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2,325,622

BUFFING MACHINE

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5 Sheets-Sheet 1

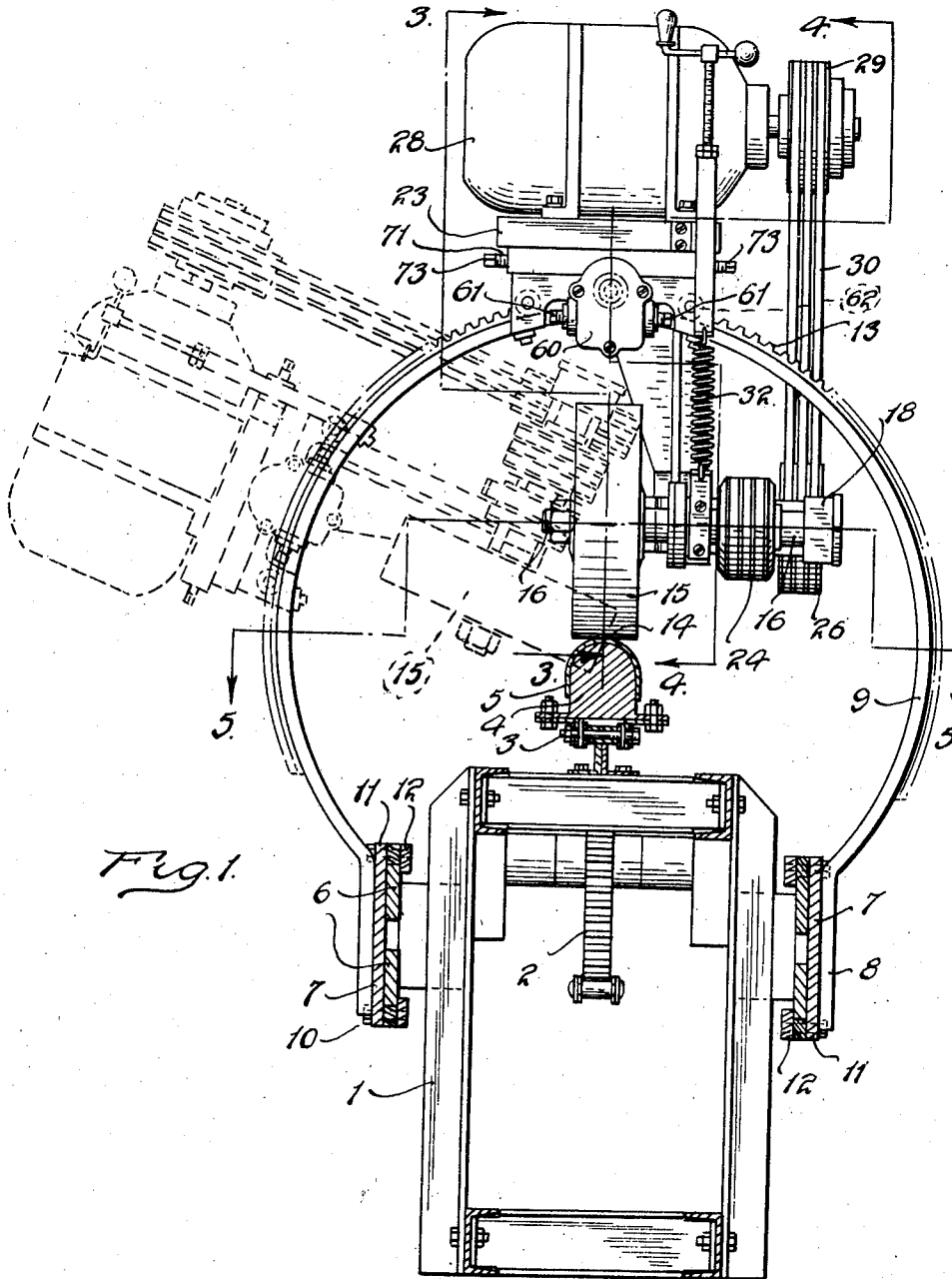


Fig. 1.

