in which are formed bearings for a transversely extending shaft 8, through which the power for operating the machine is transmitted. As shown in the drawings, this shaft 8 extends a considerable distance past each side of the machine, and it will be understood that any suitable driving apparatus may be properly connected with this shaft at this point for driving the machine. This driving apparatus may be a crank for operating the machine by hand, or it may be any suitable motor, such as an electric motor or a hydraulic motor.

As shown, a yoke 9 has arms 10 and 11 taking over the transversely extending rod 4 at the front of the machine, and the shaft 8 also passes through these arms, this yoke being thereby so positioned that it inclines downwardly into the basin with a transversely extending part 9' extending parallel to the shaft 8 at about the height of the upper edge of the basin 1. This transversely extending part 9' of the yoke 9 carries bearings for a series of sprocket wheels 12, 12^a, 12^b, 12^c, 12^d and 12^e. The sprocket wheel 12 is mounted on a shaft 13 at the side of the yoke adjacent to the part of the shaft 8 to which the power is applied. The sprocket wheel 12^a and the sprocket wheel 12^b are mounted on a common shaft 13'. The sprocket wheel 12^c and the sprocket wheel 12^d are mounted on a common shaft 13''. The sprocket wheel 12^e is mounted on a shaft 14. A level pinion 15 is mounted on the shaft 13 which the sprocket wheel 12 is mounted on, at the side of the yoke. The sprocket

wheels 12 and 12^a have a sprocket chain 16 passing around them. The sprocket wheels 12^b and 12^c have a sprocket chain 16', and the sprocket wheels 12^a and 12^c have a sprocket chain 16'' passing around them. The sprocket wheels and their chains are all mounted behind the transversely extending part 9' of the yoke 9, and are thus protected from the effects of the substances removed from the articles cleaned. A bevel gear 17, rigidly mounted on the shaft 8, is in mesh with the pinion 15, and thus when the shaft 8 is rotated the shafts 13, 13', 13'' and 14 will all be rotated, and thus provided and spaced transversely of the machine at suitable intervals, they form rotating means for the helical brushes 18, 18^a, 18^b and 18^c, respectively, which comprise suitable impinging material mounted in shafts 19, 19^a, 19^b and 19^c, respectively, extending in an inclined direction downwardly and rearwardly of the basin where their other ends are suitably rotatably mounted, as will hereinafter be more fully referred to.

Near the bottom of the basin below the brushes, which are juxtaposed in a series transversely of the basin, is a shaft 20 extending transversely of the basin, the specific manner of mounting which will also hereinafter be more fully described. This shaft has, rigidly mounted on it to rotate therewith, wheels 21, 21^a and 21^b, having grooved peripheries. These wheels are for supporting articles such as plates and saucers, the edges of the articles resting in the grooves of their peripheries. Outside the basin, a sprocket wheel 22 is provided to operatively engage with the shaft 20, and the shaft 8 has a sprocket wheel 23 in alignment therewith. These sprocket wheels 22 and 23, have a sprocket chain 24 passing around them, so that the shaft 8 may cause the shaft 20 to rotate. Forwardly of the basin in the upper part thereof, near the transversely extending part 9' of the yoke 9, a series of rollers 25, 25^a and 25^b are provided, each being journaled in an extension from the forward wall of the basin, each of these extensions being carried downwardly and rearwardly in the form of a trough 26 supported at its lower and rearward end on the bottom of the basin, near the shaft 20. Rearwardly of the basin, near its top, other rollers 27, 27^a and 27^b are journaled in forks 27', mounted on flexible supports 28 which are attached to part of the basin near its rear. The rollers 25 and 27 are in alignment with the roller 21 on the shaft 20, while the rollers 25^a and 27^a are in alignment with the roller 21^a and the rollers 25^b and 27^b are in alignment with the roller 21^b. It will thus be seen that an article to be cleaned, such as a plate 29, may be inserted edgewise downwardly into the basin with its periphery resting upon the wheel

21 below and supported and guided by the rollers 25 and 27 above, in which position the impinging material of the adjacent brushes may act upon its sides while it is rotated, due to its being inserted upon the wheel 21 which is being rotated on the shaft 20. Thus, all parts of the article are brought into position for contact with the brushes, and the brushes being rapidly rotated, will, with the use of water introduced into the basin through a suitable inlet 30, thoroughly clean the article. The rollers 27, 27^a and 27^b are mounted on the flexible supports so that they may adjust to various sized articles, such as plates and saucers, as they are inserted into the basin.

