Aug. 14, 1945. E. J. McGUINNESS 2,382,892

CLEANING APPARATUS

Filed April 7, 1943 3 Sheets-Sheet 1

FIG. 1

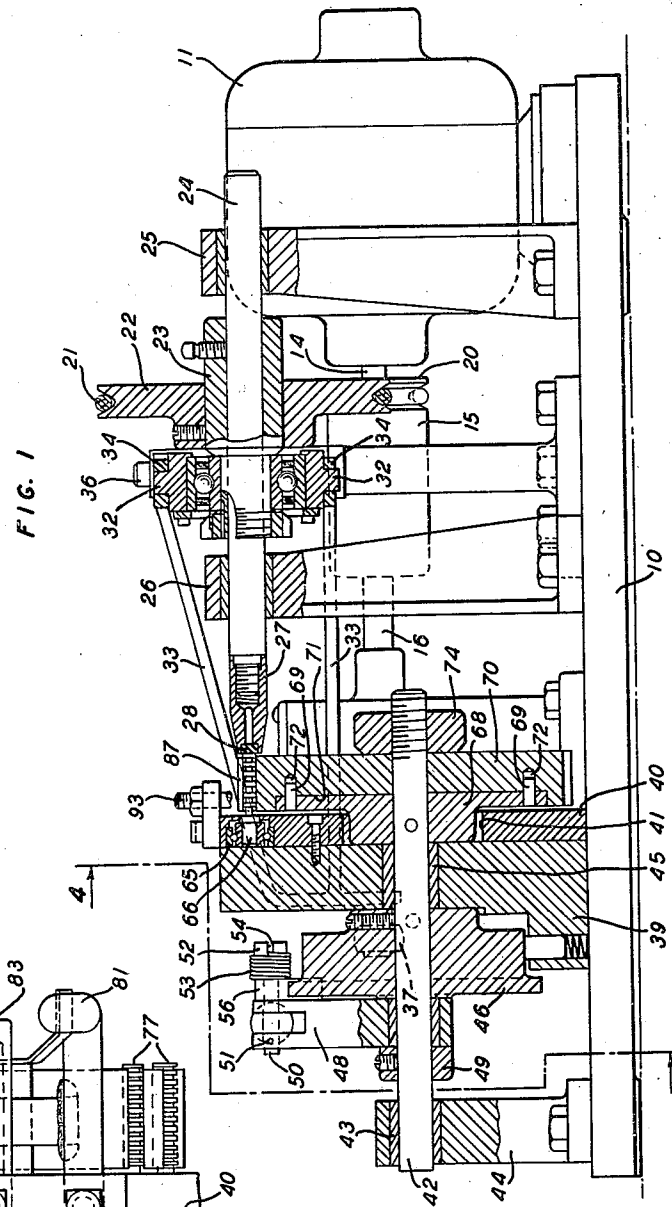
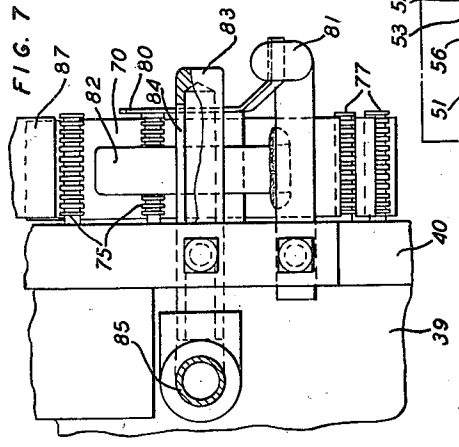


