July 4, 1961 E. J. GUINN 2,990,655

FINISHING MACHINE

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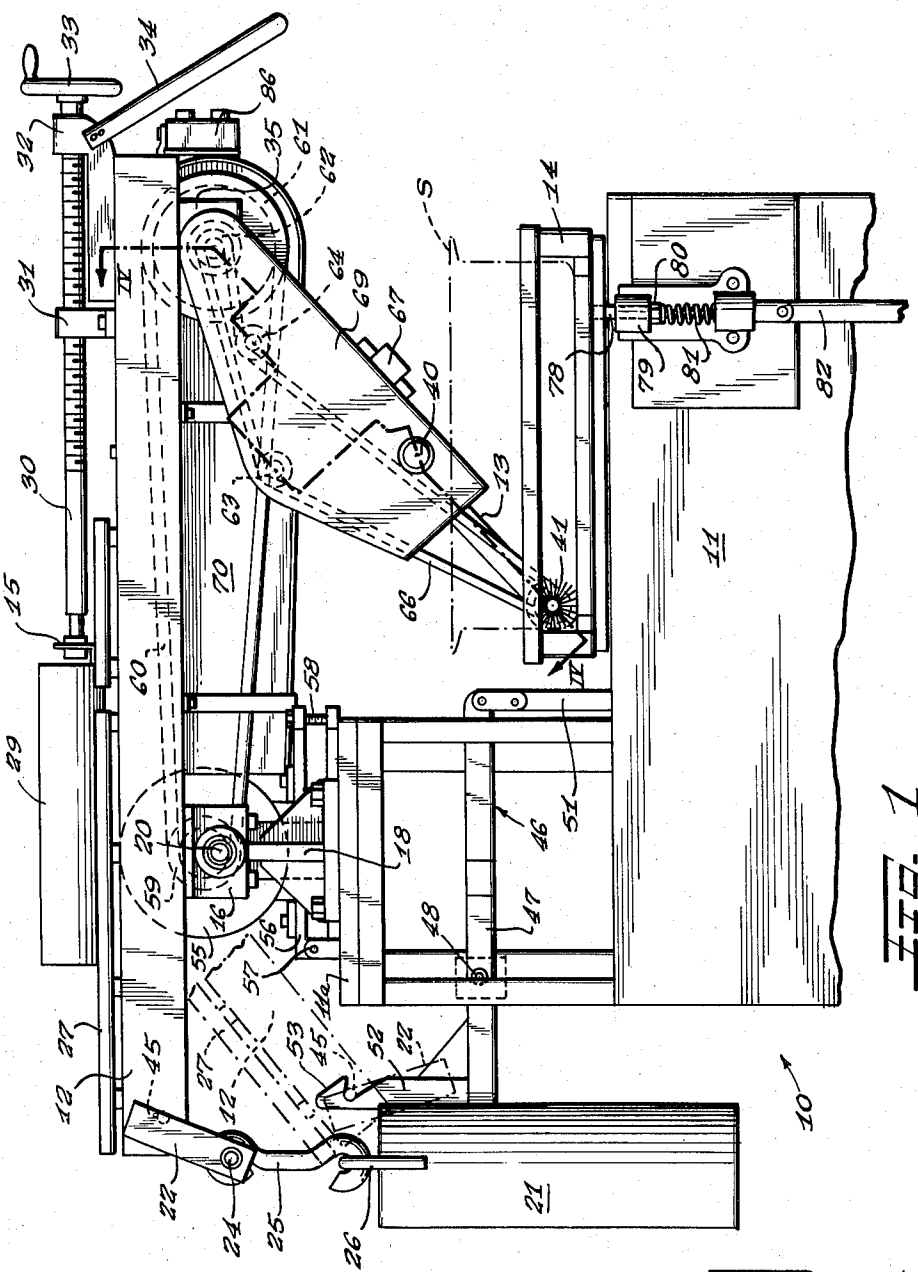