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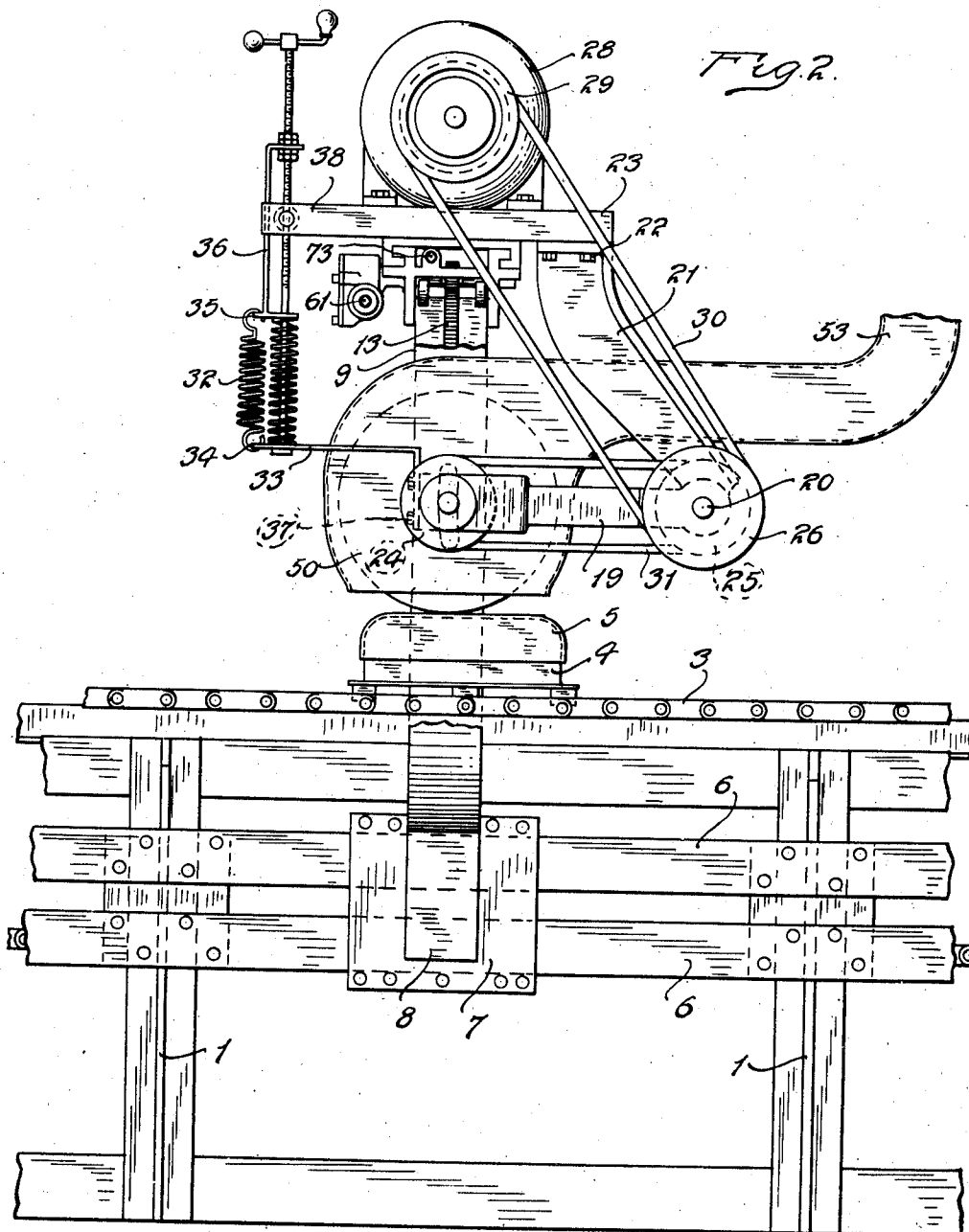
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