FIG. 7



INVENTOR
E.J. McGUINNESS
BY
E.R. Nowlan
ATTORNEY

Aug. 14, 1945. E. J. McGUINNESS 2,382,892

CLEANING APPARATUS

Filed April 7, 1943 3 Sheets-Sheet 2

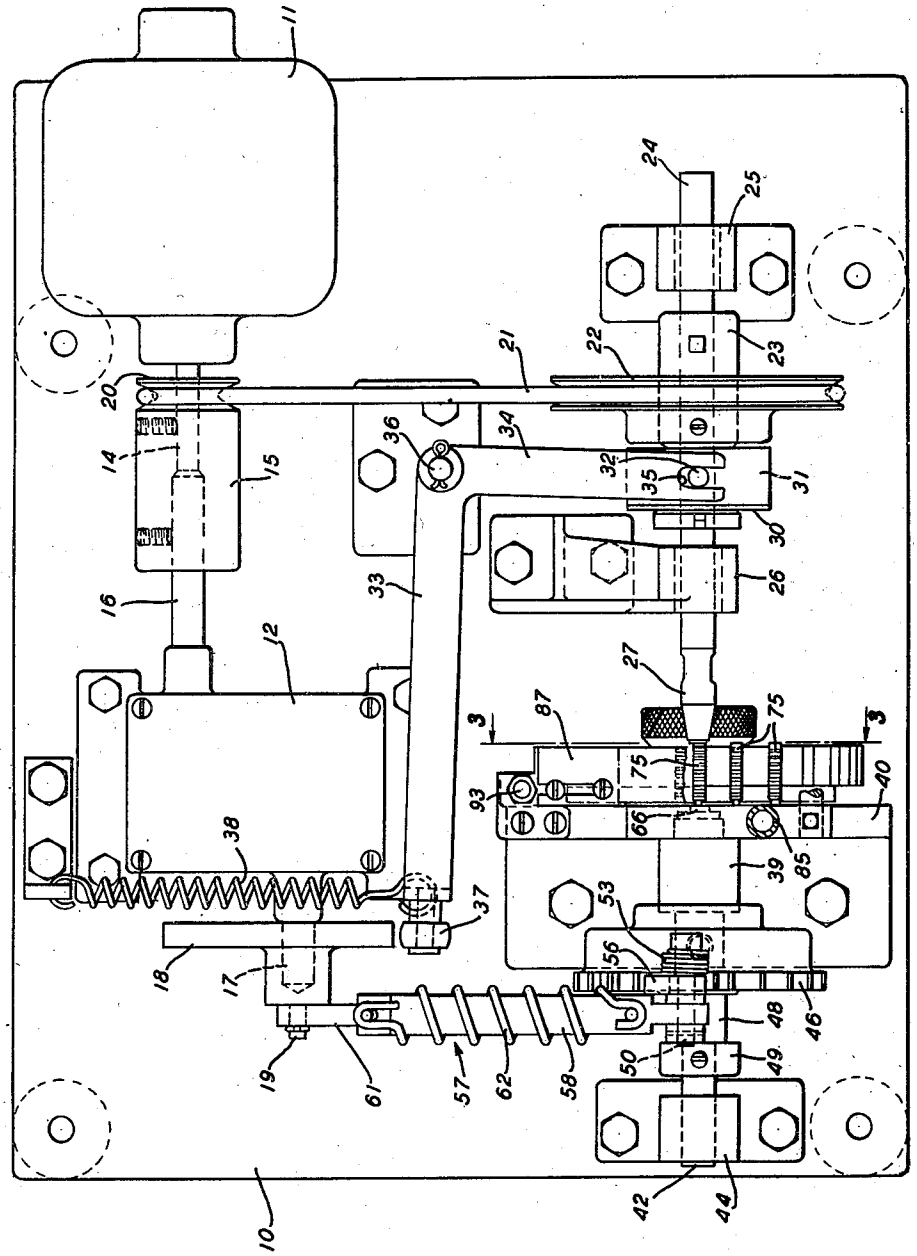


FIG. 2

INVENTOR
E.J. McGUINNESS
BY
E.R. Bowlan
ATTORNEY

Aug. 14, 1945. E. J. McGUINNESS 2,382,892

CLEANING APPARATUS

Filed April 7, 1943 3 Sheets-Sheet 3

FIG. 3

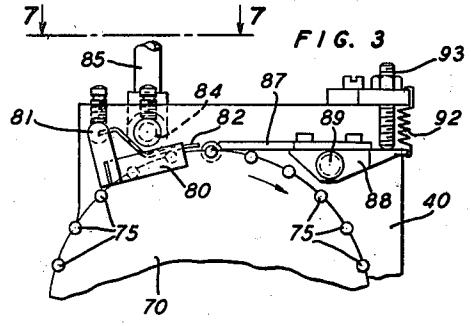


FIG. 5

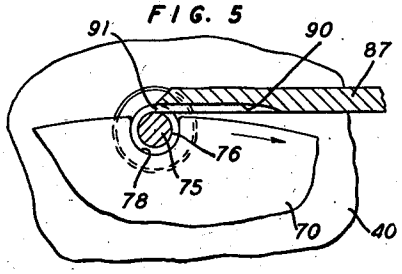


FIG. 4

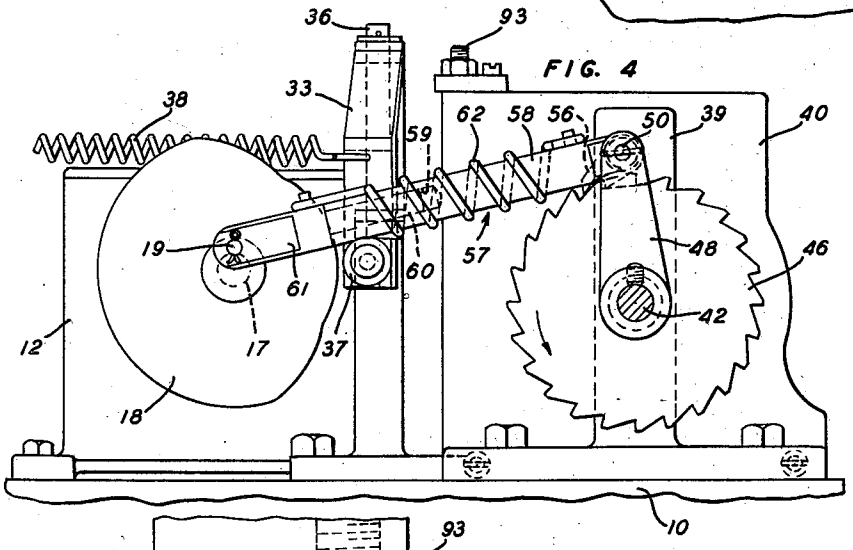
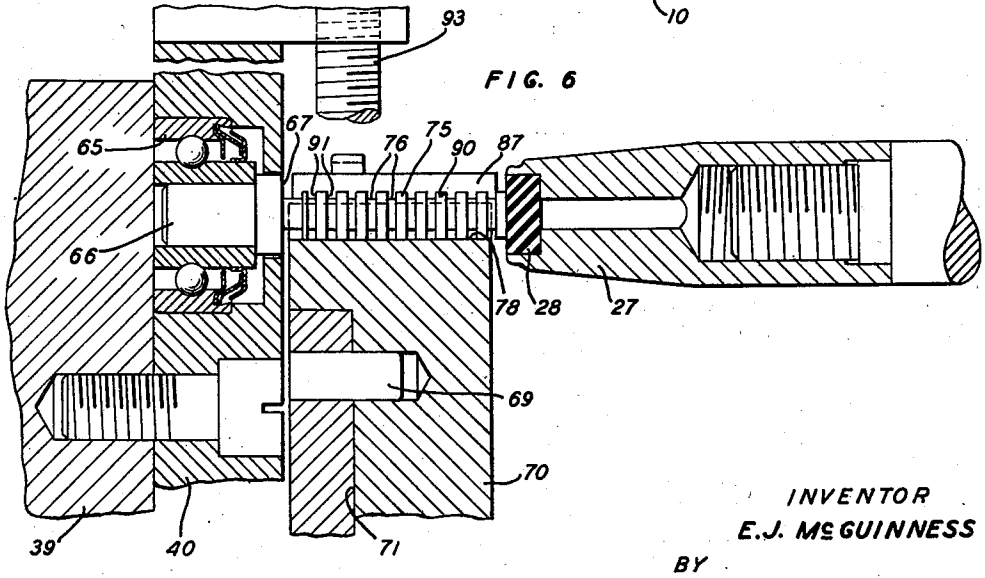


FIG. 6



INVENTOR
E.J. McGUINNESS
BY
E.R. Nowlan
ATTORNEY

Patented Aug. 14, 1945

2,382,892

UNITED STATES PATENT OFFICE

2,382,892

CLEANING APPARATUS

Edward J. McGuinness, Newark, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application April 7, 1943, Serial No. 482,085

11 Claims. (Cl. 15—93)

This invention relates to cleaning apparatus, and more particularly to apparatus for cleaning machined parts of foreign particles.

During the manufacture of machined parts, particularly those having grooves or depressions therein, foreign particles may be present which render it difficult to assemble other parts thereon. Thus it is important that such articles be free of the foreign particles so that accurate assemblage of parts thereon may be assured.

