July 7, 1953 K. P. SWANSON 2,644,276

BUFFING MACHINE FOR DRAWING ROLLS

Filed March 16, 1950 2 Sheets-Sheet 1

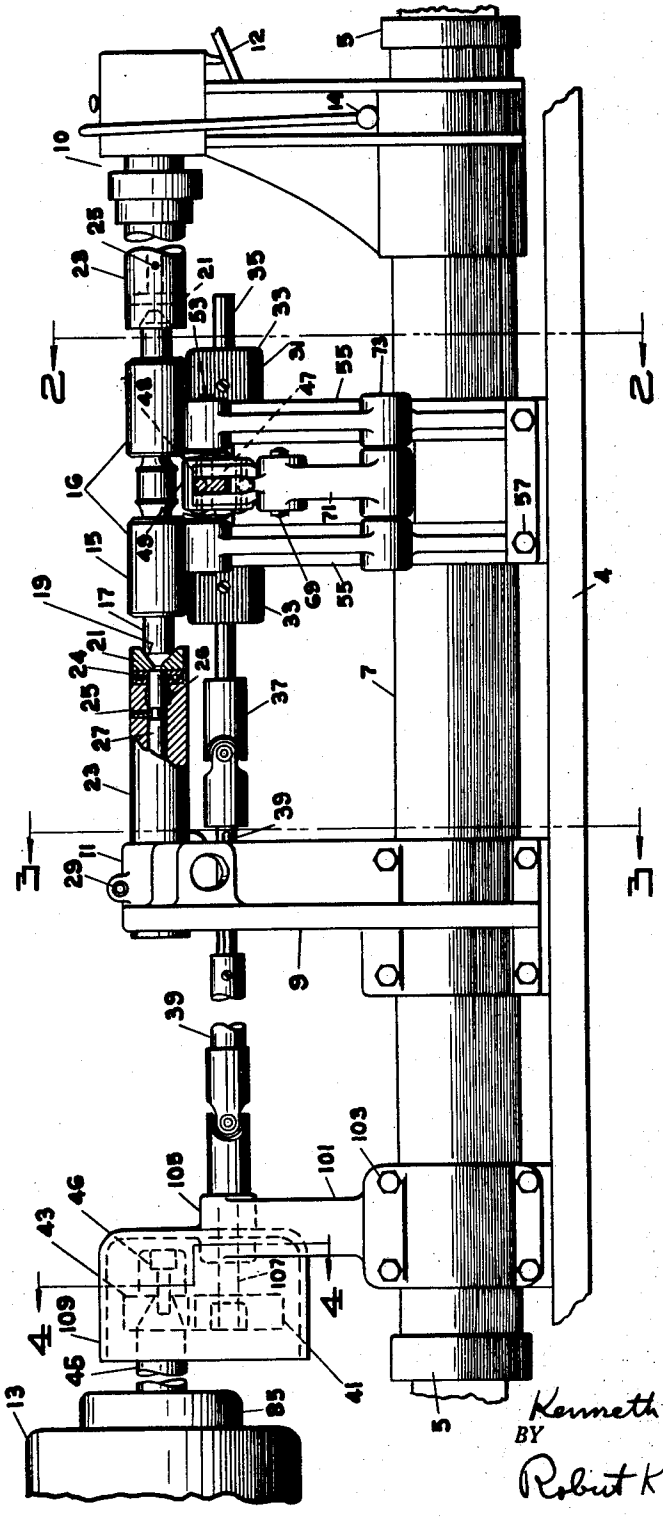


FIG. 1

INVENTOR.
Kenneth P. Swanson.
BY
Robert K. Randall.
Atty.

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Filed March 16, 1950 2 Sheets-Sheet 2

