Oct. 9, 1956 S. BELEJACK ET AL 2,765,590

AUTOMATIC BUFFING MACHINE

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Fig. 1.

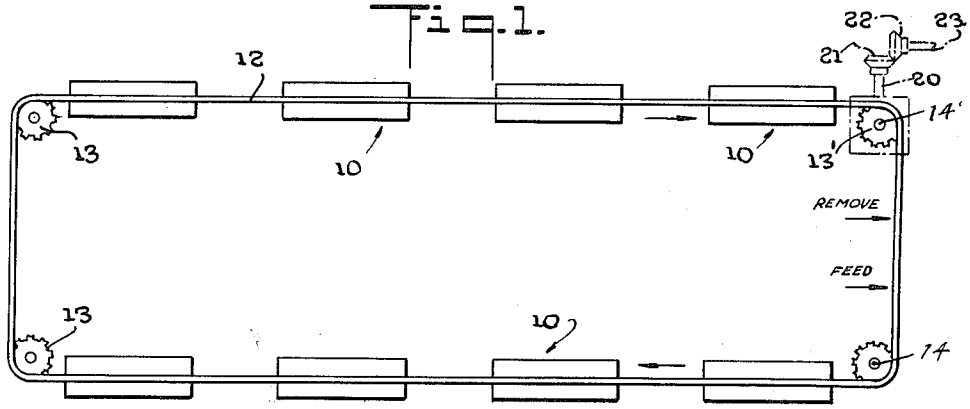


Fig. 3.

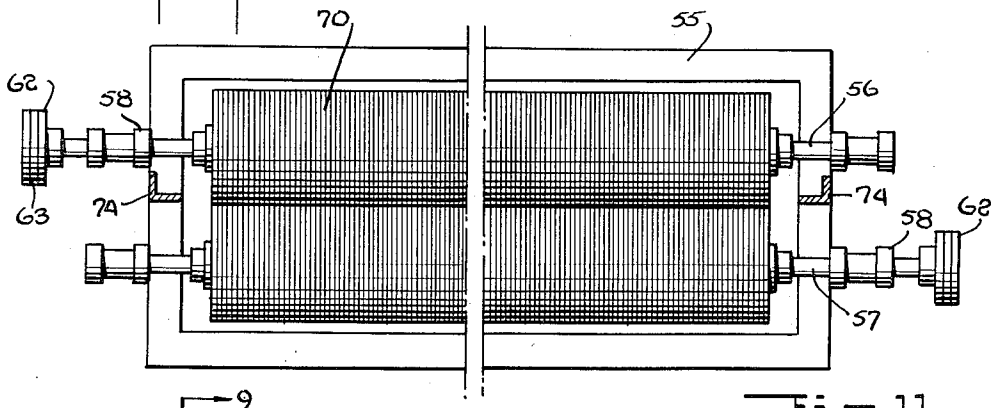


Fig. 9.

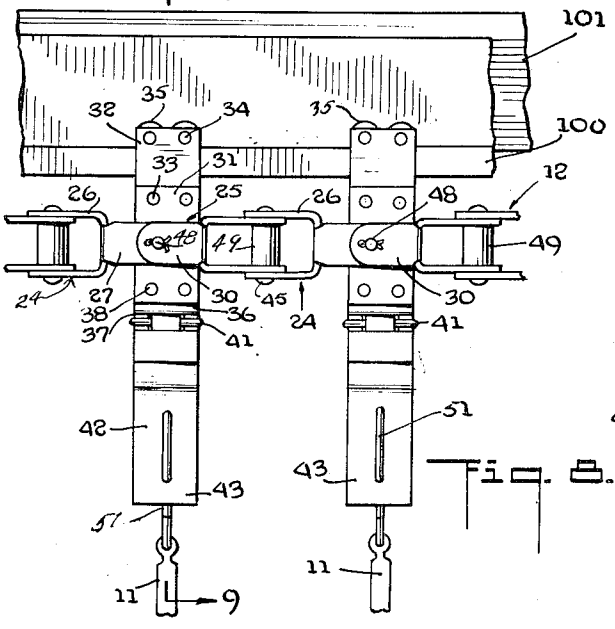


Fig. 11.