Fig. 1

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6 Sheets-Sheet 2

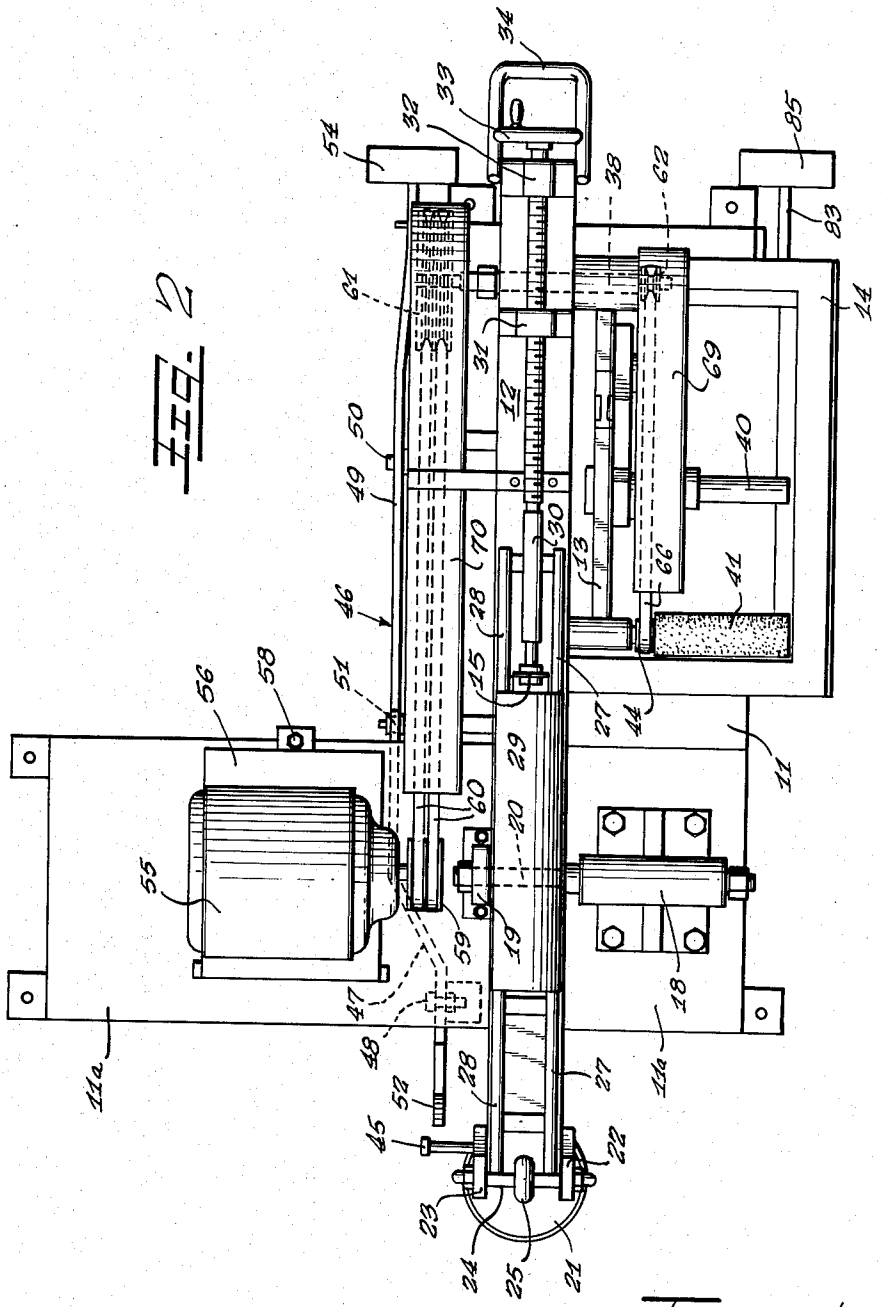


FIG. 2

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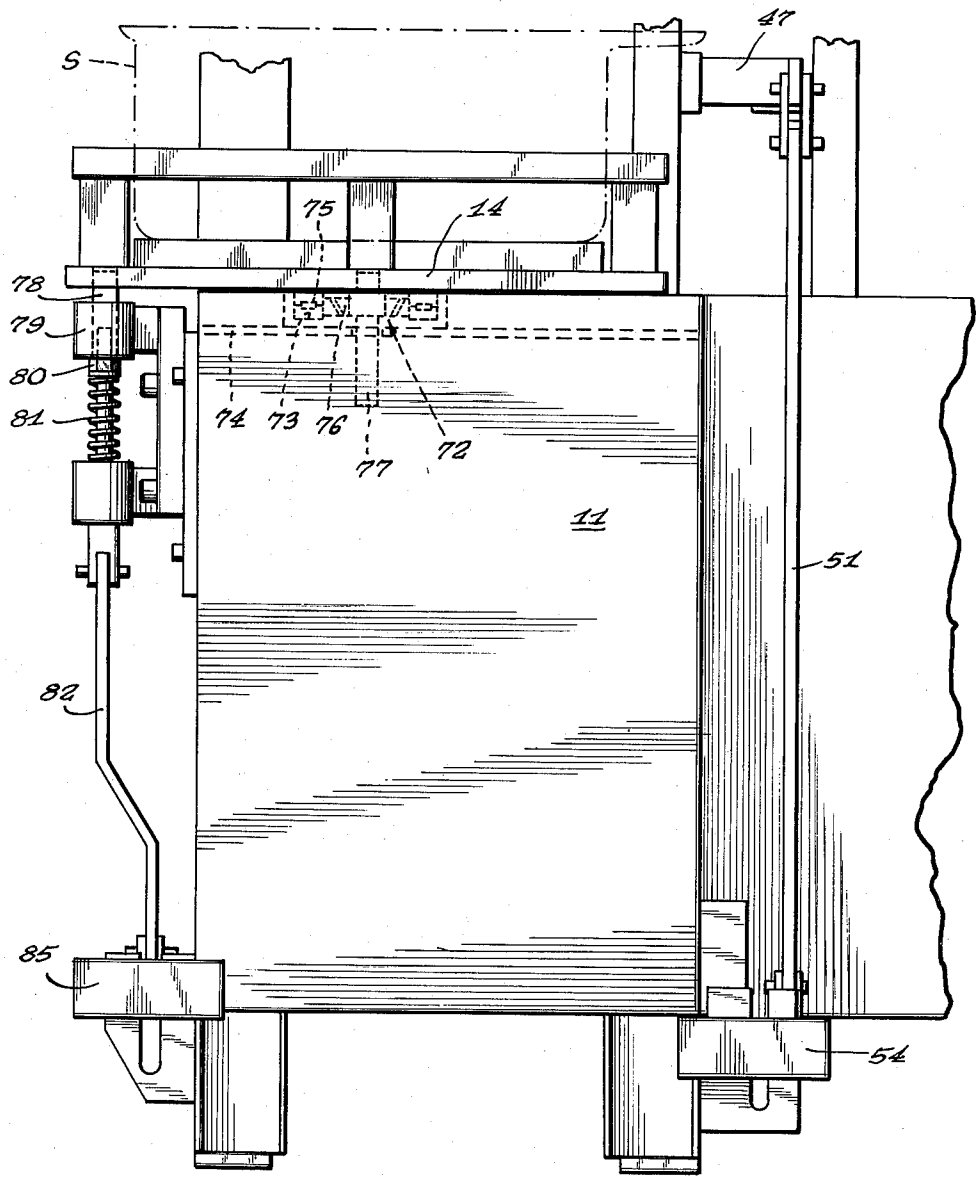