FIG. 2

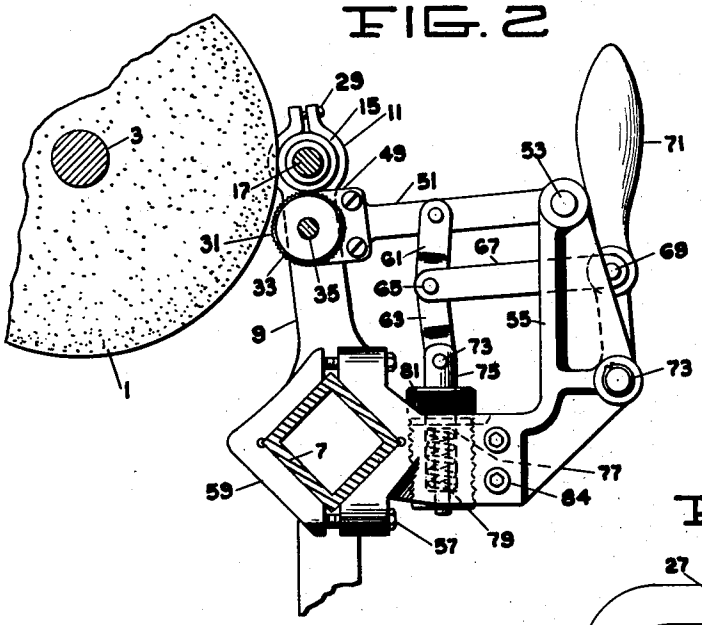


FIG. 3

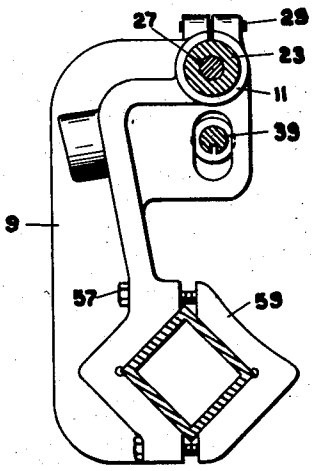
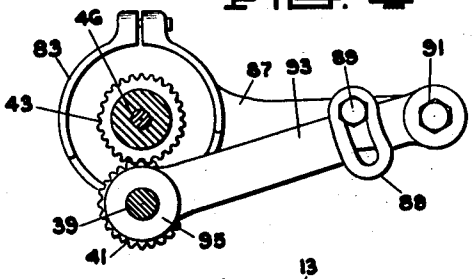


FIG. 4



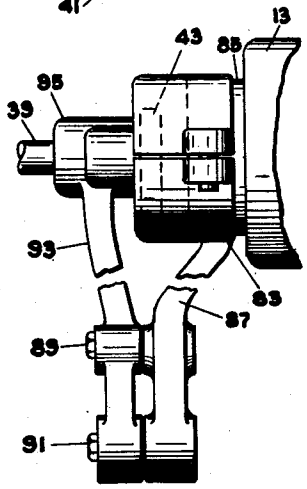


FIG. 5

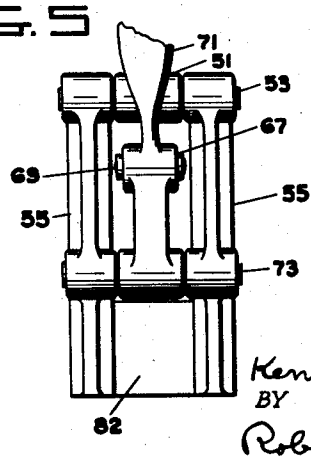


FIG. 6

INVENTOR.
Kenneth P. Swanson
BY
Robert K. Randall.
Atty.

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BUFFING MACHINE FOR DRAWING ROLLS

Kenneth P. Swanson, Abington, Mass., assignor, by mesne assignments, to Textile Engineering Corporation, Whitman, Mass., a corporation of Massachusetts

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1

This invention relates to the grinding or "buffing" of the resilient coverings of drawing rolls used in the process of spining yarn. A smooth, truly cylindrical and concentric surface must be put on and kept on the cots covering the bosses of the top rolls in order to make good yarn, and every mill employing the customary top rolls covered with cork or rubber composition or other synthetic resilient material must have access to buffing machines, of which a number of well-known makes are commercially available, in order to keep its top rolls in good working shape.

The introduction of shell rolls, including ball bearing rolls, and other anti-friction bearing rolls, has made a new problem for the mills, because most existing buffing machines are built solely for solid rolls and are designed to revolve the rolls, while pressed against the grinding wheel, by engaging solely the pintles of the rolls. Hence these machines are useless for grinding shell and anti-friction type rolls the bosses of which are free on their axles, and as constructed can only be used to grind each shell of the shell type roll individually after removal from the roll axle. Such step is impracticable because of resulting lack of standardization in grinding successive rolls, and its proneness to produce tapered rolls having different diameters at their two ends; in addition to the nuisance of requiring disassembling and reassembling of each roll, inferior performance results from returning the rolls to the wrong ends of the shaft. Also, when the pintles of the solid rolls are formed of nylon or other material having a low coefficient of friction these machines do not work reliably.