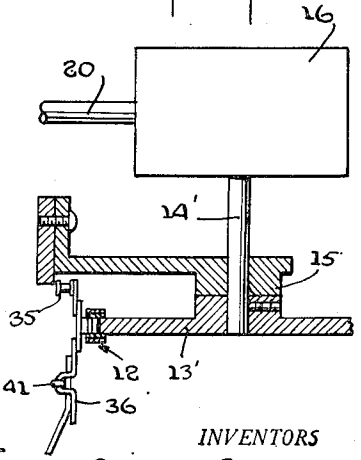


Fig. 8.

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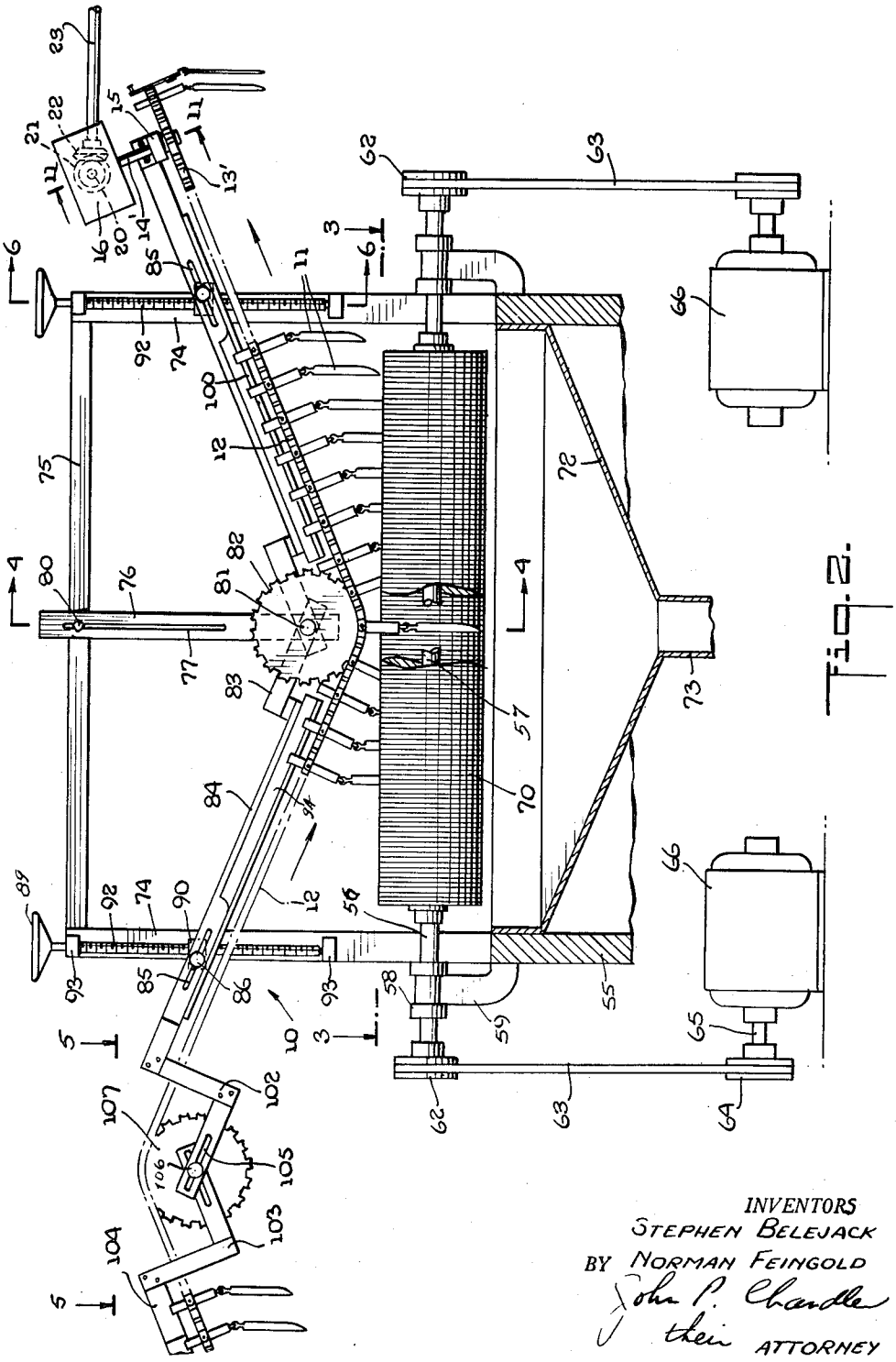