An object of the invention is to provide a cleaning apparatus particularly adapted for freeing machined parts of foreign particles.

With this and other objects in view, the invention comprises an apparatus for cleaning machined or other circular articles, including an element partially conforming to the article and mounted to engage the article during rotation thereof to remove the foreign particles therefrom.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a vertical sectional view of the apparatus;

Fig. 2 is a top plan view of the apparatus;

Fig. 3 is a fragmentary detailed view of the article feeding and cleaning means, this view being taken along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 1;

Fig. 5 is an enlarged fragmentary detailed view of a portion of the structure shown in Fig. 3;

Fig. 6 is an enlarged fragmentary sectional view of the article feeding and rotating mechanism, and

Fig. 7 is an enlarged fragmentary top plan view taken substantially along the line 7—7 of Fig. 3, portions thereof being broken away.

Referring now to the drawings, attention is first directed to Fig. 2, which illustrates a base 10 upon which a motor 11 and a speed reducing unit 12 are mounted. The motor 11 may be supplied with a suitable electrical energy to cause it to rotate its shaft 14 in a desired direction. A coupling 15 connects the shaft 14 with an input shaft 16 of the unit 12. An output shaft 17 of the unit 12 has a cam 18 and an eccentric 19 mounted thereon. It is the purpose of the unit 12 to reduce the driving speed received at 16 and transmitted to the output shaft 17.

A pulley 20 is also mounted upon the shaft 14 of the motor and is connected, through a belt 21, to a pulley 22. The pulley 22 is fixedly mounted upon a collar 23 which in turn is secured at any desired position on a shaft 24, the latter being supported by bearings 25 and 26 for axial movement therein. On the forward end of the shaft 24, a chuck or rotatable unit 27 is mounted, the end thereof being recessed, as illustrated in Fig. 6, to receive a resilient chuck member 28 for a purpose hereinafter described. A yoke 31, mounted upon a bearing which in turn is mounted upon a reduced portion of collar 23, carries diametrically opposed pins or projections 32 (Figs. 1 and 2). A cam lever 33 of the contour shown in Figs. 1, 2 and 4, has spaced ends 34 forked, as at 35, to straddle their respective projections 32. The lever 33 is pivotally supported, at 36, and supports a cam roller 37 positioned to be engaged by the cam 18. A spring 38, connected to the lever 33, applies a force to move the shaft and the rotatable member to the left (Fig. 2). The cam functions against the force of the spring to move the shaft and its rotatable member in the opposite direction, that is to the right.

A T-shaped bracket 39 (Figs. 1, 2 and 4), mounted upon the base 10, has a supporting plate 40 fixed thereto and provided with a central aperture 41, as illustrated in Fig. 1. A shaft 42, journalled in a bearing 43 of a bracket 44, and a bearing 45 of the bracket 39 has a ratchet wheel 46 mounted thereon between the brackets 39 and 44. A lever 48 is rotatably mounted upon the shaft 42 between the ratchet wheel 46 and a collar 49, the latter being fixed to the shaft. A pivot member 50, carried by the lever 48, is fixed to the lever against rotation by the aid of a pin 51 and has a slotted head portion 52 upon which is disposed a helical spring 53. One end of the spring is fixed in a slot 54 of the head 52, as illustrated in Fig. 1, the other end thereof being connected to a pawl 56 which is pivotally mounted upon the member 50 and urged into engagement with the teeth of the ratchet wheel 46 through the force of the spring 53. An extensible link 57 operatively connects the pivot member 50 of the lever 48 with the eccentric 19. This link includes a portion 58 connected to the pivot member 50 and having an aperture 59 in the opposite end thereof to receive an interfitting projection 60 of a portion 61, the latter being connected to the eccentric 19. A spring 62, disposed concentric with the portion 58 and having its ends connected respectively to the portions 58 and 61, normally holds the portions of the link in retracted positions but permits expansion of the link should the occasion arise that such is necessary.

As illustrated in Figs. 1 and 6, a bearing 65 mounted in the supporting plate 40 serves as a

mounting for a rotatable member 66, disposed in axial alignment with the rotatable unit 27 on the shaft 24, and has an article engaging surface 67 positioned against axial movement.