It will be understood that the water introduced through the inlet 30 may be projected with any desired degree of force into the basin so that a thorough washing and rinsing action is obtained in conjunction with the scrubbing action of the brushes, as above referred to, the basin being supplied with soap as required. The basin 1 has a suitable outlet 31 at its bottom at one side.

As here shown, the brushes have their impinging material disposed in the form of a helix extending on each brush in such direction with respect to its direction of rotation that the substance removed from the articles will be forced downwardly off of the article. This helical formation of the brushes is also useful in more efficiently directing the water against the articles, since the water entering near one end of each brush is carried approximately longitudinally of the brushes along the article being washed. For constructing the brushes in a helical form, the shaft of each brush is composed of two twisted plates 32 and 32', as is best illustrated in Fig. 4 of the drawings. These plates, before being brought together, have the impinging material 33 laid between them, as may be seen in Fig. 3 of the drawings, after which the plates are riveted or screwed together. These plates 32 and 32' may be twisted either before or after the impinging material has been inserted between them and they are secured together. Thus constructed, the impinging material will be caused to extend radially from the shaft in constantly varying direction along the shaft. At the same time the material may be cut to such length as may be desired to give the proper general formation to the brush and cause it to conform most accurately to the article inserted between the brushes, if required.

In order to enable the thorough cleaning of the interior of the basin in a most convenient manner, the shafts of the brushes, as well as the transversely extending shaft 20, are removably supported therein. For removably supporting the shafts of the brushes these shafts are provided, at their

forward upper ends, with hubs 34 having radially extending pegs 35 adapted to enter radially extending slots 36 in the rearward lower projections of the shafts 16, 13, 13' and 14, these shafts having sockets to receive the ends of the hubs 34. At the rearward lower ends of the shafts are provided hubs 37 which have sockets adapted to fit over pins 38 which are mounted in recesses 39 in a transversely extending forwardly and upwardly projecting lug on the lower wall of the basin. These pins 38 in these recesses are yieldable longitudinally, being mounted on helical springs 40 in the recesses, as is best illustrated in Fig. 9 of the drawings.

It will be seen that when it is desired to remove the brushes the shafts may be depressed downwardly and rearwardly longitudinally, withdrawing their hubs 34 from the sockets in the shafts of the sprocket wheels, this depression being allowed by the yieldable pins on which the other ends of the brush shafts are supported. At the same time, when the wheels are in position they are held to rotate with the sprocket wheels. The transverse rotating and supporting shaft 20 is rendered removable in a similar manner, being supported at one side of the machine on a pin 41 entering a socket in a hub 42 with which this end of the shaft is provided, this pin 41 being pressed toward the shaft 20 by a helical spring 43 inclosed in a case 44 mounted on a bracket 45 secured to the bottom of the basin. The other end of the shaft 20 enters the socket 46 in a hub 47 on a shaft 48, which extends through the wall of the basin and is provided with a suitable stuffing box 48', upon which shaft the sprocket wheel 22 is mounted to impart rotation to the shaft 20, and the shaft 20 has radially extending pegs 50 to enter slots in the hub 46 of the shaft. Thus when it is desired to remove the shaft 20 the sprocket wheel 22 and its chain 24 need not be disturbed.

On the frame member 2' near the top of the basin is a laterally extending stud 51 and a sleeve 52 is mounted thereon having a grooved pulley 53 around which passes a belt 54, this belt also passing around a pulley 55 rigidly mounted on an extension of the shaft 8 past its bearing in the rearward extension 2' of the frame member. Thus, the sleeve 52 is adapted to be rapidly rotated on the stud 51 and may receive a suitable brush for cleaning the insides of the cups or tumblers, such a brush and the above described manner of mounting it being best illustrated in Fig. 2 of the drawing. This brush is helical in formation and constructed as hereinbefore described, the twisted shaft being mounted on a hub 56 which has a socket to receive the sleeve 52 and a set screw 57 for rigidly securing it thereon.

Figs. 3 and 4 specifically illustrate the

construction of this particular brush, but it will be understood that the brushes 18, 18^a, 18^b and 18^c, interiorly of the basin, are preferably constructed in the same manner. As illustrated in Figs. 2 and 3 of the drawing, the impinging material consists in rubber tubing clamped between the twisted plates 32 and 32', which forms a most efficient device for impinging upon and cleaning the surfaces of the articles. However, it will be understood that any material usually employed in the construction of brushes, such as fiber or bristles, may be used for the impinging material in these helical brushes.

