

Sept. 23, 1969

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3,468,075

ROLLING MACHINE ROLLER FINISHING APPARATUS

Filed April 14, 1967

4 Sheets-Sheet 1

FIG_1

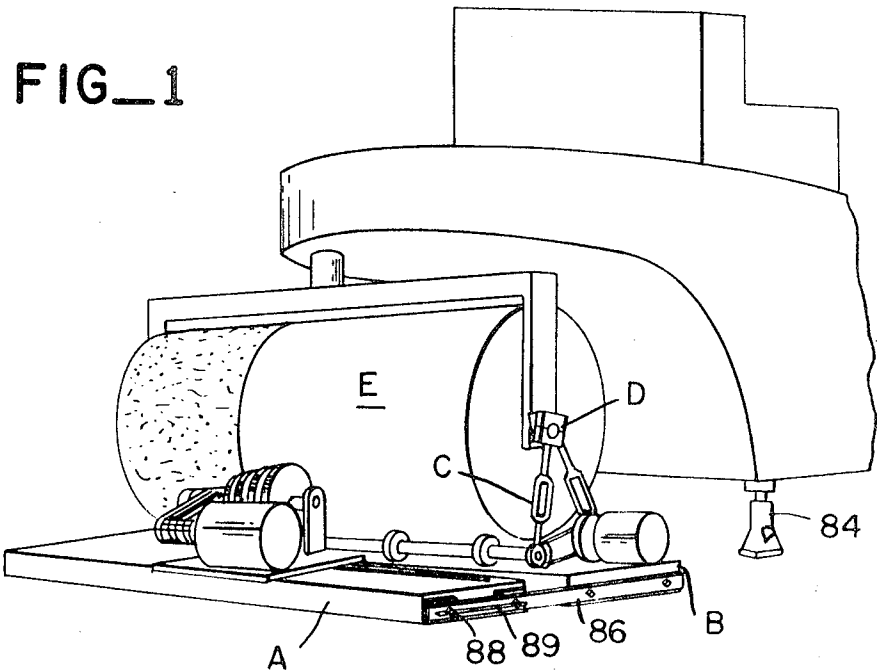


FIG_2

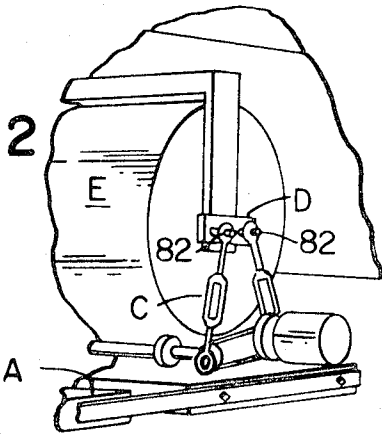
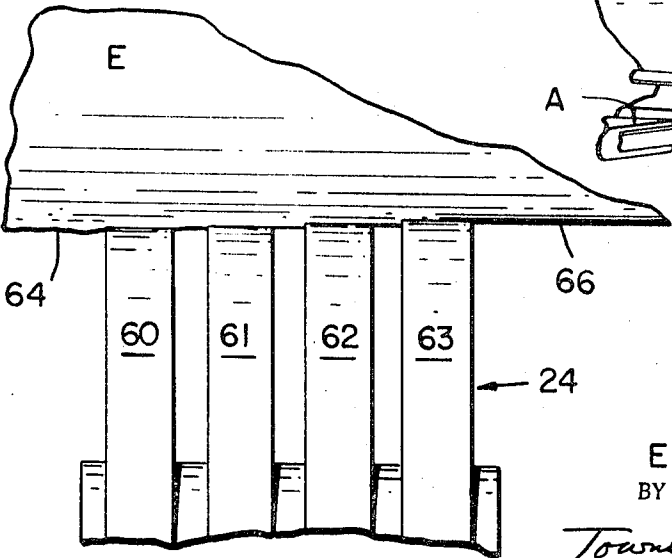