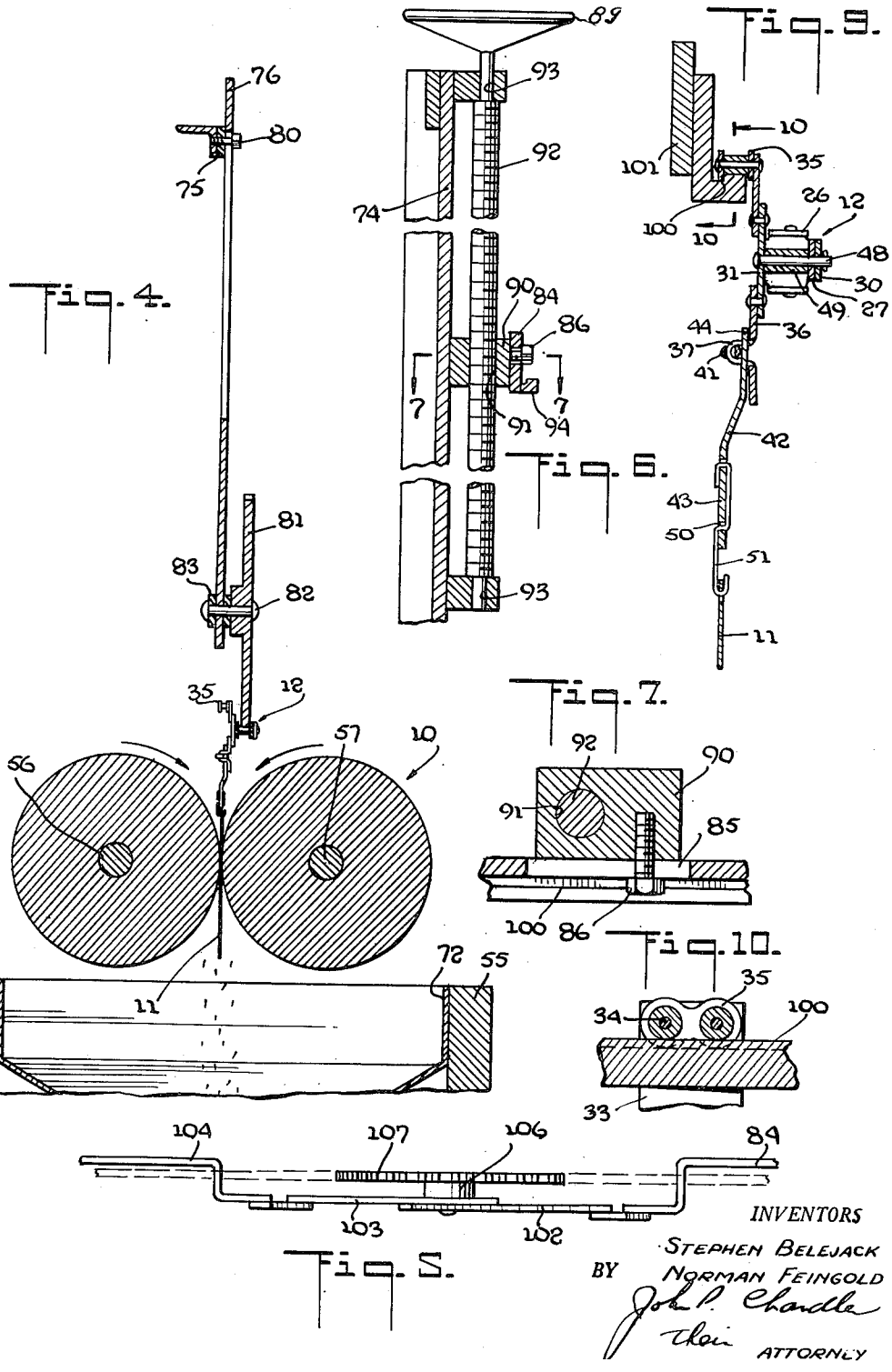
Fig. 2.