Lower down on the frame member 2, two more studs 58 and 59 are mounted, these studs receiving the sleeves 60 and 61, respectively, which are provided with pinions 62 and 63, respectively, the studs being so positioned relative to each other that these pinions 62 and 63 may mesh together. The sleeve 61 is also provided with a grooved pulley 64 by the side of the pinion 63 and the sleeve 52 on the stud 51 above is provided with an additional grooved pulley 65 in alignment with the pulley 64 below. Around these pulleys a belt 66 is passed so that the sleeve 61 may be rotated by the sleeve 52. Thus, it will be seen that the sleeves 60 and 61 will rotate in opposite directions due to the meshing of their pinions 62 and 63, respectively. On these sleeves 60 and 61 shafts 67 and 68, respectively, may be mounted, being provided with hubs 69 and 70, respectively, having sockets to receive the sleeves and being provided with set screws to rigidly secure them thereon. These shafts 67 and 68 are provided with impinging material 71 and 72, and 73 and 74, respectively, which may consist in fibers or bristles such as brushes are usually made of and which may be provided with any desired general formation. Thus, as illustrated in Fig. 2, the impinging materials 71 and 72 near the outer ends of the shafts 68 are straight and parallel, but slightly separated at 75, and into the space between them such articles as knives and forks may be inserted to be cleaned by the rapidly rotating brushes thus constituted. The material 72 on the shaft 67, as shown, is convex, while the material 74 on the shaft 68 is concave, so that when they come adjacent they are curved and parallel and slightly spaced apart at 76. Into this space such articles as spoons may be inserted to be similarly cleaned. It will thus be noted that the brushes being removable from the sleeve 52 above and the sleeves 60 and 61 below they may be placed out of the way when not in use or any other brushes of different shape but having the same kind of hubs to fit on the sleeves may be supplied for use on the machine. My improved machine may also

be provided with a brush having a flexible shaft, such as the brush illustrated in Fig. 5 of the drawings, the flexible shaft consisting in helical springs 77 and 78 coiled in opposite directions and one contained within the other, attached at one end to a hub 79, with a socket to receive the sleeve 52 on the stud 51, this hub being provided with a set screw 80 to clamp it to the sleeve. The other end of the flexible shaft is connected to a suitable brush 81 with its impinging material extending parallel with the length of the shaft, and a handle 82 has a ring 83 taking around the flexible shaft so that the brush may be presented in any desired direction by flexing the shaft and will be rapidly rotated while thus presented, due to the hub 79 being secured to the rotating sleeve 52. These auxiliary cleaning devices at the side of the machine are especially desirable when the machine is operated by power, leaving the hands of the user free to apply the articles to be cleaned to the brushes or to insert such articles into the basin between the juxtaposed brushes therein, as may be required in the course of handling the articles to be cleaned.

By providing for the constant rotation of the articles between the juxtaposed brushes interiorly of the basin under the action of water introduced therein, it will be seen that the insertion of the hands into the soapy water contained in the basin is unnecessary, it only being required to insert the articles and remove them therefrom.

With the use of a series of brushes arranged as herein described, with means for automatically bringing different parts of the article successively into position for most efficient contact of the brushes and the water, the operator of the machine may be continuously employed in the inserting and removing of the articles, since sufficient time elapses for the thorough cleaning of the first article inserted by the time the subsequent articles have been inserted, so that the duty of the operator becomes merely that of inserting and removing the articles successively from one side of the machine to the other. It will be understood that the number of brushes thus arranged in the basin may be only two in number arranged side by side with the proper means between them for supporting and guiding and rotating the article. Likewise, it will be understood that the device, as herein shown and specifically described, is subject to considerable modification, with respect to the minor details of its construction, and, therefore, I do not wish to be understood as limiting myself precisely to the illustrations and description herein contained, but

What I claim as new and desire to secure by Letters Patent is:

1. In a dish washing machine, the combi-

nation with a basin, of juxtaposed brushes rotatable on axes extending across the basin, a shaft within the basin extending below the brushes, a wheel on the shaft arranged in alignment with a space between the brushes, and rollers also in alignment with the space between the brushes, said wheel and the rollers being adapted to make contact with the periphery of the article to be cleaned, substantially as and for the purposes herein set forth.