Machines have been proposed to grind these shell type and anti-friction rolls by driving the bosses instead of the pintles, but had the drawback that then they would not handle the solid type rolls conveniently or efficiently, and therefore the mill making yarn needed two kinds of grinders, because it also possessed and used solid rolls which had to be ground. Additionally, in one or more of these special grinders the pressure of the elements rotating the shells by frictional engagement was applied in a direction radially toward the axis of the grinding wheel, while the counter-acting pressure supporting this thrust was applied to the shaft of the roll at mid-length and directed outward radially of the grinding wheel, with the result that because of the substantial offset axially these forces exerted a bending action on the entire roll which threw the outer ends of the cots inward toward the

2

grinding wheel and held the inner ends of the cots outward, resulting in a taper grind. As is fundamental and well understood, any cot which tapers, or is eccentric, or has an uneven profile, will spin yarn which is inferior because not level, and errors of taper and departures from straight profile, concentricity, parallel relation to the roll shaft, and equal exterior diameters of the two cots of a roll, must be within a practical limit of .002" for fine work. Additionally, these prior buffing machines which rotated the bosses frictionally about their own axles had defective capacity for adjustment to take rolls of different dimensions, as well as for adjustment of the pressure exerted by the frictional driving means against the cot.

It is the leading object of the present invention to remedy these drawbacks in prior machines, and to these ends the invention comprises mechanism to be constructed primarily as an attachment to existing commercial buffing machines, though capable of being built as an entire new machine, and adapted to handle either solid, anti-friction, or shell type rolls through providing roll-supporting centers having axle- or pintle-supporting elements which with the same structure either revolve freely with a solid roll or alternatively are fixed against rotation to support the axle of an anti-friction or shell type roll. To avoid the errors arising from the bending action on the roll being ground, the device of the invention first removes all counter-acting pressure from the mid-length of the roll, holding the roll solely by its extremities, and then exerts the pressure of the frictional driving roll in a direction at an angle to the radius of the grinding wheel, preferably at 90° to the radius of the grinding wheel at the point of contact of the roll cot with the surface of the latter. Thereby any thus induced distortion of the roll shaft or slack in the roll bearings causing or permitting departure of one or both of the shells from true alignment with the line of traverse of the roll with respect to the grinding wheel will be negligible in its tendency to grind a taper on the cot.

The manner of attainment of the other objects of the invention referred to above and also hereinafter is as set forth in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a front elevation of a buffing attachment made according to the invention, designed

to be applied to the existing parts of a commercial roll-buffing machine.

Fig. 2 is a vertical section on line 2—2 of Fig. 1, with the grinding wheel added.

Fig. 3 is a vertical section on line 3—3 of Fig. 1.

Fig. 4 is an alternative form of gear drive from the motor shaft, to provide facility for changing gear ratios.

Fig. 5 is a plan view of the parts shown in Fig. 4, looked at from behind the machine.

Fig. 6 is a front elevation of the operating handle and its supporting structure.

The invention is shown as built as an attachment to an existing buffing machine, to enable a single buffing machine to grind either solid type, anti-friction type, or shell type rolls. Herein, the attachment is designed to fit on the well-known Armstrong buffing machine, of which only fragmentary parts are shown, but in which a grinding wheel 1 on its drive-shaft 3 is mounted in fixed position on the stationary frame of the machine, while a table 4 slides back and forth parallel to grinding wheel shaft 3, carrying the bearings 5 in which is mounted the square hollow rockshaft 7 which supports the headstock 9 and tailstock 10 holding the usual live centers for pintles of solid type rolls. This same rockshaft 7 carries the electric motor 13 which conventionally drives one of the centers and thus rotates a solid type top roll while the latter is brought into contact with grinding wheel 1 through rocking of rockshaft 7 and traverse of table 4. Movement of rockshaft 7 in a direction to bring the roll within the radius of grinding wheel 1 is limited by the usual hand-operated adjusting screw (not shown).