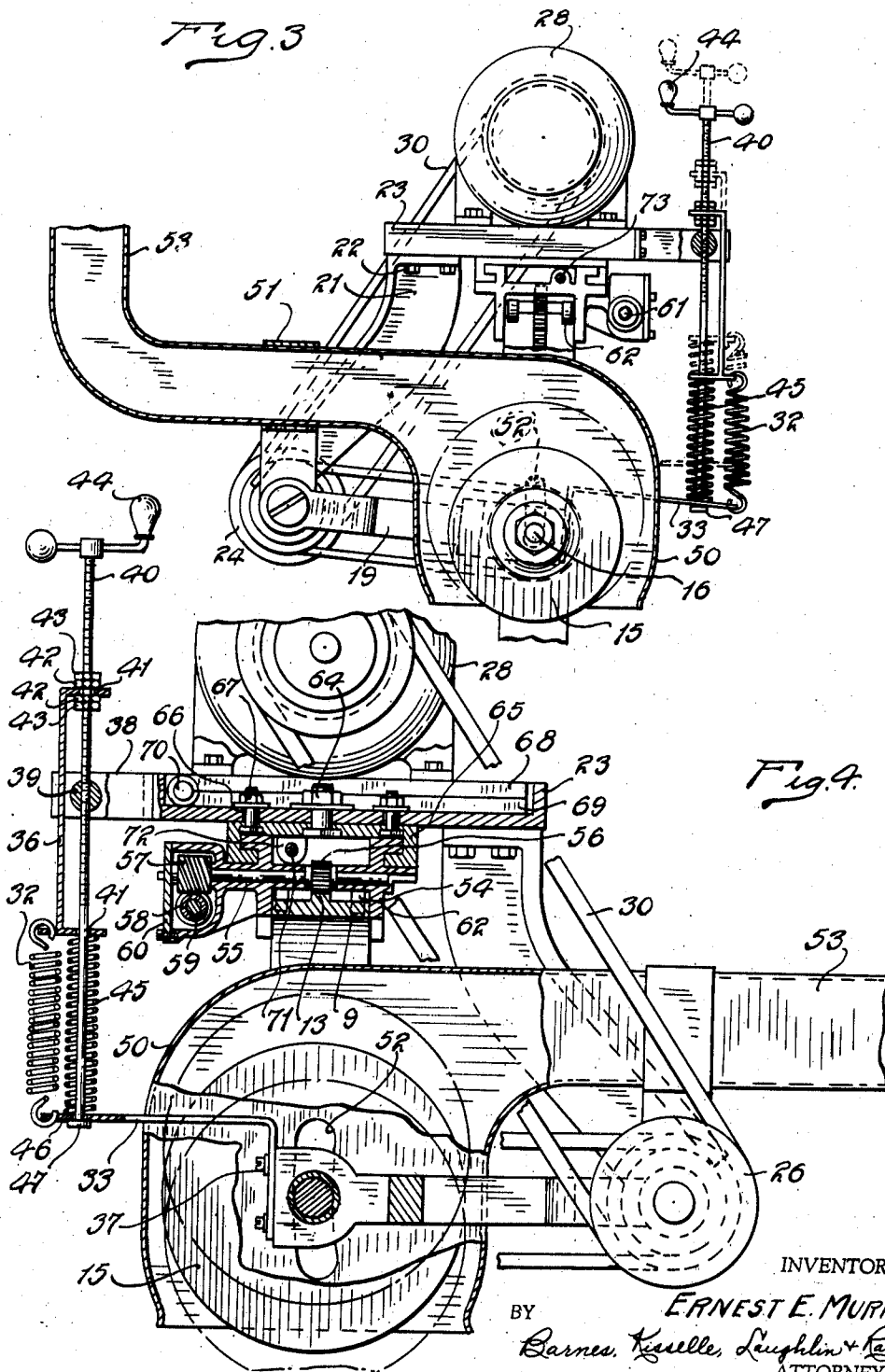
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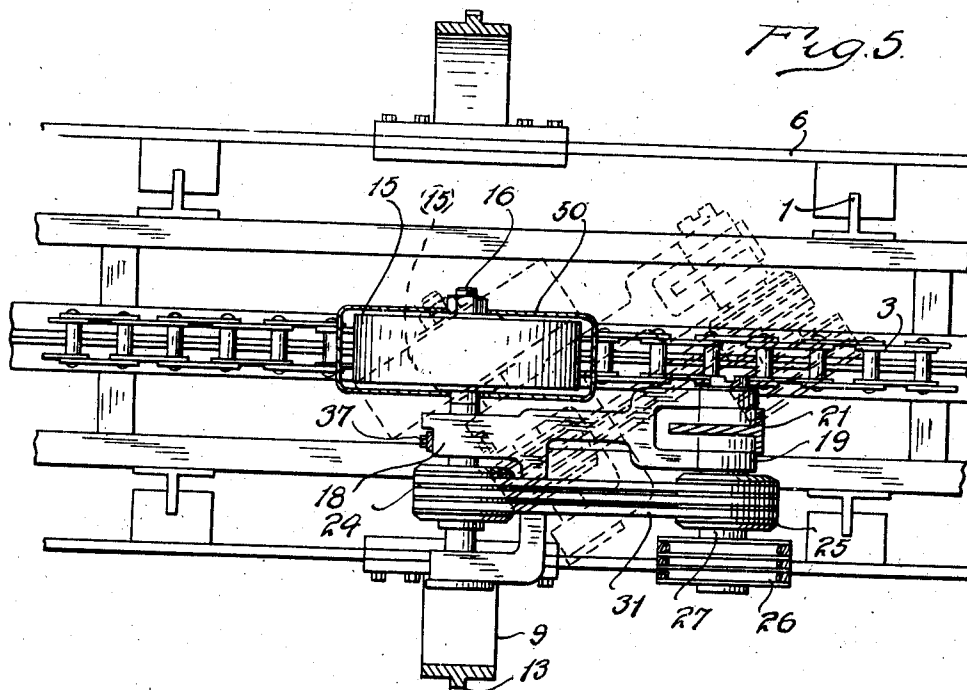
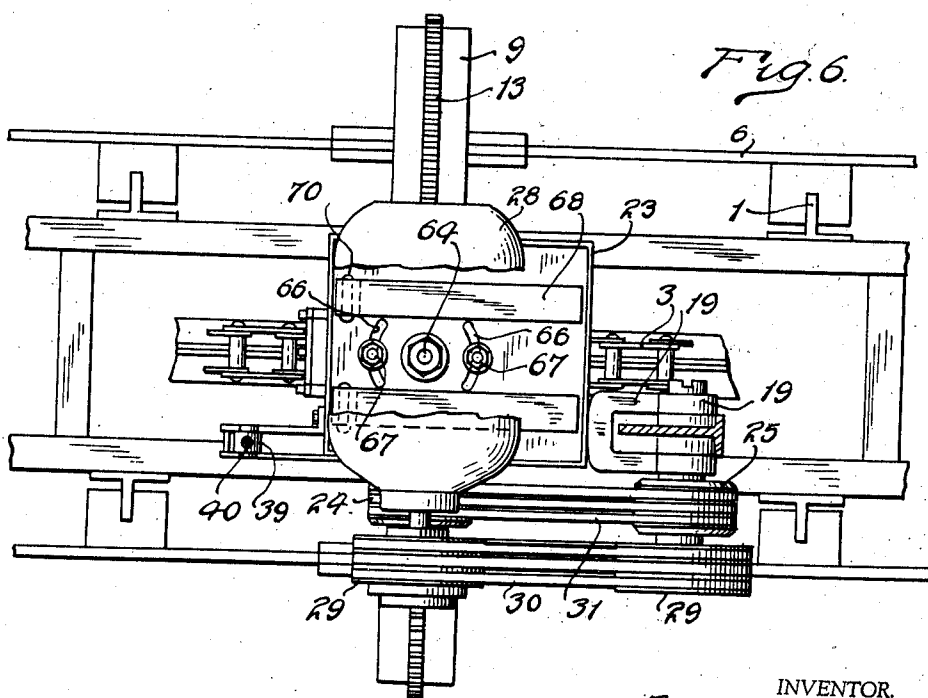