2. In a dish washing machine, the combination with a basin, of juxtaposed helical brushes therein rotatable on axes extending parallel across the basin, the basin having a water inlet near one end of each brush, and means for supporting the articles to be cleaned between the brushes, substantially as and for the purposes herein set forth.

3. In a dish washing machine, the combination with a basin, of juxtaposed brushes within the basin, a shaft within the basin, a wheel on the shaft adapted to receive and support and rotate the article to be cleaned, the article to be cleaned being adapted to be inserted between the brushes onto the wheel, a roller for receiving and guiding the article and another roller flexibly mounted to admit the article and to engage therewith to guide it, substantially as and for the purposes herein set forth.

4. In a dish washing machine, the combination with a basin, of juxtaposed brushes therein, a shaft within the basin, a wheel on the shaft adapted to receive and support and rotate the article to be cleaned, the article being adapted to be inserted between the brush onto the wheel, a roller to support and guide the article and a trough in alignment with the roller and with the wheel, substantially as and for the purposes herein set forth.

5. In a dish washing machine, the combination with a basin, of juxtaposed brushes within the basin, a shaft within the basin, a wheel on the shaft to receive and support and rotate the article to be cleaned, a roller adapted to support and guide the article, another roller flexibly mounted to admit the article and to engage with it to guide it and a trough in alignment with the rollers, and the wheel to guide the article during its insertion, said rollers and wheel being in alignment with each other, substantially as and for the purposes herein set forth.

6. In a dish washing machine, the combination with a basin, of a driving shaft extending transversely thereof, juxtaposed brushes within the basin mounted on brush shafts extending at right angles to the driving shaft, a yoke, sprocket wheels, shafts journaled in the yoke on which the sprocket wheels are mounted, sprocket chains connecting the sprocket wheels, a bevel pinion to rotate with one of the sprocket wheels, a

bevel gear on the driving shaft in mesh with the bevel pinion, the shafts of the sprocket wheels being in engagement with the brush shafts to rotate the brushes, and means for supporting articles in the basin between the brushes to be cleaned thereby, substantially as and for the purposes herein set forth.

7. In a dish washing apparatus, the combination with a basin, having forwardly frame members at the sides of the basin supporting it, rods connecting the frame members and rigidly secured thereto, a driving shaft journaled transversely in the frame members, a yoke attached to one of the rods and supported by the driving shaft, brushes in the basin, rotating mechanism for the brushes mounted on the yoke, engaging means whereby the driving shaft drives the rotating mechanism for the brushes and means for supporting articles within the basin to be cleaned by the brushes, substantially as and for the purposes herein set forth.

8. In a dish washing apparatus, a basin, a plurality of separately mounted and independently moving juxtaposed brushes therein, means for rotating the brushes, a shaft in the basin, wheels on the shaft, means for supporting and guiding articles on the wheels on the shaft to be cleaned by the brushes, rotating mechanism for the shaft, and means for detachably mounting the shaft in operative engagement with the rotating mechanism, substantially as and for the purposes herein set forth.

9. In a dish washing apparatus, a basin, a plurality of separately mounted and independently moving juxtaposed brushes in the basin, and means for rotating the brushes, a shaft in the basin extending transversely of and below the brushes, a wheel on the shaft to support and guide and rotate articles between the brushes to be cleaned thereby, rotating mechanism for the shaft located outside the basin, connecting means between the shaft and its rotating mechanism, said connecting means extending through the side of the basin, a stuffing box around the connecting means where it extends through the side of the basin, and means for detachably mounting said shaft in operative engagement with said connecting means, substantially as and for the purposes herein set forth.

10. In a dish washing apparatus, a basin, juxtaposed brushes therein rotatable upon axes inclined down from the front to the rear of the basin, said brushes being helical in formation and so disposed with respect to their normal direction of rotation as to direct water down from the front to the rear of the basin during said rotation, means for supporting articles to be cleaned by the brushes within the basin, and a water inlet to the basin near its upper forward side,

whereby water may be directed toward the helical brushes and be guided by said brushes as stated, substantially as and for the purposes herein set forth.

11. In a dish washing machine, the combination with a basin, of juxtaposed brushes therein, means for supporting and guiding and rotating articles between said brushes to be cleaned thereby, a brush shaft for each brush, a rotating shaft for each brush shaft, means for engagement between each brush shaft and its rotating shaft disengageable longitudinally of the shafts, and supporting means for the brush shafts yieldable longitudinally thereof, substantially as and for the purposes herein set forth.