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AUTOMATIC BUFFING MACHINE

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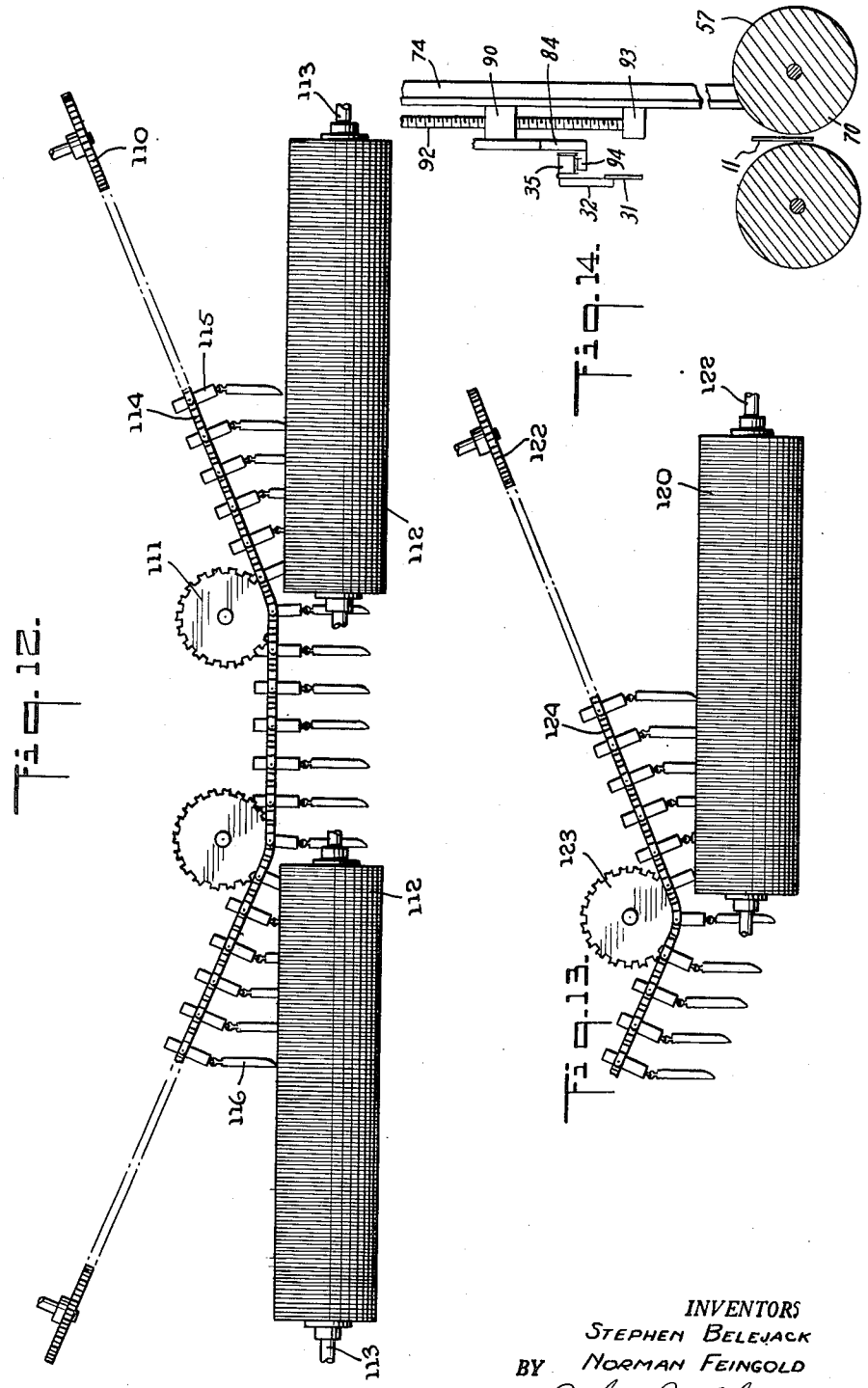


Fig. 12.