Fig. 3

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FINISHING MACHINE

Filed Aug. 25, 1958 6 Sheets-Sheet 4

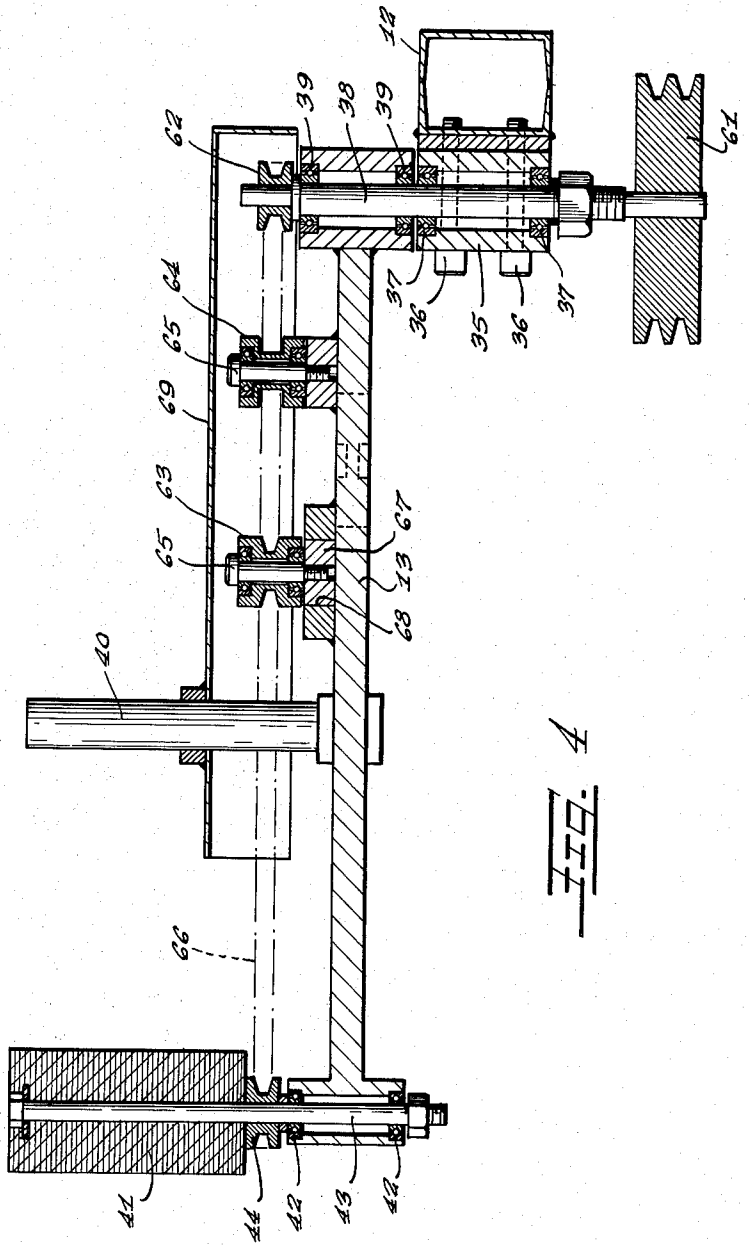


Fig. 4

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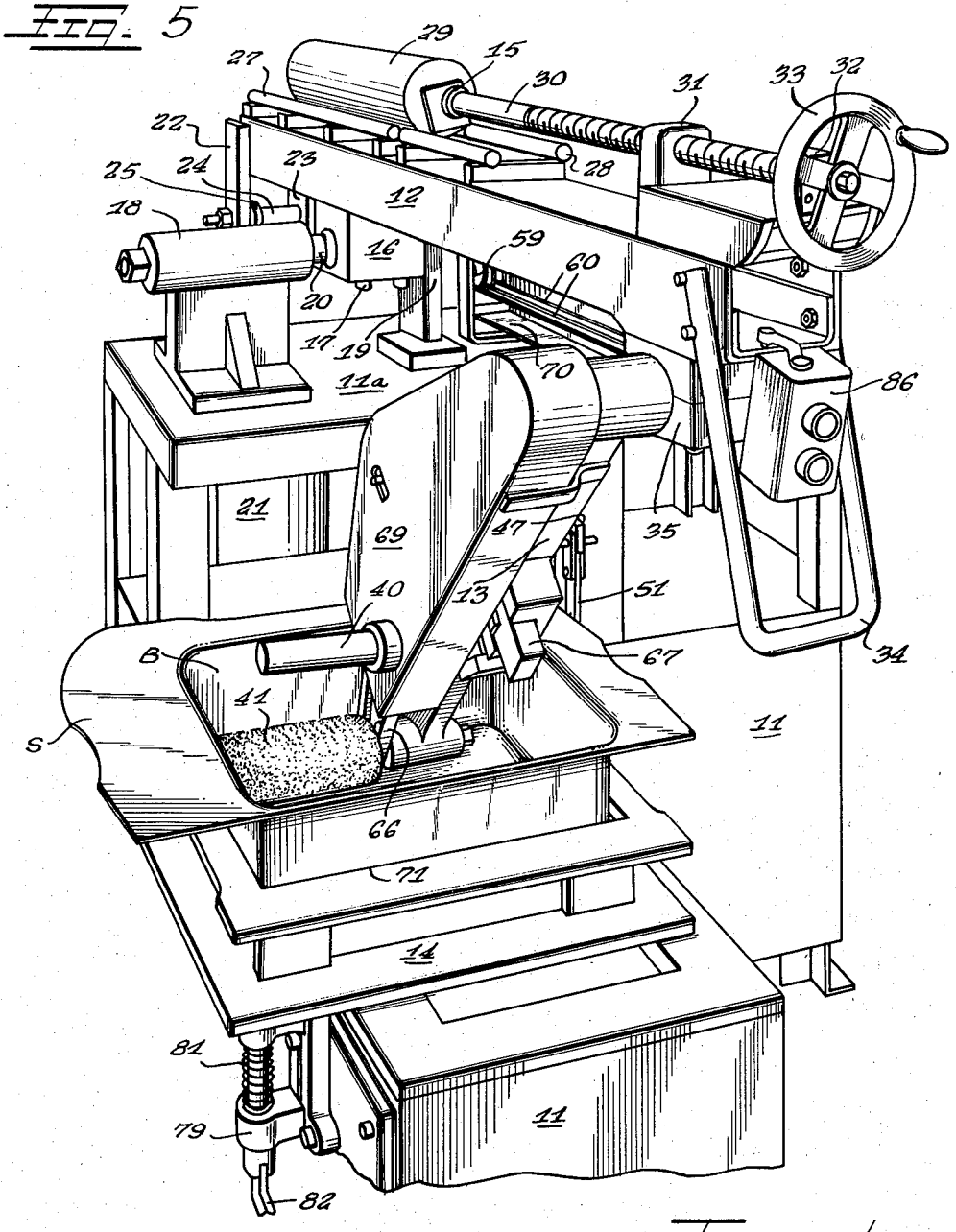
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July 4, 1961 E. J. GUINN 2,990,655

FINISHING MACHINE

Filed Aug. 25, 1958 6 Sheets-Sheet 5

Fig. 5



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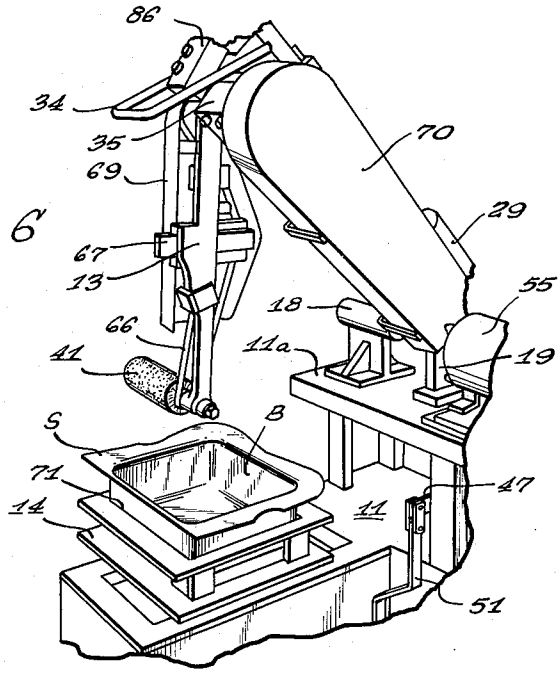
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FINISHING MACHINE