The novel attachment of the invention comprises essentially a frictional driving roller to rotate the top roll while the latter is in contact with the grinding wheel, a flexible drive shaft connecting the roller with the customary motor 13, a pair of centers carried respectively by the headstock and tailstock on the rockshaft 7 and supporting the top roll directly above the friction driving roller, means for pressing the friction driving roller yieldingly upward against the top roll while held in such centers and likewise for lowering the driving roller for change of the top roll, and means for coupling the flexible shaft to the motor shaft. Among additional features is the provision for either holding the axle of antifriction or shell type rolls from rotation, or permitting rotation of the pintles of a solid top roll.

Thus, as seen in Figs. 1 and 2, the anti-friction type top roll 15 has each end of its axle 17 seated in a conical recess 19 in a center 21 rotatably mounted within a recess formed in the end of each member 23 gripped within the clamp 11 of headstock 9 and carried by tailstock 10. Sleeve bearings 26 support each center 21 for free rotation about its axis and that of member 23, and bearing 24 supports the end-thrust of axle 17, but a clamping screw 25 threaded through the wall of member 23 bears against a reduced portion of the shank 27 of center 21 to hold the latter and thus the axle 17 of anti-friction roll 15 from rotation.

To rotate the top roll 15 about its axis in the required concurrent direction with the grinding wheel 1 during the time when its surface is in engagement with the grinding wheel, metallic friction driving roller 31 is provided having two bosses 33, preferably fluted, fixed on a common axle 35 with capacity for adjustment axially thereon, which axle is connected by universal joints 37 and telescoping shafting 39 with a gear 41 meshing with a second gear 43 fixed on the tapered end of shaft 45 of motor 13 by screw 46. Thereby friction driving roller 31 is rotated reversely to the direction of rotation of motor 13 each time the latter runs.

To hold the bosses 33 of driving roller 31 in firm driving engagement with the cots covering each boss of roll 15, so that each boss will be rotated about the stationary axle 17 at identical speed and in the same manner, an enlarged mid-section 47 of shaft 35 of the driving roll is mounted in self-aligning bearings 48 in a box 49 carried at the free end of an arm 51 pivoted at 53 between the upper ends of paired brackets 55 clamped upon the rectangular portion of rockshaft 7 by bolts 57 and yokes 59.

Arm 51 is raised and lowered by toggle links 61, 63, their common pivot 65 being connected by links 67 with a pivot 69 in hand lever 71 pivoted at 73 in brackets 55. The lower toggle link 63 is pivoted at 73 to a plunger 75 which has a shoulder 77 resting on top of a spring 79 seated in a pocket formed in a cup 81 externally screw-threaded and screwed into a hole tapped through a block 82, Fig. 6, fastened between the two brackets 55 at their lower portions by screws 84. Thus when the parts are in the relation shown in Fig. 2 with the toggle links 61 and 63 in straightened and locked relation and handle 71 swung rearward into contact with the hub at the front end of arm 51, the fluted bosses 33 of driving roller 31 are each pressed firmly against the cot of one of the bosses 16 of drawing roll 15. The direction of the pressure exerted by the driving roller on the drawing roll 15, being vertically upward, is substantially at a tangent to grinding wheel 1. The strength of the pressure is controlled and modified as desired, by screwing cup 81 up or down in its tapped hole in the block 82 joining brackets 55, to increase or decrease the loading of spring 79.

Thus, to use the device in buffing an anti-friction top roll 15, handle 71 is swung forward and downward to bend the toggle and lower the arm 51 and thus the driving roller 31, giving free access to the space between centers 23 for the insertion of a top roll to be buffed. The ends of the roll's axle 17 are then seated in centers 21 in customary manner by first depressing and then releasing hand-lever 12 of tailstock 10 to retract and then return member 23 so that its center 21 supports the proximate end of axle 17 under pressure of the usual spring (not shown) inside the tailstock. Tailstock 10 of course has been fixed in the proper position lengthwise of rockshaft 7 by means of clamping screw 14 so that both ends of the roll's axle 17 are properly and tightly seated in centers 21. Then handle 71 is pushed upward and rearward, straightening the toggle, and lifting driving roller 31 until each boss 33 thereof makes contact with the cot of the opposing boss of the top roll, the continued straightening of the toggle thereafter loading the spring 79 to attain the desired thrust of the driving roller 31 against the cots of top roll 15 to insure certain rotation of the bosses of top roll 15. By reason of the self-aligning bearing supporting the driving roller 31, the latter is able to assume the exact angular relationship of its axis to that of the top roll needed to equalize the pressure to drive both bosses 16 of the top roll 15 with equal power. As different kinds of cot material require different degrees of driv-

ing pressure by the bosses of roller 31, the required adjustment is easily and quickly attained by merely screwing cup 81 up or down, to change the elevation of its spring rest or abutment formed by the bottom of the cup.