12. In a dish washing machine, the combination with a basin having brushes for cleaning articles inserted therein, a shaft within the basin having means for supporting and guiding and rotating articles between said brushes to be cleaned thereby, rotating mechanism for the shaft, means for operative engagement between the shaft and its rotating mechanism disengageable longitudinally of the shaft, and means for supporting the shaft yieldable longitudinally thereof, substantially as and for the purposes herein set forth.

13. In a dish washing machine, the combination with a basin, a yoke having a part extending transversely of the basin near the upper side thereof, a driving shaft extending transversely of the basin adjacent to the yoke, sprocket wheels, shafts on which the sprocket wheels are mounted journaled in the transversely extending part of the yoke at right angles to the driving shaft, sprocket chains connecting the sprocket wheels, a bevel pinion on one of the shafts on which one of the sprocket wheels is mounted, a bevel gear on the driving shaft in mesh with the bevel pinion, brushes in the basin juxtaposed in a series extending transversely of the basin and rotatable upon axes extending in an inclined position down from the front to the rear thereof, brush shafts forming the axes of the brushes, means for engagement between the brush shafts and the shafts on which the sprocket wheels are mounted at the upper forward ends of the brush shafts disengageable longitudinally of the shafts, supporting means for the brush shafts at their lower rearward ends yieldable longitudinally of the shafts, said brush shafts being rotatable on said supporting means, substantially as and for the purposes herein set forth.

14. In a dish washing machine, the combination with a basin, of helical brushes juxtaposed therein, each brush comprising a shaft consisting of two twisted plates and impinging material between the plates, the plates being secured together and said impinging material having a helical form due

to the twisting of said plates thus secured together with said material between them, a hub secured to one end of each shaft consisting in the two twisted plates, pegs in one of the hubs, a socket in the other of the hubs, shafts comprising parts of rotating mechanism for the brushes, each shaft having slots extending radially thereof to receive the pegs in the hubs of the shafts of the brushes, the hubs on the other ends of the shafts having sockets, parts of the basin being provided with recesses, pins extending into the recesses, springs in the recesses yieldably supporting the pins, the sockets in the hubs on the shafts of the brushes being adapted to receive the pins, whereby said brushes are removably mounted in the basin for rotation therein, and means for supporting articles between the brushes in the basin to be cleaned by said brushes, substantially as and for the purposes herein set forth.

15. In a dish washing machine, the combination with a basin having juxtaposed brushes therein in a series extending transversely thereof and rotatable on axes extending across the basin and inclined down from the front to the rear thereof, a shaft extending transversely of the basin below the brushes, wheels on the shaft in alinement with the spaces between the brushes having grooved peripheries, rollers located forwardly of the basin near the upper side thereof with grooved peripheries and in alinement with the wheels on the shaft, other rollers to the rear of the basin near the top thereof, forks on which said rollers are journaled mounted on flexible supports consisting in flat springs which are attached to part of the basin near its rear, said other rollers being in alinement with the rollers in front and the wheels on the shaft, where-

by articles inserted between the brushes may be supported by said rollers forwardly and rearwardly of the basin, the rollers journaled in the forks on the flexible supports being adapted to yield rearwardly to allow the insertion of the articles, substantially as and for the purposes herein set forth.

16. In a dish washing machine, the combination with a basin, of helical brushes juxtaposed therein, and means for receiving and supporting and rotating dishes between the juxtaposed brushes within the basin, a shaft extending transversely of the basin to actuate the juxtaposed brushes, and a helical brush adapted to rotate about an axis parallel to the axis of the shaft and operatively connected to said shaft where it may be rotated simultaneously with the actuation of the juxtaposed brushes, substantially as and for the purposes herein set forth.

17. In a dish washing machine, the combination of a basin with helical brushes juxtaposed therein, and a shaft extending transversely of the basin to actuate the juxtaposed brushes, of a helical brush mounted to rotate on an axis parallel to the axis of the shaft, brushes mounted adjacent to each other to rotate on parallel axes parallel to the axis of the shaft, and means for operatively connecting the shaft, the helical brush and the brushes mounted adjacent to each other, whereby they may be rotated simultaneously with the actuation of the juxtaposed brushes within the basin, substantially as and for the purposes herein set forth.

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