FIG_5



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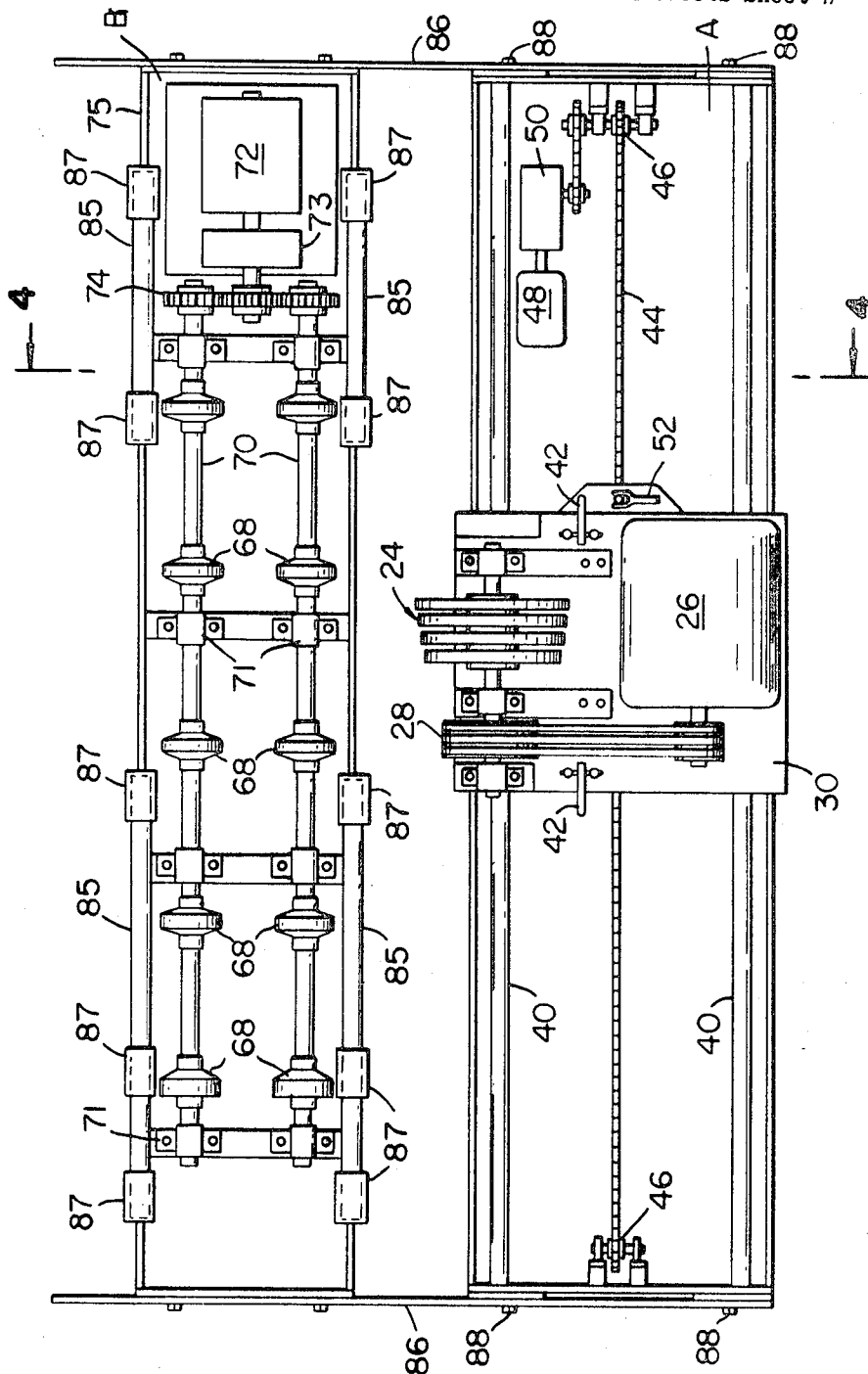
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ROLLING MACHINE ROLLER FINISHING APPARATUS