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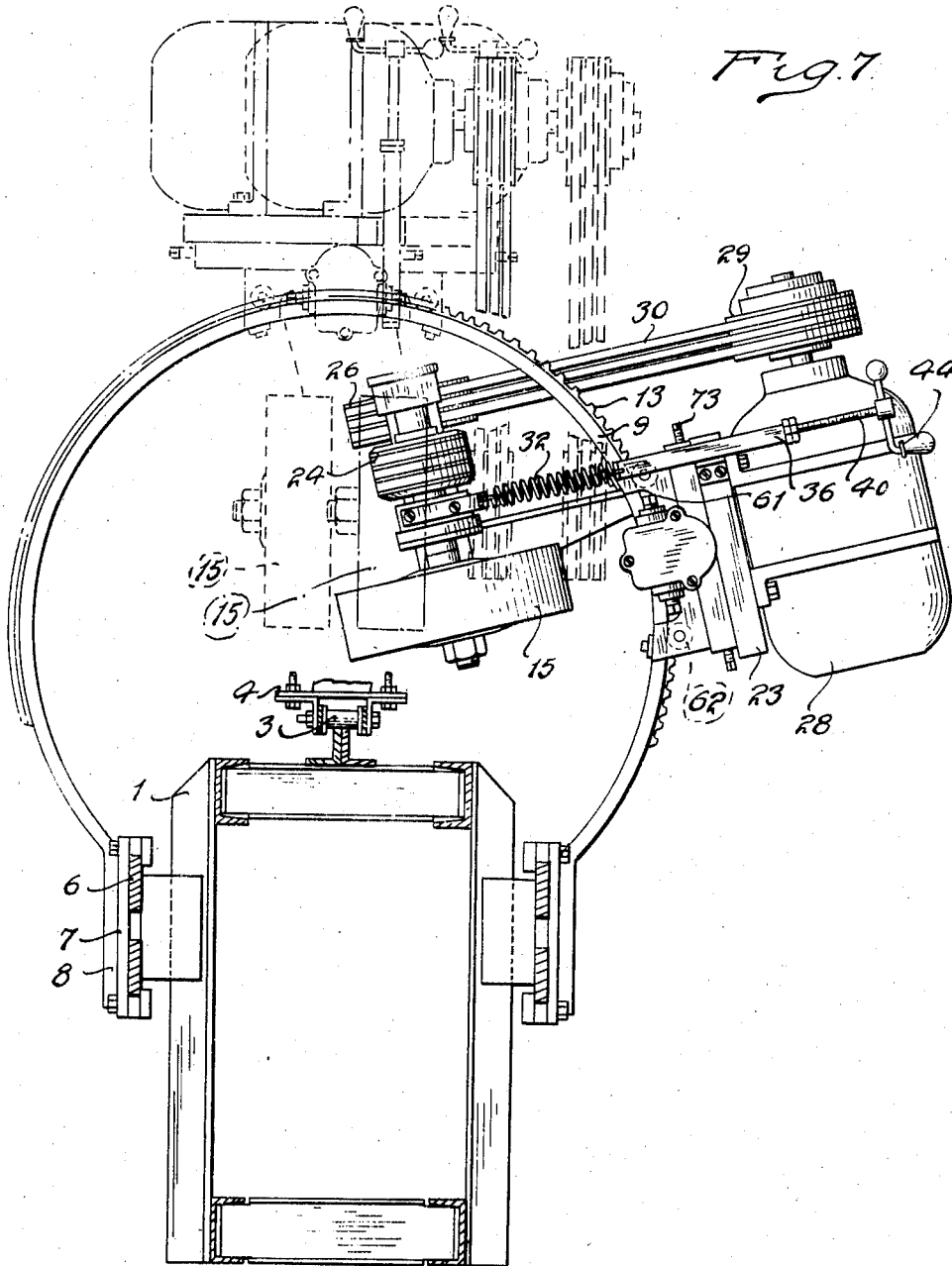
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BUFFING MACHINE