Means is provided to feed articles to be cleaned intermittently between the rotatable members 27 and 66. This means includes a supporting wheel 68 fixedly mounted upon the shaft 42 and having outwardly projecting pins 69 disposed at spaced positions adjacent its periphery. An article supporting wheel or element 70, recessed as at 71 to receive the disk-like portion of the wheel 68 and apertured at 72 to receive the pins 69, is also centrally apertured for mounting upon the shaft 42, as illustrated in Fig. 1, and to be secured in place thereon through the aid of a nut 74.

In the present embodiment the articles to be cleaned, indicated at 75, are machined with a plurality of grooves 76 therein. These articles may be condenser shafts, the grooves to receive the movable condenser plates. To assure the possibility of assembling the condenser plates in the grooves, it is necessary that metal chips and other foreign particles, which may be present thereon during or after the machining of these articles, be removed. The article supporting element 70 is therefore provided with a plurality of recesses or pockets 78 to receive the articles 75. These pockets are shaped so as to permit rotation of the articles therein when moved to the cleaning position in axial alignment with the rotatable members 27 and 66. Furthermore, they are spaced so as to successively position their articles at the cleaning positions during the movement of the ratchet wheel 46 the distance of one tooth.

Although the articles are disposed loosely in the pockets at the feeding position, means is provided to accurately locate the articles in their pockets for movement into cleaning position. This means includes a resilient member or spring 80 carried by an arm 81 supported by the plate 40, the spring being positioned to engage the outer ends of the articles and force them inwardly to cause their inner ends to ride upon the adjacent surface of the plate 40. Another resilient element 82, supported by the arm 81, is positioned to ride upon the periphery of the article supporting element 70, to retain the articles in their pockets. This structure is shown clearly in Figs. 3 and 7. While viewing these figures, attention is directed to a fluid nozzle 83, which is in the form of a cylinder with a closed end having an elongate aperture 84 therein to direct a fluid toward the article at the cleaning position. A supply line 85 is connected to the nozzle 83 to supply the cleaning fluid thereto.

A cleaning element 87, mounted upon a cradle 88 which is pivotally supported at 89, extends forwardly to what has been termed the cleaning position, where its forward end lies in interengagement with the article 75 at this position. By viewing the article 75 shown in Fig. 6, it will also be observed that a plurality of notches 90 is cut back a given distance, as illustrated in Fig. 6, these notches being adapted to receive the high or outer portions of the article and causing the formation of teeth or projections 91 which extend into the groove 76 of the article to engage not only the inner cylindrical surfaces but the adjacent walls of the side walls of the notches. Thus the cleaning element 87 is formed to partially conform to the article to engage all surfaces thereof during rotation of the article, to forcibly remove all foreign particles from the articles. The contour of the cleaning element 87 therefore depends upon the contour of the article, and if articles of different contours from that shown are to be cleaned, such variations will be present in the contour of the cleaning element employed. By viewing Fig. 3, it will be observed that the rearmost end of the cradle 88 has connected thereto a spring 92 normally urging a forward end of the cleaning element toward the article at the cleaning position, this movement being limited and under the control of an adjustable stop 93.

Considering now the operation of the apparatus, let it be understood that the motor 11 is energized, causing rotation of the shaft 24 and with it the rotatable member or unit 27. At the same time the unit 12 receives a rotating power at its input shaft 16, transmitting a given rotary motion to the shaft or output 17, including the cam 18 and the eccentric 19. Thus the axial movement of the rotatable unit 27 through the cam 18 and the lever 33, will be in timed relation with the intermittent movement of the article support 70 through the actuation of the pawl and ratchet 54—46.

When the rotatable member 27 is in its inoperative position, the article support 70 will be advanced one position to locate an article in the cleaning position in axial alignment with the rotatable member 66, and in engagement with the surface 67 thereof. As soon as this movement has been completed, the rotatable member 27 will be moved into engagement with the article, the resilient chuck member 28 affording sufficient connection between the rotatable member and the article to cause rotation of the article in its pocket 78 and relative to the cleaning element 87. During rotation of the article, the engagement of every surface thereof with the cleaning element will bring about the removal of all foreign particles from the article. At this same time a sheet of cleaning fluid, which may be air or any other suitable fluid, will be directed toward the article through the aperture 84 in the nozzle 83, to wash the foreign particles from the article. This operation may continue automatically, requiring only the feeding of the articles into the pockets of the article support 70. The continued rotation of the member 27 will cause at least one complete revolution of the article, if not a plurality of revolutions thereof, to assure a complete removal of all foreign particles.