As is obvious, the adjustment of the spring tension by screwing cup 81 up or down serves to fit the attachment to the grinding of top rolls of different diameters, as well as to different kinds of cot material. These machines with slight modification in dimensions of cup 81 and block 82 are able to buff a large range of sizes of rolls, from ¾" diameter up to drafting rolls of 4½" diameter such as are used in the Bradford worsted system. Longitudinal adjustment along rockshaft 7 of bracket 9 and tailstock 10 carrying the centers supporting the top roll likewise adjusts the machine to top rolls of different lengths. The spaced relation of bosses 33 on their shaft 35 is likewise adjusted by the manipulation of set screws holding the bosses to the shaft, to match the gauge of the particular top roll being buffed.

The toggle mechanism represents one form, and at present the preferred form, of an irreversible mechanical leverage for quickly releasing and reinstating the spring pressure thrusting the driving roll against the top roll with exactly the same driving pressure each time a fresh roll of the same dimensions is inserted for buffing. By the same token, all cots of these similar rolls will be accurately buffed to the same diameter with a single setting of the apparatus, because held in identical manner. It is to be understood that the original adjustable stop mechanism including the hand screw provided to fix the angular position of rockshaft 7 about its axis and thus establish the depth of cut of the grinding wheel 1 is retained and utilized.

To maintain the preferred direction of rotation of the top roll 15 during buffing, while utilizing the original motor 13, the flexible shaft driving roller 31 is not driven directly from the motor shaft but reversely to the direction of rotation of such motor shaft, through the use of gears 41 and 43. To hold gear 41 in mesh with the gear 43 fixed on the end of motor shaft 45, a bracket 101 is provided and fixed on rockshaft 7 by clamping bolts 103 and a yoke similar to 59, Figs. 2 and 3, and in the upper end of such bracket a bearing is formed in a hub 105 to receive the end portion 107 of the flexible shaft 39 on which gear 41 is mounted. A shell 109 is formed integral with bracket 101 and hub 105, to serve as a housing enclosing and shielding the two gears 41, 43.

An alternative form of gear drive shown in Figs. 4 and 5 provides for easily changing the gear ratio to adjust the speed of rotation of roller 31 and thus of the bosses of the top roll, both to suit different diameters of top rolls and also for different kinds of cot material, and sometimes to compensate for wearing down of the grinding wheel 1. Thus, a split collar 83, Figs. 4 and 5, is bolted around hub 85 of the motor, and provided with an arm 87 clamped by bolts 89 and 91 to an arm 93 carrying a bearing 95 supporting the outward end of the flexible shaft, on which gear 41 is fixed. Arm 93 is slotted at 88 where bolt 89 extends therethrough, to permit slight modification of the angular relation of the two arms to accommodate gears 41, 43, of different ratios where change of speed of the roll being buffed is desired.

The drive of driving roller 31 through flexible shafting affords the necessary provision for disaligning the axis of such roller from that of its driving gear 41 in working the toggle to lift and lower the driving roller.

When solid rolls are to be buffed on this attachment, the only change necessary is to loosen clamping screws 25 from tangs 27 so as to permit centers 21 to rotate freely within members 23 by reason of the ball thrust bearings 24 and sleeve bearings 26. By this simplest of operations, the mere loosening of two screws, the attachment is converted to a condition in which solid rolls are buffed with the same ease and accuracy as already set forth in regard to the buffing of shell rolls.

While I have illustrated and described certain forms in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular forms shown, or to the details of construction thereof, but what I do claim is:

1. A buffing machine for drawing rolls having in combination a grinding wheel, centers supporting the roll in contact with the grinding wheel with capacity for movement lengthwise of the latter's axis with its own axis ever parallel to such axis, and roller means rotating the bosses of the roll by frictional contact therewith effected by radial pressure against the bosses at right angles to the radius of the grinding wheel at the roll's point of contact with the latter, such roller means being free to vary the angle of its axis to that of the top roll.

