BUFFING AND POLISHING MACHINE

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BUFFING AND POLISHING MACHINE

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This invention relates to certain new and useful improvements in multiple-spindle buffing and polishing machines of the type for holding the articles for presentation to a buffing or polishing wheel.

One of its objects is to provide a machine of this character which is so designed and constructed as to be efficient, reliable and positive in operation, and which is provided with novel means for driving and adjustably timing the spindle-carrying head and the spindles.

Another object of the invention is to provide a multiple-spindle buffing machine having simple and inexpensive means for automatically controlling the driving of the spindle-head and the work-supporting spindles.

Other features of the invention reside in the construction and arrangement of parts herein described and particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a front elevation of the buffing machine embodying my invention, the buffing wheel being shown in operative relation to the work-holding spindles. Figure 2 is a fragmentary end view thereof. Figure 3 is an enlarged horizontal section taken substantially in the plane of line 3—3, Figure 1. Figure 4 is a fragmentary longitudinal section taken in the plane of line 4—4, Figure 3, but with the spindle-head latching shaft in its opposite or released position. Figure 5 is a transverse vertical section taken on line 5—5, Figure 4.

Similar characters of reference indicate the corresponding parts throughout the several views.

Referring now to the drawings, 10 indicates the base or pedestal upon which the working parts of the machine are mounted, and 11 indicates a polishing or buffing wheel to which the articles 12, applied to the spindles of the machine, are adapted to be successively presented for buffing or polishing.

This wheel is shown mounted on a rotatable shaft 13 applied to suitable frame 15 and driven by a belt 14 in any well known manner.

Applied to the top of the pedestal 10 for rotative adjustment about a vertical axis as well as lateral adjustment toward and from the axis of the buffing wheel is a slide plate 16, a hand wheel 18 being provided for effecting its lateral adjustment. Surmounting this plate for bodily adjustment therewith and for independent angular adjustment to the horizontal as well as linear adjustment at right angles thereto or in a direction parallel to the axis of the buffing wheel, is a work-spindle supporting means consisting of a table 17 adapted for both vertical and angular adjustment through the medium of adjusting screws 18, and a casing or work-spindle frame 19 rising from such table and guided thereon for longitudinal adjustment by a hand wheel 20. This frame supports the multiple-spindle head and its associated parts as well as the mechanism for operating the head and the work-holding spindles.

The numeral 21 indicates a rotatable spindle-carrying head or plate which is circular in form and is journaled for intermittent turning movement on a horizontal arbor or stub-shaft 22 projecting outwardly from the frame 18 in parallel relation to the axis of the buffing wheel 11. Applied to this head and disposed in equi-spaced relation in an annular row about the same are a plurality of rotary spindles 23 having suitable chucks or mandrels 24 thereon for removably supporting the articles to be treated. This head is removably retained on the arbor by a thrust plate 25 and at its inner end has a driving gear 26 connected thereto which is constantly in mesh with an intermittently driven pinion 27 fixed on the adjoining end of an axially-shiftable driven shaft 28 journaled in suitable bearings 29 applied to the frame, and also serving as a latching element releasably engageable with one or another of an annular row of openings 30 formed in the head. These openings correspond in number to the work-spindles 23 and the reduced end 31 of the shaft 28, when latched successively therewith, serves to hold the spindle-carrying head in a fixed position while one of its spindles is in operative relation to the buffing or polishing wheel. When the shaft is shifted inwardly, its latching end is released from the head and the latter is free to be advanced to present the next article-carrying spindle to such wheel.

Each rotary spindle 23 has a driven pinion 32 thereon adapted, when presented in operative relation to the buffing wheel, to mesh with a common driving pinion 33 fixed on the opposing end of a horizontal shaft 34 parallel to the shaft 28 and journaled in a bearing 35 applied to the frame 18. During the operation of the machine the pinion 33 is constantly driven from an electric motor 36 connected by a belt 37 to a pulley 38 whose transverse shaft 39 has a worm 40 thereon meshing with a worm wheel 41, the shaft 42 of the latter having a gear 43 thereon meshing with a like gear 44 fixed on the inner end of the driven pinion shaft 34. Thus, as each
article-bearing spindle is presented in meshing relation to the driving pinion 33, it is driven at a high speed to effectually buff or polish the article in contact with the wheel 11.