Although specific improvements of the invention have been shown and described, it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. An apparatus for cleaning machined articles comprising an article feeding element adapted to successively move articles, having grooves in their peripheries, relative to a cleaning position, a cleaning member, conforming to the general contours of the peripheries of the articles, mounted to interengage the articles successively at the cleaning position, and means to rotate the articles at the cleaning position to render the member effective to remove foreign particles from the articles.

2. An apparatus for cleaning machined articles comprising an article feeding element adapted

to successively move articles, having grooves in their peripheries, relative to a cleaning position, a cleaning member, conforming to the general contours of the peripheries of the articles, mounted to interengage the articles successively at the cleaning position, means to rotate the articles at the cleaning position to render the member effective to remove foreign particles from the articles, and means to direct a sheet of fluid under pressure to the cleaning position longitudinally of the article to cause washing of the foreign particles therefrom.

3. An apparatus for cleaning machined articles comprising an article feeding element adapted to successively move articles, having concentrically machined contours, relative to a cleaning position, a cleaning member, conforming to the general contours of the articles, mounted to interengage the articles successively at the cleaning position, means to rotate the articles at the cleaning position to render the member effective to remove foreign particles from the articles, and means to intermittently move the element to advance the article.

4. An apparatus for cleaning machined articls comprising an element, having spaced recesses therein to receive articles having concentrically machined contours, mounted for movement to successively advance the articles to a cleaning position, a cleaning member, conforming to the general contours of the articles, mounted to interengage the articles successively at the cleaning position, and means to rotate the articles at the cleaning position to render the member effective to remove foreign particles from the articles.

5. An apparatus for cleaning machined articles comprising an element, having spaced recesses therein to receive articles having concentrically machined contours, mounted for movement to successively advance the articles to a cleaning position, a cleaning member, conforming to the general contours of the articles, mounted to interengage the articles successively at the cleaning position, means to rotate the articles at the cleaning position to render the member effective to remove foreign particles from the articles, and means to retain the articles in their recesses during their movement relative to the cleaning position.

6. An apparatus for cleaning machined articles comprising an article feeding element adapted to successively move articles, having concentrically machined contours, relative to a cleaning position, a cleaning member, conforming to the general contours of the articles, mounted to interengage the articles successively at the cleaning position, means to rotate the articles at the cleaning position mounted for movement into and out of engagement with the articles at the said position, and separate means to cause movement of the element and rotating means in timed relation with respect to each other.

7. An apparatus for cleaning circular articles comprising rotatable members mounted for relative axial movement, means to position a circular article between the members in axial alignment with the members for rotation therewith, means held against rotation with the article and in engagement therewith to clean the article of foreign particles, a power means, and separate means driven by the power means to cause rotation of the members, cause positioning of the article and cause axial movement of the rotatable members.

8. An apparatus for cleaning circular articles comprising a driven member rotatable about its axis, a drive member axially aligned with the driven member, a member having a recess therein to support an article and adapted to position the article between the drive and driven members, power means driving the drive member to rotate the article and the driven member, and a fixed cleaning element engaging the article during rotation thereof to clean the article.

9. An apparatus for cleaning circular articles comprising a driven member rotatable about its axis, a drive member axially aligned with the driven member, a member having a recess therein to support an article and adapted to position the article between the drive and driven members, power means driving the drive member to rotate the article and the driven member, and a fixed cleaning element engaging the article during rotation thereof to clean the article, the recessed member being further adapted to receive the article from the drive and driven members and move the article away from the members.

10. An apparatus for cleaning articles comprising spaced rotatable members having aligned axes, a feeding wheel having spaced pockets in the periphery thereof to receive articles, means to cause intermittent rotation of the wheel to successively present the articles in the pockets between the members, means to cause the members to grip and rotate the articles singly, and means positioned to engage the articles while rotating to clean the articles.

11. An apparatus for cleaning articles comprising spaced rotatable members having aligned axes, a feeding wheel having spaced pockets in the periphery thereof to receive articles, means to cause intermittent rotation of the wheel to successively present the articles in the pockets between the members, means to cause the members to grip and rotate the articles singly, means positioned to engage the articles while rotating to clean the articles, and means to cause the members to successively release the articles into their respective pockets.

EDWARD J. McGUINNESS.