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Fig. 6



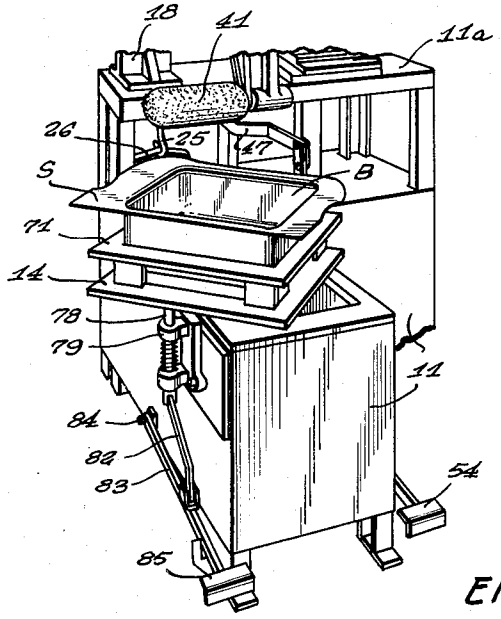


Fig. 7

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United States Patent Office 2,990,655 Patented July 4, 1961

2,990,655

FINISHING MACHINE

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10 Claims. (Cl. 51—99)

This invention relates generally to finishing machines, and more specifically to an improved buffing machine which is particularly well adapted to polish the interior of sink bowls.