The means employed for intermittently feeding and releasably latching the spindle-carrying head 21 to successively present the articles to the buffing wheel, and for adjustably timing the duration of buffing or polishing the articles borne by the spindles 23, are preferably constructed as follows, reference being had more particularly to Figure 3 and 4, of the drawings:

Loosely mounted on the rear end of the axially-shiftable, spindle-head driving shaft 28, and held against axial displacement relative thereto by suitable thrust shoulders engaging opposite sides of the adjoining rear bearing 29, is a continuously rotating drive sleeve 48 having a sprocket wheel 46 fixed thereon between its ends and connected by a sprocket chain 47 to a drive sprocket 48 applied to the motor-driven, common spindle-driving shaft 34. At its front end, this drive sleeve is provided with a clutch-ring 49, and disposed on operative relation thereto is a companion, axially-shiftable clutch-ring 50, featured on the intermediate enlarged portion 51 of the shaft 28. A spring 52 encircles the latter and bears at one end against the clutch-ring 50; and at its other end against a collar 53 shrunk or otherwise fixed on the shaft 28; alongside its enlarged portion to be displaced therewith during its axial displacement into and out of latch-engage ment with the spindle-carrying head 21. In the latched position of the reduced end 54 of this shaft with one of the head-openings 30, shown in Figure 3, the clutch-ring 50 is retracted and the clutch-rings released so that no motion is transmitted to the head-driving pinion 27. In this position of the parts, it will also be noted that the collar 53 bears at its front side against the rear face of the adjoining front shaft 29, and that the spring 52 serves the dual function of normally releasing the clutch elements and constantly urging the shaft 28 to its latching position.

The drive sleeve 48 also serves to transmit motion to the mechanism for shifting the shaft 28 to its released position to allow the spindle-carrying head 21 to be advanced to bring the next spindle into presentation with the buffing wheel. For this purpose, this sleeve has a pinion 54 thereon adjacent its rear end which meshes with a gear 55 journaled on a sub-shaft 56, applied to the lower rear portion of the frame 19 and having a pinion 57 driven thereby which in turn meshes with a gear 58 journaled on the rear end of the sleeve to rotate independently thereof at a reduced speed as determined by the gearing just described. Applied to the rear face of this gear 58 is a plurality of radial ribs 59 disposed in predetermined spaced relation and adapted to detachably support, through the medium of bolts 60 or the like, one or more tripping lugs 61 having inclined cam faces 52 thereon, such cam faces being inclined in a circumferential direction and each having a predetermined radial position, to cause the shaft 28 to be shifted axially to the released-position shown in Figure 4.

Cooperating with these cam lugs is a follower-roller 53 mounted on the intermediate portion of a vertically-swiveling lever 54 pivoted at its lower end at 65, to the rear end of the sub-shaft 56, while its upper end is forged to embrace the shaft 28 and is adapted to abut against the inner face of a thrust collar 66 applied to the inner end of such shaft, the spring 52 normally urging the latter and its thrust collar forwardly against the lever. By this construction as each cam lug is successively presented to the lever-roller 63, it causes the lever 65 to be tripped or displaced rearwardly and cause the shaft 28 to be shifted from its head-latching position, shown in Figure 3 to the unlatched position shown in Figure 4, to thereby cause the clutch-rings 49, 50 to be engaged and drive said shaft 28 to transmit motion to the head 21 to direct the then-operating spindle 23 away from, and the next spindle into operative relation with the buffing wheel, and the duration of the buffing operation upon each article is the time element required for such gear to travel one-third of a revolution. Should a longer buffing time be desired on the articles, then a lesser number of cam lugs are used, and if a shorter time element is desired then a correspondingly greater number of cam lugs are provided and mounted on the companion properly-spaced radial ribs 59 on the gear 58.

I claim as my invention:

1. In a buffing machine, a work-spindle frame, a multiple-spindle head, rotatably supported on said frame, a plurality of rotateable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto, upon presentation to the buffing wheel, and the duration of the buffing operation upon each article is the time element required for such gear to travel one-third of a revolution.

2. In a buffing machine, a work-spindle frame, a multiple-spindle head, rotatably supported on said frame, a plurality of rotateable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto, upon presentation to the buffing wheel, and the duration of the buffing operation upon each article is the time element required for such gear to travel one-third of a revolution.