2. A buffing machine for drawing rolls having in combination a grinding wheel, means supporting the roll by its ends for movement lengthwise of the axis of the grinding wheel, a driving roller, means yieldingly forcing the driving roller into frictional engagement with the boss or bosses of the drawing roll, and means continuously driving the driving roller, the roll-supporting means being adapted to permit rotation of the ends of the roll and also having clamping means preventing such rotation of the ends when desired.

3. An attachment for buffing machines having a grinding wheel, a carriage traversing past the grinding wheel, and a support on the carriage movable crosswise of the carriage's movement, such attachment comprising in combination centers to be mounted on the support for supporting the roll in contact with the grinding wheel, a driven roller driving the roll by frictional engagement with the bosses of the roll, a spring carried on the said support, linkage connecting the spring and driving roller, and manually operable means setting the linkage to transmit the spring's force to the driving roller to press the latter against the bosses of the roll in a direction at right angles to the radius of the grinding wheel at the point where the latter engages the roll.

4. A buffing machine for drawing rolls having in combination a grinding wheel, means supporting the roll in contact with the grinding wheel, a roller adapted to rotate the roll's bosses by frictional contact therewith, means driving the roller, spring means urging the roller into contact with the bosses of the roll, and linkage between the spring and the roller transmitting the force of the spring to the roller, manually

operable in one direction to relieve the stress of the spring for removal of a buffed roll and in the other direction to reinstate the identical force upon the roller when the latter is engaged with a second drawing roll of the same size as the first.

5. A buffing machine for drawing rolls having in combination a grinding wheel, supporting means for the ends of the drawing roll, a rockshaft mounting the supporting means for movement to and from the grinding wheel, a roller mounted on the rockshaft for bodily movement therewith and also for rotation, means for rotating the roller also mounted on the rockshaft, and linkage shifting the roller radially of the rockshaft into and out of driving engagement with the drawing roll.

6. A buffing machine for drawing rolls having in combination a grinding wheel, supporting means for the ends of the drawing roll, a rockshaft mounting the supporting means for movement to and from the grinding wheel, a roller mounted on the rockshaft for bodily movement therewith and also for rotation, means for rotating the roller also mounted on the rockshaft, toggle linkage thrusting the roller against the drawing roll in a direction radially of the rockshaft, manually operable means actuating the toggle linkage, and yielding means governing the pressure of the roller against the drawing roll.

7. A buffing machine for drawing rolls having in combination a grinding wheel, supporting means for the ends of the drawing roll, a rockshaft mounting the supporting means for movement to and from the grinding wheel, a roller mounted on the rockshaft for bodily movement therewith and also for rotation, means for rotating the roller also mounted on the rockshaft, toggle linkage thrusting the roller against the roll, a spring supporting one end of the toggle linkage, and an abutment engaged by one end of the spring and shiftable to adjust the spring tension and thus the working pressure of the roller against the drawing roll.

8. An attachment for drawing roll buffing machines having a grinding wheel, a traversing carriage, and a driving motor on such carriage, the attachment having in combination centers for supporting the drawing roll for swinging movement toward and from the grinding wheel at right angles to the latter's axis, a roller driving the drawing roll by frictional engagement therewith, means supporting the roller to swing into and out of frictional engagement with the drawing roll, driving means coupling the roller to the driving motor, and spring means yieldingly pressing the roller against the drawing roll.

9. A buffing machine for drawing rolls having in combination a grinding wheel, means engaging the ends of the roll alone to hold the roll in contact with the grinding wheel and carry the roll past the latter with its axis ever parallel to that of the grinding wheel, a driving roller frictionally engaging the drawing roll to rotate the latter, and means yieldingly thrusting the driving roller against the drawing roll, such thrust being supported wholly by the means engaging the ends of the drawing roll.

10. An attachment for drawing roll buffing machines having in combination a grinding wheel, a traversing carriage, a rockshaft thereon, and a driving motor also on the carriage, such attachment having in combination arms to be mounted on the rockshaft having centers to support the drawing roll by its ends, a bracket to be also mounted on the rockshaft, an arm pivoted on such bracket, a bearing on the free end of such arm, a roller for frictional driving engagement with the drawing roll mounted in such bearing, linkage swinging such arm with respect to the bracket to thrust the roller carried by the arm into engagement with the drawing roll, and yielding means determining the strength of such thrust.

KENNETH P. SWANSON.

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