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8 Claims. (Cl. 51—76)

This invention relates to a buffing machine. This invention relates more particularly to a buffing head adapted for use on an automatic machine wherein the work is carried on a straight line conveyer or a conveyer of the dial type.

The term "buffing" is herein used in the generic sense to include buffing, polishing and similar finishing operations wherein the finishing is accomplished by a rotating wheel regardless of the specific characteristics of the wheel.

In an automatic buffing machine where the work is carried on a conveyer which presents the work to and removes it from the buffing wheel it is essential to obtain the proper finish desired that the buffing wheel be applied to the work with a certain predetermined pressure which is usually arrived at empirically and that for any given type of work this pressure should not vary. In some instances the pressure should be light and in others heavy. It is an object of this invention to produce a buffing head wherein the buffing wheel can be applied to the work with either a very light or sensitive pressure or a heavy pressure and which pressure, during the operation of the machine, will not vary substantially.

Since the work which is being conveyed through the buffing machine is usually of undulating or non-planiform surface, the buff necessarily has to ride into and out of undulations or valleys in the work. If the buffing wheel is mounted so that a considerable or substantial weight or mass must be raised each time the buff travels upwardly out of the valley, or which weight or mass must be lowered as the buff travels into the valley, obviously the inertia of this mass is going to create considerable variation in the working pressure of the buff. It is a further object of this invention to produce a buff which, even though working on an uneven or undulating surface will function with substantially uniform working pressure. This object has been achieved by mounting the buffing wheel on the floating arm divorced from its driving motor so that the only sprung weight is that of the arm carrying the buffing wheel and the buff itself. Variation in pressure may be had by adjusting the compression of the compression spring which works against the buff carrying arm.

This invention also contemplates a buffing head which can be easily adjusted to any position desired about the surface to be buffed without throwing the contact portion of the buffing wheel out of contact with the work. This object has been achieved by mounting the buffing head on an arcuate ring, the center of which falls approximately on the center line of the fixture carrying the work and approximately coincides with the point of contact of the buffing wheel with the work.

It is also an object of this invention to produce

a buffing machine which is compact and conserving of floor space. This object has been achieved by arranging the buffing head so that it can be mounted directly on the frame of the work conveyer where it is out of the way and does not utilize or obstruct floor space.

It is also an object of this invention to produce a buffing head and dust collecting hood arrangement which is highly efficient and collects substantially all the dust generated by the buffing operation regardless of whether the buffing wheel is of original diameter or worn down to a substantially smaller diameter.

A further feature of the invention is that the dust collecting hood is arranged so that none of its weight is carried by the floating buffing wheel or supporting arm therefor. Thus the dust collecting hood in no wise affects the pressure with which the buffing wheel contacts the work.

In the drawings:

Fig. 1 is a vertical section through the work conveyer showing the buffing head in elevation and mounted on the frame of the conveyer.

Fig. 2 is a side elevation of the buffing head and a portion of the work conveyer.

Fig. 3 is a section along the line 3—3 of Fig. 1.

Fig. 4 is a section along the line 4—4 of Fig. 1.

Fig. 5 is a section along the line 5—5 of Fig. 1.

Fig. 6 is a top plan view showing the swivel mounting for the motor.

Fig. 7 is a front elevation showing in the broken lines the lateral adjustment of the motor and buffing wheel along the saddle support for the motor and showing in the full lines the motor, buffing wheel and driving connections reversed on the saddle and positioned along the lower right-hand side of the mounting ring.

Referring more particularly to the drawings there is shown an automatic buffing machine comprising a work conveyer and a plurality of buffing heads. The work conveyer comprises a frame generally designated 1 provided at each end with a sprocket 2 about which is driven an endless chain 3. The chain 3 has fixed thereto in properly spaced relation a plurality of work fixtures 4 upon which is mounted the work 5. This form of work conveyer is shown by way of description rather than limitation.

Fixed to each side of the conveyer frame 1 is a pair of parallel rails 6. Each pair of rails 6 carries a shoe 7 to which is secured the lower end 8 of the mounting ring 9. The mounting ring 9 can be adjusted along the rail 6 by loosening the shoes 7 and sliding the same along the rails. The shoes 7 can be loosened on the rail 6 by loosening the bolts 10 which connect the outer and inner plates 11 and 12 respectively of the shoes. Thus loosened, the shoes and associated ring can be adjusted along the rails 6

and then secured in adjusted position by turning down the bolts 10.

The ring 9 is provided along its circumference with teeth 13 which form an arcuate or ring rack. The center of the ring 9 is designated 14. The center falls on the center line of travel of the fixtures 4 and approximately coincides with the point at which the buffing wheel 15 contacts the work.

The buffing wheel 15 is fixed to spindle 16 which is journaled or rotatably supported in furcations 18 of the bifurcated arm 19 (Figs. 5 and 2). The arm 19 is rotatably supported on spindle 20 one end of which is fixed to the rigid arm 21 secured by bolts 22 to the plate 23 (Fig. 2). Pulley 24 is fixed to spindle 16 and pulleys 25 and 26 are fixed to sleeve 27 which is rotatably mounted on spindle 20. Driving motor 28 is mounted upon plate 23. A driving pulley 29 is fixed upon the drive shaft of the motor 28. A plurality of endless driving belts 30 run around pulleys 26 and 29 and another set of driving belts 31 run around pulleys 24 and 25. Thus the two sets of belts operating through the several pulleys transfer the driving power from the motor to the buffing wheel 15.

It should be noted that the weight of the motor 28, pulleys 25 and 26, and the driving connections therebetween, are supported by the plate 23 and arm 21. None of the aforesaid weight is carried by, or transferred to, the buffing wheel 15.