3. In a buffing machine, a work-spindle frame, a multiple-spindle head, rotatably supported on said frame, a plurality of rotateable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto, upon presentation to the buffing wheel, and the duration of the buffing operation upon each article is the time element required for such gear to travel one-third of a revolution.
said head for intermittently rotating it to and latching it in its respective spindle-operating positions, a clutch-controlled driven mechanism for said head, a plurality of rotatable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto upon presentation to the buffing wheel, an axially-shiftable driven shaft journaled in said frame for operative driving and releasable latching engagement with said head, a drive member for said shaft, clutch means interposed between said drive member and said shaft, and means operatively connected to said shaft for governing said axilal displacement thereof and from its clenching and latching positions.

4. In a buffing machine, a work-spindle frame, a multiple-spindle head rotatably supported on said frame, a plurality of rotatable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto upon presentation to the buffing wheel, an axially-shiftable driven shaft journaled in said frame for releasable driving and latching engagement with said head, the latter having a gear therein and an annular row of openings therein and the shaft having a companion gear in mesh with said head-gear and a portion for endwise latching engagement with one or another of said head-openings, a clutch-controlled drive means for said shaft including a spring for normally urging the latter to a released position and the shaft to its head-latching position, a lever connected to said shaft for shifting it to its clutch-engaging and head-unlatching position.

5. In a buffing machine, a work-spindle frame, a multiple-spindle head rotatably supported on said frame, a plurality of rotatable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto upon presentation to the buffing wheel, an axially-shiftable driven shaft journaled in said frame in driving relation to and for releasable latching engagement with said head, a drive member for said shaft, releasable clutch elements applied to said drive member and said shaft, a spring acting on the shaft and one of said clutch elements for normally urging the latter to a released position and said shaft to its head-latching position, and a complementary means operatively connected to said shaft and said drive member for governing the shifting of the former to its clutch-engaging and head-unlatching position.

6. In a buffing machine, a work-spindle frame, a multiple-spindle head rotatably supported on said frame, a plurality of rotatable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto upon presentation to the buffing wheel, an axially-shiftable driven shaft journaled in said frame in driving relation to and for releasable latching engagement with said head, a drive member for said shaft, releasable clutch elements applied to said drive member and said shaft, a spring acting on the shaft and one of said clutch elements for normally urging the latter to a released position and the shaft to its head-latching position, a lever connected to said shaft for shifting it to its clutch-engaging and head-unlatching position, and a rotatable member in motion-transmitting relation to said drive member and having means thereon in tripping relation to said lever for governing the actuation thereof.

7. In a buffing machine, a work-spindle frame, a multiple-spindle head rotatably supported on said frame, a plurality of rotatable work-receiving spindles mounted on said head for presentation in operative relation to a buffing wheel or the like, means disposed in the operative path of said spindles for individually imparting rotation thereto upon presentation to the buffing wheel, an axially-shiftable driven shaft journaled in said frame for releasable driving and latching engagement with said head, the latter having a gear therein and an annular row of openings therein and the shaft having a companion gear in mesh with said head-gear and a portion for endwise latching engagement with one or another of said head-openings, a clutch-controlled drive means for said shaft including a spring for normally urging the latter to a released position and the shaft to its head-latching position, a lever connected to said shaft for shifting it to its clutch-engaging and head-unlatching position.
ing it to its clutch-engaging and head-unlatching position, a rotatable member in motion-transmitting relation to said drive member, and a plurality of cam-like lugs disposed in predetermined spaced relation on said rotatable member for operative engagement with said lever for governing the axial shifting of said shaft.

11. In a machine of the character described, a frame, a rotating head journalized thereon and including a gear and having an annular row of openings therein, an axially-shiftable driven shaft journalized in said frame in parallel relation to the head-axis and having one end thereof adapted to releasably engage one or another of the openings in the head to latch it in an operating position, a gear on said shaft engaging said head-gear, a driven member including a clutch element, a sliding clutch element feathered on said driven shaft for movement into and out of driving relation with the companion clutch element, a collar fixed on said shaft in spaced relation to said sliding clutch element, a spring interposed between the latter and said collar for normally urging the shaft in one direction to its head-latching position and the clutch elements to a released position, a rotatable member disposed axially of said shaft and geared to said driven member, a plurality of tripping cams adjustably mounted on the face of said rotatable member, and a lever in coupling engagement at its free end with said shaft and in the path of travel of said cams for actuating said shaft in the opposite direction to its clutch-engaging and head-unlatching position.

WALTER DE F. ABBOTT.

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