Fig. 14.

Fig. 13.

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2,765,590

Patented Oct. 9, 1956

2,765,590

AUTOMATIC BUFFING MACHINE

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Application November 2, 1953, Serial No. 389,752

7 Claims. (Cl. 51—80)

This invention relates to buffing machines for buffing and polishing articles which are flat or substantially so and relates more particularly to a machine for automatically polishing articles such as knife blades, kitchen flatware and the like which will constantly vary the surface of the work which is presented to the buffing or polishing wheels and in one linear motion at an angle to the buff there is effected a plurality of completely different polishing actions.

In the polishing of articles of cutlery by automatic machines it has been considered necessary to constantly oscillate the articles in a substantially straight line longitudinally of the axis of the buffing wheels as well as at right angles thereto since if the surface is not varied the buffing wheels which carry an abradant compound cause the formation of striations and scratches in the surface to be polished.

An important object of the present invention is to provide an automatic machine which constantly varies the surface of the work relative to the periphery of the buffing wheels and the resulting polish is much the same as that obtained by a hand buffer who "works" his surface to be polished relative to the wheel.

Another object of the invention is to provide a continuous polishing machine having an endless work piece conveyor which follows a predetermined but circuitous path whereby the major axes of the articles to be polished are constantly being varied with respect to the polishing surface of the buffing wheel.

A further object of the invention is to provide a buffing machine having one or a plurality of polishing stations and an endless work conveying chain which is supported in part by a plurality of rectangularly disposed sprockets rotating on generally vertical axes and whose path of travel is deflected vertically by other sprockets at the several polishing stations, all to the end of accomplishing in an automatic machine a high polish of uniform character normally produced only by a hand polishing operation.

Yet another object of the invention is to provide a novel endless work piece conveyor chain which can be deflected in two planes, one at right angles to the other, and having improved article supporting means which permit the articles to be readily attached to the chain before the first polishing station and detached therefrom after they leave the last polishing station. In the polishing machine illustrated in the drawing the articles are manually applied to the conveyor although the machine can be readily modified to provide automatic article feeding and removing means.

A further object of the invention is to provide in a polishing machine of the character described a compound motion of the article to be operated upon relative to the polishing rollers, the chain with its arrangement of higher and lower supporting sprockets providing an excellent substitute for the oscillatory movement of the machines of the prior art.

In the drawings:

Fig. 1 is a plan view showing the general arrangement of the machine.

Fig. 2 is a front elevation, partially in section, of one of the polishing assemblies.

Fig. 3 is a broken plan view, partially in section, of the polishing assembly shown in Fig. 2, the section being taken on line 3—3 of Fig. 2.

Fig. 4 is a broken section taken on line 4—4 of Fig. 2.

Fig. 5 is a broken section taken on line 5—5 of Fig. 2.

Fig. 6 is a broken section taken on line 6—6 of Fig. 2.

Fig. 7 is a broken section taken on line 7—7 of Fig. 6.

Fig. 8 is a broken elevation of a part of the conveyor assembly.

Fig. 9 is a broken section taken on line 9—9 of Fig. 8.

Fig. 10 is a broken section taken on line 10—10 of Fig. 9.

Fig. 11 is a broken section taken on line 11—11 of Fig. 2.

Fig 12 is a broken side elevation showing a modified machine

Fig. 13 shows a broken side elevation showing a machine with only one polishing station.

Fig. 14 is a broken section taken on line 14—14 of Fig. 2.