Although the principles of the present invention may be included in various buffing or polishing machines, a particularly useful application is made in a buffing machine such as is disclosed herein. In particular, when metal sinks, such as stainless steel, are fabricated from a sheet of metal, such fabrication is typically accomplished by a deep-drawing process. This process leaves tool marks on the interior portion of the sink, which are unsightly. Heretofore, it has been common to remove these tool marks by hand or by using hand-held devices. This method has been both tiresome and unwieldy. It has been impractical to increase the size of buffer used so as to speed up the operation owing to the weight which the operator would have to hold.

The present invention contemplates the utilization of a base which supports the sink to be polished as well as the means for polishing the sink. The polishing means are provided with a source of power, and are adapted to be guided by hand over the surfaces of the article which are to be polished. Provision is made to releasably lock the workpiece in a given position, and to releasably lock the buffing element in a raised or retracted position. Provision is also made for automatic starting and stopping of buffer movement in response to raising and lowering of the buffing element.

Accordingly, it is an object of the present invention to provide an improved buffing machine.

Another object of the present invention is to provide a buffing machine which may be manually guided over various surfaces of a workpiece which is too large to hold by hand.

Yet another object of the present invention is to provide a buffing machine, the buffing element of which automatically starts and stops rotating in response to its position.

A still further object of the present invention is to provide a machine for supporting and driving a relatively large buffing element, the weight of which is effectively balanced out.

Yet another object of the present invention is to provide a buffing machine having a buffing member which may be retracted and releasably locked in a retracted position.

Yet another object is the provision of a buffing machine having movable elements whose relative friction is oppositely directed to the friction created between the buffer and the workpiece.

A still further object of the present invention is the provision of a buffing machine which is adapted to releasably support a workpiece in various buffing positions.

Another object of the present invention is the provision of a buffing machine which is particularly suited to polish the interior of a sink bowl.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating

the principles of the present invention is shown by way of illustrative example.

On the drawings:

FIGURE 1 is a side view of a buffing machine provided in accordance with the present invention, with the lower portion thereof omitted;

FIGURE 2 is a top view of the buffing machine shown in FIGURE 1;

FIGURE 3 is an end view of the lower portion of the machine as viewed from the right of FIGURES 1 and 2;

FIGURE 4 is an enlarged sectional view taken generally along line IV—IV of FIGURE 1;

FIGURE 5 is a perspective view of the machine shown in FIGURE 1, with a workpiece disposed in the machine, the lower portion of the machine being omitted;

FIGURE 6 is a fragmentary perspective view of the machine shown in FIGURE 1 taken from the opposite side from that which FIGURE 5 is taken; and

FIGURE 7 is a fragmentary perspective view generally similar to FIGURE 5, but in reduced scale and showing the lower portion of the machine with the workpiece partially rotated.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in a buffing machine assembly such as illustrated in FIGURE 1, generally indicated by the numeral **10**. The machine includes a base **11**, a boom **12**, an arm assembly **13**, and a workpiece supporting table **14**. As best seen in FIGURE 2, the base **11** is generally L-shaped, one leg of the L supporting the table **14**, and the other leg of the L being generally elevated as indicated at **11***a*, best seen in FIGURE 1.

The boom **12** is provided with a bearing block **16** which depends from its lower surface and which is secured to the boom **12** such as by screws **17**. The upper level **11***a* of the base **11** supports a pair of journal blocks **18**, **19** while a shaft **20** extends through the journals **18** and **19** as well as the bearing block **16**. The shaft **20** is disposed horizontally so that the boom **12** may pivot about a horizontal axis extending through the shaft **20**. The bearing block **16** is secured to the boom **12** adjacent to one end thereof, so that the boom is inherently unbalanced. Remotely from the axis of the shaft **20**, there is secured a counterweight **21**. A pair of plates **22**, **23** are secured as by welding to the boom **12** while a transverse pin **24** is in turn supported by the plates **22**, **23**. A double ended hook **25** engages the pin **24** and a loop or eye **26** on the counterweight **21** to secure the counterweight **21** to the boom **12**.

To the upper surface of the boom **12**, there is secured a pair of rails **27**, **28**, each of which may be interrupted along its length as shown if desired. The rails **27** and **28** are disposed generally adjacent to the horizontal axis extending through the shaft **20**.

A second counterweight **29** is supported by the rails **27**, **28**, and is provided with a means for selectably varying the distance between the center of mass of the counterweight **29** and the axis of the shaft **20**. To this end, a shaft **30** is threadedly engaged by at least one of a pair of supports **31**, **32** secured to the upper surface of the boom **12**. The shaft **30** is provided with a hand crank **33** at one end, and with a relatively rotatable connection **15** at the other end with the counterweight **29**. The crank **33** is so positioned that the boom **12** and the arm **13** are in a generally balanced condition about the axis of the shaft **20**. To facilitate rocking of the boom **12** about the axis of the shaft **20**, there is provided a first handle **34** which in this embodiment is secured near the support **32** of the boom **12**, the handle **34** thus being at the end of the boom opposite to its pivoting axis.

Also at the end of the boom **12** opposite to the axis of the shaft **20**, there is a second bearing block **35** secured to the boom **12**.

As best seen in FIGURE 4, the bearing block **35** is hollow and is secured as by a pair of screws **36** to the boom **12**. A pair of bearings **37**, **37** is supported by the block **35** and receives a second shaft **38** therethrough, the shaft **38** being rotatable about a second horizontal axis.