The weight of the arm 19 which pivots about spindle 20, the buffing wheel spindle 16 and the buffing wheel 15 are counterbalanced by a tension spring 32, one end 34 of which is secured to an L bracket 33 and the other end 35 of which is secured to the U bracket 36. The L bracket 33 is secured by bolts 37 to the outer end of the arm 19.

The plate 23 is provided with a pair of extending arms 38 in which is journaled the nut 39 which has a threaded engagement with the screw 40 (Fig. 4). The U bracket 36 is provided with a pair of openings 41 having a slightly larger diameter than the external diameter of the screw 40. The screw 40 passes through the openings 41. The bracket 36 travels up and down with the screw 40 but is prevented from turning by the arms 38. The upper end of the bracket 36 is held loosely between nuts 42 which in turn are held in position by the lock nuts 43. The screw 40 is provided with a crank 44. A compression spring 45 is fitted over the lower end of the screw 40 between the bracket 36 and the bracket 33. The lower end of the screw passes freely through an opening 46 in the bracket 33 and is provided with an enlarged head 47 which limits the downward swinging travel of bracket 33 and associated buffing wheel 15, spindle 16 and arm 19. By loosening lock nuts 43, the nuts 42 can be turned to adjust the bracket 36 upwardly or downwardly on the screw 40. The bracket 36 is adjusted primarily to vary the compression of spring 45. The compression or force exerted by spring 45 against the arm 33 largely determines the force with which the buffing wheel contacts the work because the tension spring 32 is arranged so that at all positions of adjustment it substantially counterbalances the gravitational pressure or weight exerted by the buffing wheel 15, spindle 16, arm 19 and pulley 24 against the work.

When the buffing wheel is in vertically upright position, such as shown in the full lines in Fig. 1,

obviously the force exerted by the buffing wheel 15, associated spindle, pulley and arm 19 would, except for the counterbalancing spring 32, approximately equal the weight of these members whereas the force exerted upon the work by these members is substantially less when the buffing head is adjusted to the approximately horizontal position as shown in the dotted lines of Fig. 1.

Thus the counterbalancing spring 32 always approximately opposes the force exerted upon the work due to the weight or gravitational pull on the buffing wheel, pulley, spindle and associated arm 19, and the working pressure exerted by the buffing wheel against the work is controlled by placing the spring 45 under more or less compression. It should be noted that once the proper working pressure is arrived at by adjustment of the bracket 36 and locking nuts 43 turned down, the buffing wheel 15 can be lowered to take up the wear by turning crank 44 which in no wise alters the compression of spring 45. When the buffing wheel is in contact with the work the bracket 33 will be raised slightly from the head 47 at the end of the screw 40.

It is obvious from the above that due to the fact that the combined weight of the buffing wheel 15, spindle 16, pulley 24 and arm 19 are nicely counterbalanced by the spring 32 and riding up and down into and out of the valleys of the work there is practically no weight or inertia of these members which must be overcome. Due to this floating arrangement of the buffing wheel the force exerted by the wheel against the work will be determined largely by the compression forces of spring 45. Thus once adjusted to a given working pressure the pressure exerted by the wheel on the work remains approximately constant. Further, this arrangement, since it rules out the weight of the buffing wheel, associated driving member and arm 19, makes the working pressure adjustment of the wheel very sensitive so that either light, heavy or any intermediate pressure desired can be obtained and maintained in operation.

A dust collecting hood 50 is mounted over the wheel. The hood 50 is supported by bracket 51 fixed to arm 21. The hood is provided with the arcuate slots 52 through which the spindle 16 passes. The slots permit the wheel 15 and spindle to move up and down in the hood. The hood is preferably carried down to a fraction of an inch of the work surface because the wheel can move in and out of the hood. This provides excellent dust collecting. The hood 50, of course, is connected by means of the flexible conduit 53 with a conventional suction fan for drawing the dust from the work during the buffing operation. Here again it should be noted that the weight of the hood is not at all supported by the floating buff and buff support 19.

The entire buffing wheel and driving assembly, including the motor, is adjustably mounted on the ring 9. To this end the ring 9 is provided with a saddle 54 which has a shaft 55 journaled therein carrying a spur gear 56 which meshes with rack 13 and a worm gear 57 which meshes with a worm 58, Fig. 4. The worm 58 is carried on a shaft 59 mounted in housing 60. The shaft 59 is arranged so that its square ends 61 project out of the ends of the housing 60. Thus a hand crank can be applied to either square end 61 of the shaft depending upon which side of the machine the workman is on, and by turning the shaft 59 the worm 58 acts through worm gear 57, spur gear 56 and rack 13 to adjust the saddle back

and forth along the ring support 9. The pitch of worm 58 and worm gear 57 is such that the drive is irreversible.

The saddle 54 is provided fore and aft with the rollers 62 which provide a rolling support for the saddle 54 on the outer face of the ring 9 on opposite sides of the rack 13.