The machine forming the first embodiment of the present invention includes a plurality of polishing stations, shown in plan view in Fig. 1, each of which is designated by the reference numeral 10, and the articles to be polished, indicated at 11, are successively conveyed to the several stations by an endless conveyor chain 12 which is supported at the corner sections of the machine by chain sprockets 13, one of which, shown at 13' in the upper right-hand corner in Fig. 1, is driven.

The machine includes a frame, portions of which are illustrated, and at each corner section the axes of the sprockets 13 are substantially vertical and the extent to which they deviate from the vertical will be discussed hereinafter.

The driving sprocket 13' is keyed to a shaft 14' journalled in a bearing 15 (Fig. 11) mounted on the frame. This shaft extends from a gear reduction box 16 which is suitably supported by means (not shown) for upward and downward movement (Fig. 2) because of the need for making adjustments in the final polishing station, as well as the ohers, to accommodate articles of varying lengths to be polished. A drive shaft 20 extends from the reduction box and a bevel gear 21 is keyed to the opposite end thereof, such gear being driven by another bevel gear 22 keyed to a drive shaft 23 driven by a motor (not shown).

The conveyor chain 12 is formed from a plurality of alternate links 24 and 25, each of which are generally similarly formed from sheet metal. Thus, link 24 (left-hand end of Fig. 8) has a U-shaped portion 26 whose opposed walls are spaced vertically from each other and a U-shaped portion 27 at right angles thereto, the opposed walls being horizontally spaced from each other.

The next link 25 has a U-shaped portion whose first walls are horizontally spaced from each other. Of these, front wall 30, when viewed as in Fig. 8, is shaped similar to the walls in portion 27 of the preceding link but its rear wall 31 has a greater depth and to its upper section a plate 32 is secured by rivets 33.

Plate 32 carries a number of pins 34 which support flanged rollers 35. A plate 36 having a forwardly offset portion 37 is secured by rivets 38 to the lower section of wall 31. A key 41 passes through the offset portion and supports a plate 42, whose lower end 43 is offset and whose upper end 44 is apertured to receive the forward portion 37. Thus plate 42 has a slightly pendulous motion with respect to plate 36. A pin 45 secures links 24

and 25 together and a similar pin 48 secures the next pair of links together. Spacing bushings 49 are mounted on all pins and are the parts of the links which are engaged by the sprockets 14. It will be seen from the foregoing that the conveyor chain 12 can be supported and be guided by sprockets mounted either on horizontal shafts or vertical shafts. The lower end 43 of plate 42 is formed with two openings 50 which support a hook 51 on which the work to be polished is suspended.

Each polishing station is shown in some detail in Fig. 2. This comprises a generally rectangular frame element 55 whose end walls support shafts 56 and 57 having thrust bearing elements 58 at their ends which receive bearings 59. A pulley 62 is keyed to each shaft, the pulley being driven by a belt 63 connected with a pulley 64 keyed to shaft 65 of motor 66.

Polishing drums 70 are keyed to each of shafts 56 and 57. The polishing surfaces of these drums may vary depending upon the particular article to be polished and such surfaces will be renewed from time to time. Coarse fabric may be used as the covering material for the drums. It will be noted in Fig. 4 that the peripheries of the two drums are sufficiently close together to engage both surfaces of the work which is relatively thin.

Below the polishing drums there is disposed a hopper 72 having lower walls which slope downwardly toward a central discharge port 73 which latter may be connected with a suitable source of negative pressure to draw the particles of the polishing compound into a receptacle and prevent the particles from passing into the atmosphere.

Frame 55 has a rearward upper extension 74 which supports a cross arm 75. At the center of this cross arm a vertical frame member 76 is carried which is vertically adjustable by providing a slot 77 through which a bolt 80 passes. A shaft 81 at the lower end of frame member 76 supports a sprocket 82 for guiding conveyor chain 12 in its diagonal path downwardly and then upwardly. This shaft further supports frame member 83 having a lateral extension 84 on each side thereof and provided with a slot 85. A bolt passes through this slot to secure frame extension 85 to a block 90 having a vertical threaded aperture 91 which receives a lead screw 92 journalled for rotative movement at its upper and lower ends in bearings 93 secured to vertical frame member 74. A hand wheel 89 is keyed to the upper end of the lead screw to rotate the same and thus move block 90 to an adjusted, fixed position.