The arm **13** is supported adjacent to one end thereof by a pair of bearings **39**, **39** received and carried on the shaft **38** so that the arm **13** is disposed in a laterally offset relation with respect to the boom **12** and is also rotatable about the second horizontal axis or shaft **38**. The arm **13** is provided with a second handle **40** which is secured to the arm **13** at a point remote from the second horizontal axis. The handle **40** extends so that its gripping portion is still further laterally offset with respect to the boom **12**.

The other end of the arm remote from the bearings **39** is provided with means for rotatably supporting a buffer element **41**. To this end, the arm **13** is made hollow as shown and provided with a pair of axially spaced bearings **42**, **42** through which a shaft **43** extends. The buffer **41** is corotatable with the shaft **43** as is also a pulley **44**. Suitable nuts, spacers, or washers are provided to hold the components together as shown. It is thus apparent that the buffer **41** is rotatable about a third horizontal axis.

Referring again to FIGURES 1 and 2, it may be seen that the boom **12** is provided with a horizontally directed pin **45** which is secured thereto at a point on the boom **12** remote from the arm **13** and on the other side of the first horizontal axis about which the boom **12** may be pivoted. There is also provided a lever system generally indicated by the numeral **46** having a latch mechanism adapted to interlock generally with the boom **12** and more specifically with the pin **45**, at a point remote from the first horizontal axis. The lever system **46** includes a horizontal lever **47** pivoted to the base **11** by a pin **48**, a second horizontal lever **49** pivoted to the base **11** by a pin **50** and disposed near the bottom of the machine, together with a link member **51** which pivotably joins together the levers **47** and **49**. At one end of the lever system **46**, and more particularly at the free or rear end of the lever **47**, there is provided an upwardly directed hook **52** which has a generally upwardly and forwardly directed cam surface **53** which is adapted to engage the pin **45** when the boom **12** is raised. The pin **45** cams the hook **52** out of the way to cause a pivoting of the lever **47** about the pin **48** until the pin **45** slips into the throat of the hook **52**. This interengagement holds the handle end of the boom **12** in a raised position, and holds the opposite end in a lowered position as shown by the dash-dot lines in FIGURE 1. The other end of the lever **49** is adapted to be actuated to release the hook **52** from the pin **45**. To facilitate this, the other end of the linkage and in particular the other end of the lever **49** is provided with a pedal portion **54** which may be downwardly deflected to effect a retraction of the hook **52** to disengage it from the pin **45**, thereby releasing the boom **12** so that it may be lowered into a position to engage the workpiece S.

Referring further to FIGURES 1 and 2, it may be seen that power for operating the buffing machine **10** is provided by a motor **55** which is secured to a support plate **56** pivoted to the base **11***a* by a pin **57**. The plate **56** is provided with means to adjust its position or angle with respect to the base, such means here comprising with the pivot pin **57** a screw **58** having threaded engagement with the plate **56** and abutting engagement with an upwardly directed stationary surface on the upper portion **11***a* of the base **11**.

The motor **55** is provided with a driving pulley **59** which is rotatable about an axis parallel to that of the shaft **20**. The motor axis is vertically offset by the plate

56 from the axis of the shaft **20** by an amount which is determined by the position of the plate **56** with respect to the base **11**. At least one belt **60** is directed about a driving pulley **59** and thence about a second pulley **61** corotatably carried on the shaft **38**, in alignment with the driving pulley **59**. As best seen in FIGURE 1, if the motor **55** were lowered by adjustment of the plate **56**, there would be no significant change in the tension of the belt **60**. However, if the boom **12** were rotated counterclockwise as shown in FIGURE 1, it can be seen that tension would be removed from the belt **60**. The amount of tension which is lost by raising the boom **12**, or which is gained by lowering the boom **12** is determined by the position of the motor **55** with respect to the base **11**. Thus lowering and raising the boom is effective to couple and to decouple, respectively, the pulleys **59** and **61**.

Referring to FIGURE 4, it can be seen that the pulley **61**, which is corotatably coupled to the shaft **38**, is also operative to effect rotation of an additional pulley **62** corotatably carried on the shaft **38**.

The arm **13** is provided with a further pair of pulleys **63**, **64** each of which is bearingly supported on a shaft pin **65**. The pulley **64** is an idler which acts to direct a belt **66** around a substantial portion of the pulley **62**. The pulley **63** is supported by a slide plate **67** slidably guided and supported in a channel **68** on the arm **13**. The slide plate may be secured in any selected position by conventional means (not shown) so that the pulley **63** may be employed as a tensioning pulley for the belt **66**. Thus the belt **66**, as best seen in FIGURE 1, extends between the pulleys **44** and **62**, being guided in part by the pulley **64** and being tensioned by the pulley **63**. Thus rotation of the pulley **61** is effective to rotate the buffer **41**.

Preferably, a belt guard **69** is provided for the belt **66**, and a belt guard **70** is provided for the belts **60**.

As best seen in FIGURES 6 and 7, the table **14** is provided with a nest-like portion **71** which receives the bowl B of the sink S. The table **14** is rotatably supported on the base **11**, such as by a bearing assembly **72**, best seen in FIGURE 3. The bearing assembly **72** includes a lower portion **73** which is supported by a transverse member **74** secured to the base **11**. The bearing assembly **72** includes an upper portion **75** secured to the table **14**. The bearing assembly **72** also includes a radial thrust portion **76** which carries part of the vertical load and which acts to center a pilot shaft **77** with respect to the bearing assembly **72**.