The motor support plate 23 is swivelly connected by bolt 64 to plate 65. Plate 23 is provided with arcuate slots 66 concentric with bolt 64 through which pass the bolts 67. Thus when the nuts on bolts 64 and 67 are loosened plate 23 can be swivelled in relation to plate 65, thus adjusting the motor angularly across the ring bar 9 as will be explained below. The nuts on bolts 64 and 67, of course, after adjustment are tightened down to hold the motor in place. The motor 28 is bolted to the upper leaf 68 of a hinge. The lower leaf 69 of the hinge is fixed to the plate 23. The hinge leaves 68 and 69 are pivotally connected by pins 70. The motor, buffing wheel 15 and intermediate driving connections can be adjusted back and forth on saddle 54. Two such adjustments are shown in the dotted lines, Fig. 7. This adjustment is accomplished by means of a threaded shaft 71 journaled in the ends of the saddle 54 which is held against longitudinal movement and has a screw connection with an internally threaded lug 72 fixed to the underface of the plate 65, Fig. 4. By applying a hand crank to either squared end 73 of the shaft 71 and turning the same the plate 65 and supported mechanism which includes the motor, support arm 21, all the pulleys, arm 19 and the buffing wheel 15, are adjusted to the right or to the left as viewed and shown in Fig. 7.

As shown in Fig. 1, full lines, the buffing wheel 15 is positioned so that it rotates in a vertical plane and contacts the upper face of the work 5. In this position it should be noted that the area of contact of the buff with the work is approximately on the center of ring 9. If it is desired for the buffing wheel to buff the side face of the work 5, the buffing wheel and driving mechanism is adjusted to the dotted line position shown in Fig. 1. This is accomplished, as above described, by applying a wrench to shaft 61 and turning the same which acts through the worm, worm gear 58, 57 and spur gear 56 and rack 13 to roll the saddle 54 to the position indicated in the dotted lines. Since the saddle 54 carries the buffing wheel 15, the motor 28 and all of the intermediate driving connections, movement of the saddle 54 obviously moves the buffing wheel and its driving mechanism. It should be noted that as the saddle 54 rolls along ring 9 the area of contact of the buffing wheel 15 with the work remains substantially at the geometrical center of the ring 9. In other words, adjustment of the wheel 15 and associated driving mechanism from the position shown in the full lines Fig. 1 to that shown in the dotted lines, is accomplished by a simple shifting of the saddle 54 along the ring support 9. No in and out adjustment whatsoever of the wheel 15 is necessitated.

If it is desired to have the wheel 15 cut across or cross-cut the work, then the wheel is adjusted from the position shown in the full lines, Fig. 5, which is similar to the full lines shown in Fig. 1; to the dotted line showing in Fig. 5. This adjustment of the wheel to cross-cut position is accomplished by swivelling plate 23 on plate 65 about bolt 64 as above described. The swivel bolt 64 is directly over the wheel 15 in the verti-

cal center line of the wheel and directly over the approximate point of contact of the wheel with the work. In other words, the swivel bolt 64 is vertically directly above the geometric center 14 of ring 9. Thus the plate 23 and wheel 15 swivel about the same axis. Obviously the turning of plate 23 will turn the motor 28 and wheel 15 and the intermediate driving mechanism because all this driving and driven mechanism is mounted on plate 23. The wheel 15 can also be positioned to cut across the work from the opposite direction from that shown in the dotted lines, Fig. 5, that is, by swivelling the plate 23 and associated driving mechanism and wheel 15 clockwise from the full line position shown in Fig. 5. In fact, the wheel 15 can be said to rotate in a plane at right angles to the work conveyor 3.

If it is desired to swing the wheel 15 from the full line position shown in Fig. 1 to the full line position shown in Fig. 7 so that it engages the right hand face of the work 5, the entire assembly including motor 28, wheel 15, and intermediate driving belts and pulleys, must be reversed in assembly on plate 65. If it were attempted to adjust the motor, buffing wheel 15 and intermediate driving mechanism from the full line position shown in Fig. 1 to the full line position in Fig. 7, or even further downwardly along the ring 9, obviously the spindle 16, spindle 20 and associated mechanism would abut the top of the conveyor frame 1 and prevent this adjustment. To avoid this, plate 23 and everything supported thereby, as above described, is swivelled 180° about pin 64 on plate 65. This reversing of the entire mechanism is preferably accomplished in the assembly of the motor 28, wheel 15 and intermediate driving mechanism on plate 65. In all cases where several of these heads are used on a machine they are preferably divided for right and left hand mounting. Hence, once after the machine is assembled it is only occasionally necessary to vary this mounting arrangement. With the motor 28 and wheel 15 reversed from the position shown in Fig. 1, adjustment of the wheel and motor to the full line position shown in Fig. 7 is readily accomplished by turning shaft 61.

When the work is adjusted to either of the dotted line showings in Fig. 7 the wheel is positioned for off-center line work, that is, the wheel will contact the work to the right or left hand side of the longitudinal center line of the work.

To compensate for the wearing down of the buffing wheel the arm 19 with the buffing wheel is adjusted downwardly by turning of hand crank 44. This is illustrated in Fig. 3 wherein the dotted line showing illustrates the position of the arm 19, bracket 33, screw 40 and springs 32 and 45 before the wheel 15 is worn down. The original size of the wheel 15 is also indicated in the dotted lines. The wheel 15 is, of course, adjusted downwardly as it wears down so that it remains in contact with the work under substantially the same pressure. One of the positions of adjustment of the wheel after it has worn down is shown in the full lines in Fig. 3.