It was earlier pointed out that the shafts 14 for sprockets 13 were substantially vertical. It will be noted from an examination of Fig. 2 that shaft 14' is perpendicular to frame member 84 and that the particular inclination of this frame member is dependant upon the adjustment of the machine for the length of article to be polished. The shorter the article the closer will frame members 84 be to the horizontal and shafts 14 to the vertical.

By one's referring to Fig. 6 it will be noted that frame extension 84 carries a recessed trackway 94 and rollers 35 carried by each chain link unit 25 travel on said trackway. The polishing drums exert a considerable downward pull on the work pieces and accordingly on the conveyor chain. The strain on the chain is reduced by providing the rollers 35 on the chain link units 25 and the trackways on which the rollers travel when the work pieces are being buffed or polished.

It is also desirable to provide trackways at the end of the machine where the work pieces are applied to the chain and thereafter removed at the end of the operation. This trackway, shown at 100, is horizontal and is secured to frame member 101.

Returning now to Fig. 2 it will be noted that an L-shaped frame 102 is secured to the upper end of frame extension 84 and a similar frame 103 is connected with the next frame extension 104. These frames have slots 105 for longitudinal adjustment and they also support a shaft 106 (Fig. 5) carrying an idler guide sprocket 107.

It is believed that the method of using the machine of the present invention will be largely clear from the foregoing description. The buffing wheels or drums in each station engage each other with a slight pressure. The motors driving the buffing wheels, to which the buffing compound has been applied, and the motor driving the article conveyor are started and the operator feeds the articles to the conveyor at the right-hand end of the machine as shown in Fig. 1. The number of polishing stations is a matter of choice although it is desirable to have a sufficient number to do a complete polishing or buffing operation in one pass through the machine. The terms "buffing" and "polishing" have been used interchangeably although they are actually separate operations. The machine of the present invention may be employed for any operation where opposed surfaces are worked on by a rotating member and if desired certain of the stations may be used for buffing and others of them for polishing.

In the modified arrangement of Fig. 12 the upper sprockets corresponding to the sprocket 107 of Fig. 2 are eliminated and the articles to be polished are always suspended below the sprockets, whether it be the corner sprockets 110 which correspond to sprockets 13 in the first embodiment or the intermediate sprockets 111 which are journalled on horizontal axes.

In this instance the one side of the machine is shown as having two sets of polishing drums 112 which are journalled on shafts 113 and the conveyor chain 114 may be the same as in the first embodiment with suspension means 115 for the work 116.

The articles traverse generally the same path relative to the polishing drums as they do in the first embodiment and this arrangement positively eliminates any possibility of the articles becoming fouled between the chain and any of the sprockets.

Fig. 13 shows an arrangement with a single station comprising a plurality of polishing drums 120 on shafts 121, corner sprockets 122 and a single lower sprocket 123 with chain 124. This arrangement is highly satisfactory where a single pass is all that is necessary.

While three forms or embodiments of the invention have been shown and described herein for illustrative purposes, and the construction and arrangement incidental to one specific application thereof have been disclosed and discussed in detail, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiments shown herein, but that extensive deviations from the illustrated forms or embodiments of the invention may be made without departing from the principles thereof.

What we claim is:

1. In a buffing machine, the combination of a frame, an endless conveyor chain comprising a plurality of links pivotally interconnected alternately on two axes, one at right angles to the other and having suspending means for the articles to be polished, a plurality of alternate higher and lower sprockets journalled on the frame on horizontal axes, and a buffing station disposed substantially centrally of each lower sprocket and comprising a pair of juxtaposed, buffing drums journalled on substantially horizontal axes between which the articles to be buffed pass in a downwardly and then upwardly inclined path, thus presenting continually varying work surfaces to be buffed by the drums, means for rotating the drums oppositely, corner sprockets for the chain journalled on the frame on axes disposed at right angles to the lower sprockets and means for driving at least one of the sprockets.