In the instant embodiment, the buffer **41** has a length which enables it to extend to the left wall of the sink S as seen in FIGURE 3 and to the right beyond the center-line of the bearing assembly **72**. Thus, when the table is rotated about the bearing assembly **72**, there will be a small portion of the buffer **41** which engages a central portion of the sink S for either of two sink positions 180 degrees apart from each other. Thus, so long as the buffer **14** can engage the sink S directly above the shaft **77**, there will be no portion of the bottom of the sink not engaged by the buffer **41**, but there will be a small area of overlap between successive passes of the buffer for different sink positions. This relationship will be maintained if the vertical axis of the shaft **77** or of the bearing assembly **72** is in a plane which is perpendicular to the rotational axis of the buffer, and extends transversely through the buffer.

A slide plunger **78** is slidably supported by a bracket **79** secured to the base **11**. The plunger **78** has a shoulder **80**, here comprising a nut, against which a spring **81** acts. The other end of the spring **81** engages a portion of the bracket **79** or base **11** to act thereagainst so that the spring **81** may expand to urge the plunger **78** upwardly into locking interengagement with the table **14**. The table **14** is provided with a plurality of openings or notches to receive the plunger **78**, each such opening or notch defining one angular position in which the

table 14 may be positively locked. As best seen in FIGURE 7, the plunger 78 is provided with a downwardly extending link 82 which is pivotally coupled to a lever 83 secured at one end by a pin 84 to the base 11. The other end of the lever 83 is provided with a pedal portion 85 by which the plunger 78 may be retracted to unlock the table 14 for rotation.

If desired, a switch assembly 86 may be disposed adjacent to the handle 34 for starting and stopping the motor 55.

The motor 55 may be started or stopped with the boom 12 in any position. If the boom is in a raised position as shown in FIGURE 6, the driving pulley 59 will slip with respect to the belts 60, whereby the buffer 41 remains stationary.

After a sink has been disposed in the nest of the table 14 as shown in FIGURE 6, the pedal 54 may be actuated to release the hook 52 from the pin 45, thereby unlocking the boom for lowering about the shaft 20. It may be brought down by the right hand of the operator grasping the handle 34. The amount of force needed is negligible since the counterweight 29 can be positioned to make the mechanism substantially weightless, as it were. The operator may then grasp the handle 40 using his left hand, to guide the buffer 41 up and down across the further disposed interior rear wall of the bowl B of the sink S, to guide the buffer 41 back and forth across the bottom of the sink bowl, and to guide the buffer 41 up and down against the interior of the forward wall of the bowl.

After the desired degree of polish has been obtained, the table 14 may be rotated after it has been unlocked by actuation of the pedal 85, and thus indexed, for example 180 degrees, so that the remainder of the sides of the bowl partially buffed may be finished. When the table is indexed to other positions 90 degrees from those described, the other vertical walls may be polished. It will be apparent that the flanges may also be polished by moving the arm back and forth across the forward or rearwardly disposed flanges.

When the buffer 41 engages the sink, there is a tendency for the buffer to be moved along the surface of the sink by the rotation of the buffer. This tendency is partially offset by the friction between the shaft 38 and the bearings 39, which acts in the opposite direction.

It is to be understood that various lengths, shapes, and quality of buffer 41 may be attached to the shaft 43, as may be required by the workpiece.

The offsetting of the handle 40 with respect to the handle 34 enables the operator to simultaneously grasp and manipulate each of such handles. At the same time, the operator's hands are not required to unlock either of the boom 12 or the table 14, which unlocking may be effected by the feet of the operator.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A machine for driving a rotary buffer comprising in combination: a base; a generally horizontally directed boom supported near one end thereof by said base and having a pivotal connection therewith for pivoting about a first horizontal axis which is disposed in offset relation below said boom in horizontally spaced relation to said one end; an arm pivotally supported adjacent to one end thereof by the opposite end of said boom and pivotable primarily about a second horizontal axis parallel to said first horizontal axis, the other end of said arm having means to rotatably support the rotary buffer for rotation about a third horizontal axis parallel to said horizontal axes; means carried by said arm for rotatably driving the buffer; a counterweight slidably supported by and above said boom adjacent to said pivotal connection; and means for varying the horizontal distance between the center of mass of said counterweight and said axis of said pivotal connection, the center of mass being movable by said means to either side of said pivotal connection.

2. A machine for driving a rotary buffer comprising in combination: a base; a boom supported near one end thereof by said base and having a pivotal connection therewith for pivoting about a horizontal axis below the upper surface of said boom and spaced from said one end thereof; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; means carried by said arm for rotatably driving the buffer; a pair of laterally spaced rails secured to the upper side of said boom above, adjacent to, and extending in horizontally spanning relation to said axis; a counterweight slidably supported on said rails; and means for selectably moving said counterweight for varying the effective distance between the center of mass of said counterweight and said axis, said counterweight being movable through and beyond a point where said boom is balanced.

3. A machine for driving a rotary buffer comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a horizontal axis; a lever linkage having a latch at one end thereof adapted to interlock with said boom remotely from said axis when said boom is pivoted to a raised position and to hold said boom in the raised position, said latch being adapted to be disengaged therefrom upon actuation of said linkage; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; and means carried by said arm for rotatably driving the buffer.