I claim:

1. In a buffing machine, a fixed support, a buffing wheel adapted to contact the work to be buffed, a floating support including a counterbalancing tension spring for floating the buffing wheel on the fixed support in a predetermined relation with the work to be buffed whereby the buffing wheel applies a predetermined pressure to the work during the buffing operation, and

a compression spring acting upon the buffing wheel and against the counterbalancing spring to cause the buffing wheel to contact the work during the buffing operation with a predetermined pressure and adjusting mechanism for simultaneously adjusting the said floating support, the said counterbalancing and compression springs and the buffing wheel whereby the tension of the tension spring and the compression of the compression spring remains the same in all positions to which the buffing wheel is adjusted.

2. In a buffing machine, a frame, a buffing wheel adapted to contact the work to be buffed, an arm pivoted on the frame upon which the buffing wheel is rotatably supported, a counterbalancing spring for counterbalancing the weight of the buffing wheel and pivoted arm, a compression spring acting upon the arm and against the counterbalancing spring to cause the buffing wheel to contact the work during the buffing operation with a predetermined pressure, a support for both the counterbalancing spring and compression spring adjustably mounted on the frame whereby the pivoted arm can be adjusted to take up the wear on the buffing wheel without changing the compression and tension relationship of the said tension and compression springs.

3. In a buffing machine, a frame, a buffing wheel adapted to contact the work to be buffed, an arm pivoted on the frame upon which the buffing wheel is rotatably supported, a counterbalancing spring for counterbalancing the weight of the buffing wheel and pivoted arm, a compression spring acting upon the arm and against the counterbalancing spring to cause the buffing wheel to contact the work during the buffing operation with a predetermined pressure, a member adjustably mounted on the frame connected to the pivoted arm for supporting the arm and buffing wheel when out of contact with the work, the said compression spring being carried by the said member and acting between the said member and the arm tending to force the buffing wheel upon the work during the buffing operation, the said tension spring being also carried by the said member and acting between the said member and the pivoted arm against the counterbalancing spring to float the buffing wheel on the frame and cause the buffing wheel to contact the work during the buffing operation with a predetermined pressure whereby the member can be adjusted to take up the wear on the wheel without effecting the compression of the compression spring and the tension of the tension spring.

4. In a buffing machine, a frame, an arm pivoted to the frame, a buffing wheel rotatably mounted on the arm, a member adjustably mounted on said frame, a stop on said member upon which the pivoted arm rests when the buffing wheel is out of contact with the work whereby the pivoted arm and buffing wheel is supported by said member, a second stop on said member, a compression spring carried by the said member and positioned between the second stop and the pivoted arm, a tension spring one end of which is connected to the second stop on said member and the other end of which is connected to said pivoted arm to serve as a counterbalancing spring, the said pivoted arm being swung free of the first mentioned stop when the buffing wheel con-

tacts the work, the said compression spring acting upon the pivoted arm and against the counterbalancing spring to cause the buffing wheel to contact the work during the buffing operation with a predetermined pressure whereby the tension-compression relationship of the said tension and compression springs remains the same when the said member is adjusted to take up the wear on the buffing wheel.

5. In a buffing machine including a work fixture for supporting the work during the buffing operation, an arcuate track positioned about the work receiving side of the fixture with the fixture in approximately the geometrical center of the arcuate track, a saddle adjustable along the track, a motor mounted upon the saddle without the track, an arm pivotally supported at one end by the saddle, a buffing wheel rotatably mounted on the other end of the arm within the arcuate track, driving connections between the motor and the buffing wheel, the said motor, pivoted arm, buffing wheel and driving connections being assembled as a unit and supported solely upon said saddle whereby the unit can be adjusted along the arcuate track and the buffing wheel maintained continuously in contact with the work.

6. In a buffing machine including a work fixture for supporting the work during the buffing operation, an arcuate track positioned about the work receiving side of the fixture with the fixture in approximately the geometrical center of the arcuate track, said arcuate track extending through at least 180°, a saddle adjustable along the track, a motor mounted upon the saddle without the track, an arm pivotally supported at one end by the saddle, a buffing wheel rotatably mounted on the other end of the arm within the arcuate track, driving connections between the motor and the buffing wheel, the said motor, pivoted arm, buffing wheel and driving connections being assembled as a unit and supported solely upon said saddle whereby the unit can be adjusted along the arcuate track through at least 180° and the buffing wheel maintained continuously in contact with the work.

7. The combination of an arm mounted for oscillation about a fixed axis, a tool holding spindle mounted in said arm parallel to said axis, a pulley having a plurality of grooves concentric with said axis, a stationary motor support having a motor mounted thereon, means driving said pulley from said motor, means driving said spindle from said pulley, springing means supporting said arm against gravity at an angle with respect to the vertical, and springing means including the first named springing means opposing oscillation of said arm out of its selected position.

8. The combination of an arm mounted for oscillation about a fixed axis, a tool holding spindle mounted in said arm parallel to said axis, a pulley concentric with said axis, a stationary motor support having a motor mounted thereon, means driving said pulley from said motor, means driving said spindle from said pulley, springing means supporting said arm against gravity at an angle with respect to the vertical, and springing means including the first named springing means opposing oscillation of said arm out of its selected position.

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