2. In a buffing machine, the combination of a frame, an endless conveyor chain comprising a plurality of links pivotally interconnected on two axes, one at right angles to the other and having article suspending means, corner sprockets journalled on the frame on generally vertical

axes and a plurality of alternate higher and lower sprockets journalled on the frame on horizontal axes, and a buffing station disposed substantially centrally of each lower sprocket and comprising a pair of juxtaposed, buffing drums journalled on substantially horizontal axes between which the articles to be buffed pass in a downwardly and then upwardly inclined path, thus presenting continually varying work surfaces to be buffed by the rollers, and means for rotating the drums oppositely.

3. In a buffing machine, the combination of a frame, an endless conveyor chain comprising a plurality of pivotally interconnected links and provided with article suspending means and with rollers on alternate links and a plurality of alternate higher and lower sprockets journalled on the frame on generally horizontal axes, and a buffing station disposed substantially centrally of each lower sprocket and comprising a pair of juxtaposed, buffing drums journalled on substantially horizontal axes between which the articles to be buffed pass in a downwardly and then upwardly inclined path, thus presenting continually varying work surfaces to be buffed by the drums, means for rotating the drums oppositely, trackways extending between the upper and lower sprockets on which the rollers travel to support the chain during the polishing operation, means for vertically adjusting the upper and lower sprockets, corner sprockets for the chain journalled at right angles to the lower sprockets and a motor for driving the chain.

4. In a buffing machine, the combination of a frame, a conveyor chain having suspending means for the articles to be buffed, and a plurality of alternate higher and lower sprockets journalled on horizontal axes to guide the chain through a downwardly and then upwardly inclined paths, a buffing station disposed below each lower sprocket and comprising a pair of juxtaposed, buffing drums journalled on substantially horizontal axes between which the articles pass and which present continually changing surfaces to the drums, means for rotating the drums oppositely, rollers carried by some of the links and trackways for supporting the rollers during the buffing operation.

5. In a buffing machine, the combination of a frame, an endless conveyor chain comprising a plurality of pairs of links pivotally connected together by pivot pins disposed alternately on axes at right angles to each other, article suspending means carried at the lower end and a roller carried at the upper end of one link in each pair, a plurality of alternate higher and lower sprockets journalled on horizontal axes on the frame to guide the chain through a downwardly and then upwardly inclined path,

a buffing station disposed below each lower sprocket and comprising a pair of juxtaposed, buffing drums journalled on substantially horizontal axes between which the articles pass, which latter present continually changing surfaces to the wheels, means for driving the buffing drums oppositely and means for driving the chain, adjustable trackways positioned on each side of the lower sprockets for supporting the rollers during the buffing operation and corner sprockets journalled on axes at substantially right angles to the axes of the lower sprockets to guide the chain around the frame.

6. In a buffing machine, the combination of a frame, a plurality of buffing stations mounted in spaced relation on the frame on substantially the same horizontal plane, each including a pair of juxtaposed buffing drums journalled on substantially horizontal axes, an endless conveyor chain comprising a plurality of links having article suspending means, sprockets journalled on the frame carrying the chain and guiding it to the several stations and a plurality of alternate higher and lower sprockets journalled on the frame on horizontal axes for guiding the chain downwardly to a buffing station and then upwardly therefrom, thus presenting continually varying work surfaces to be buffed by the drums.

7. In a buffing machine, the combination of a frame, a buffing station mounted on the frame and including a pair of juxtaposed buffing drums journalled on substantially horizontal axes, an endless conveyor chain comprising a plurality of links pivotally connected together by pivot pins disposed alternately at right angles to each other, said links having article suspending means, sprockets journalled on the frame on substantially vertical axes which carry the chain and guide it to the station and a lower sprocket journalled on the frame on a horizontal axis for guiding the chain downwardly to a buffing station and then upwardly therefrom, thus presenting continually varying work surfaces to be buffed by the rollers.

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