4. A machine for driving a rotary buffer comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a horizontal axis; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; a horizontally directed pin secured to said boom remotely from said arm and on the opposite side of said horizontal axis; a lever system having a hook at one end thereof, said hook having a cam surface disposed to be engaged by said pin in response to raising of said boom to move said hook into a pin-engaging position for holding said boom in a raised position, the other end of said lever system being adapted to be actuated to release said hook from said pin; and means carried by said arm for rotatably driving the buffer.

5. A machine for driving a rotary buffer comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a first horizontal axis; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; a driving pulley supported for rotation about an axis slightly vertically offset from said first horizontal axis; a second pulley rotatably supported by said boom remotely from said first horizontal axis and in alignment with said driving pulley; a belt having a length effective to couple and decouple said pulleys in response to lowering and raising of said boom, respectively; and means connected to said second pulley for rotatably driving the buffer in response to rotation of said second pulley.

6. A machine for driving a rotary buffer comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a first horizontal axis; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; a support plate pivoted

to said base; means for adjusting the angle between said plate and said base; a motor supported by said plate and having a driving pulley rotatable about an axis vertically offset from said first horizontal axis by an amount determined by the angular position of said support plate; a second pulley rotatably supported by said boom remotely from said first horizontal axis and in alignment with said driving pulley; a belt having a length effective to couple and decouple said pulleys in response to lowering and raising of said boom, respectively; and means connected to said second pulley for rotatably driving the buffer in response to rotation of said second pulley.

7. A machine for driving a rotary buffer comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a first horizontal axis; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; a support plate; means securing said plate to said base in various selectable positions; a motor supported by said plate and having a driving pulley rotatable about an axis vertically offset from said first horizontal axis by an amount determined by the position of said support plate; a second pulley rotatably supported by said boom remotely from said first horizontal axis and in alignment with said driving pulley; a belt having a length effective to couple and decouple said pulleys in response to lowering and raising of said boom, respectively; and means connected to said second pulley for rotatably driving the buffer in response to rotation of said second pulley.

8. A machine for driving a rotary buffer comprising in combination: a base; a boom pivotably supported adjacent to one end thereof by said base; an arm pivotably supported adjacent to one end thereof by the opposite end of said boom, the other end of said arm having means to rotatably support the rotary buffer; a table for supporting the article to be buffed, said table being rotatably secured to said base adjacent to said other end of said arm; a plunger slidably supported by said base and biased into interlocking engagement with said table, said plunger being adapted to be retracted from said table to permit repositioning of said table; and means carried by said arm for rotatably driving the buffer.

9. A buffing machine for the interior of a sink bowl comprising in combination: a stationary base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a first horizontal axis; an arm supported adjacent to one end thereof by the opposite end of said boom and adapted to be pivoted about a second horizontal axis; a rotary buffer supported by the other end of said arm for rotation about a third horizontal axis while in engagement with the sink bowl; said first, second, and third axes being parallel to one another; a table for supporting the sink to be buffed; a bearing assembly securing said table to said base for rotation about a fixed vertical axis, said vertical axis lying in a vertical plane normal to said third horizontal axis and which vertical plane extends transversely through said buffer for every position thereof; and means carried by said arm for rotatably driving said buffer.

10. A buffing machine for the interior of a sink bowl comprising in combination: a base; a boom supported adjacent to one end thereof by said base and adapted to be pivoted about a first horizontal axis; a shaft rotatably journalled by the opposite end of said boom for rotation about a second horizontal axis; an arm rotatably supported adjacent to one end thereof by said shaft in a laterally offset relation to said boom for pivoting about said second axis; a rotary buffer supported by the other end of said arm for rotation about a third horizontal axis while in engagement with the sink bowl; a pair of laterally spaced rails secured to the upper side of said boom adjacent to said first horizontal axis; a counterweight slidably supported on said rails; means for selectably varying the distance between the center of mass of said counterweight and said first axis to balance the torque of said boom, said arm, and said buffer about said first axis; a first handle secured to said opposite end of said boom for pivoting said boom about said first horizontal axis; a second handle secured to said arm remotely from said second horizontal axis and disposed in further laterally offset relation from said boom; a horizontally directed pin secured to said boom remotely from said arm and on the opposite side of said first horizontal axis; a lever system secured to said base and having a hook at one end thereof, said hook having a cam surface disposed to be engaged by said pin in response to raising of said boom to move said hook into a pin-engaging position for holding said boom in a raised position, the other end of said lever system being adapted to be actuated to release said hook from said pin; a support plate pivoted to said base; means for adjusting the angle between said plate and said base; a motor supported by said plate and having a driving pulley rotatable about an axis vertically offset from said first horizontal axis by an amount determined by the angular position of said support plate; a second pulley corotatably carried by said shaft in alignment with said driving pulley, a belt having a length effective to couple and decouple said pulleys in response to lowering and raising of said boom, respectively; means connected to said second pulley for rotatably driving said buffer in response to rotation of said second pulley; a table for supporting the sink to be buffed; a bearing assembly securing said table to said base for rotation about a vertical axis, said vertical axis lying in a plane normal to said third horizontal axis and which extends transversely through said buffer; and a plunger slidably supported by said base and biased into locking engagement with said table, said plunger being adapted to be retracted from said table to permit repositioning said table.

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