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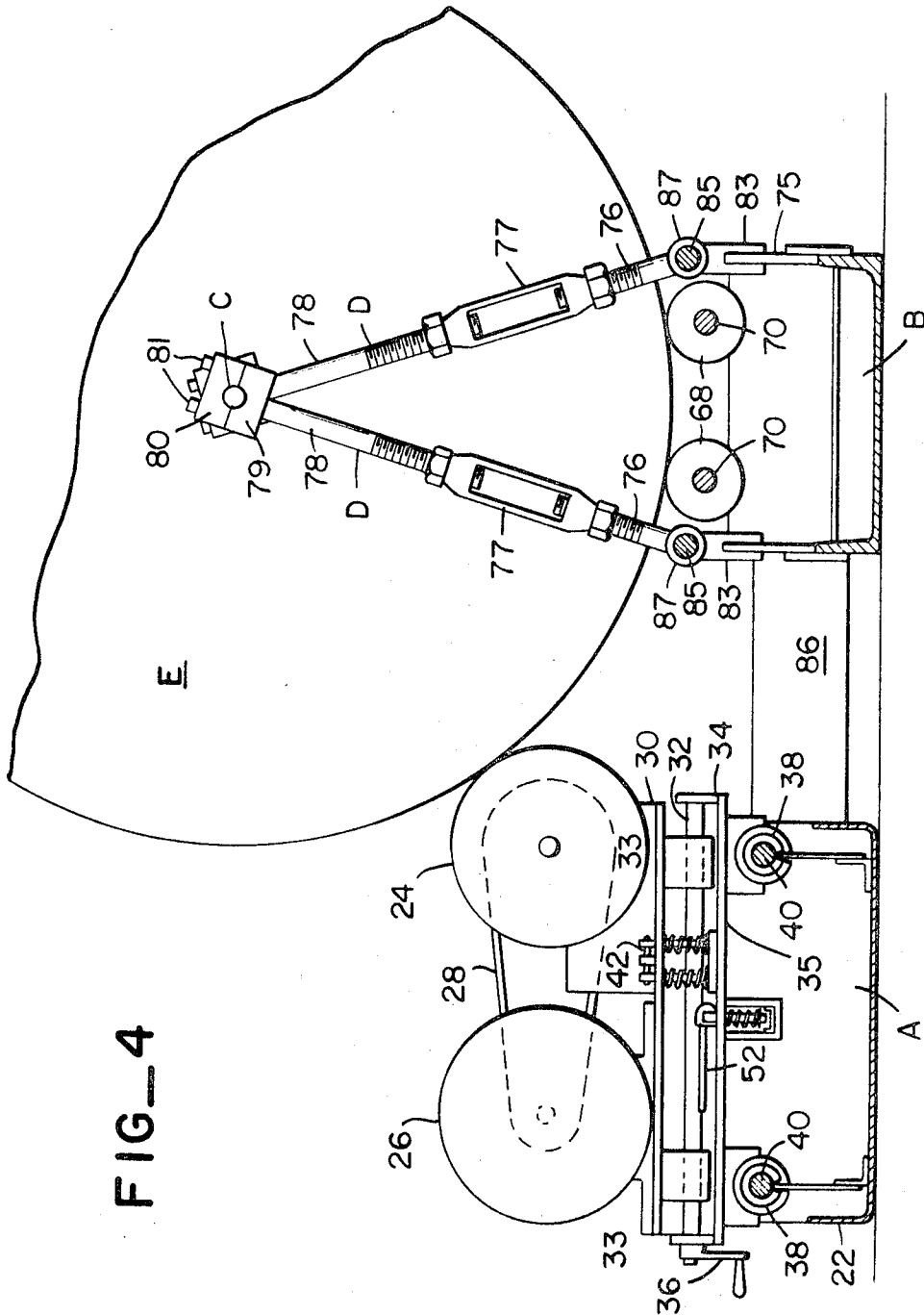
3,468,075

ROLLING MACHINE ROLLER FINISHING APPARATUS

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4 Sheets-Sheet 3

FIG-4



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ROLLING MACHINE ROLLER FINISHING APPARATUS

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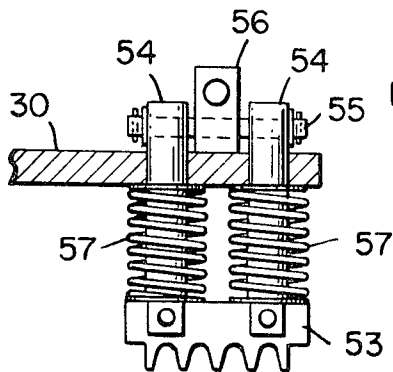


FIG_6

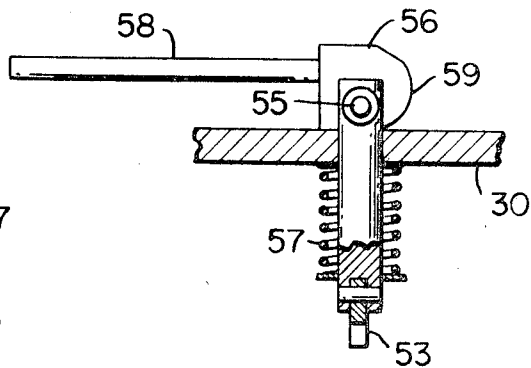


FIG_7

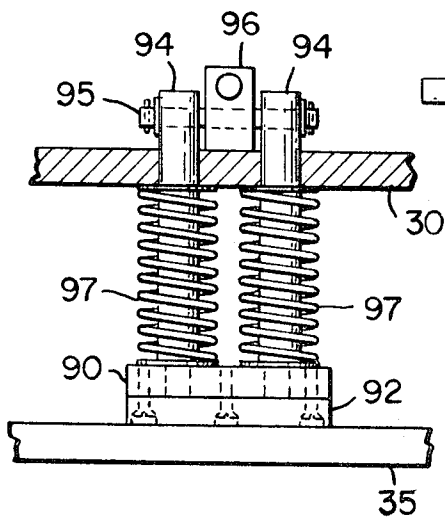


FIG_8

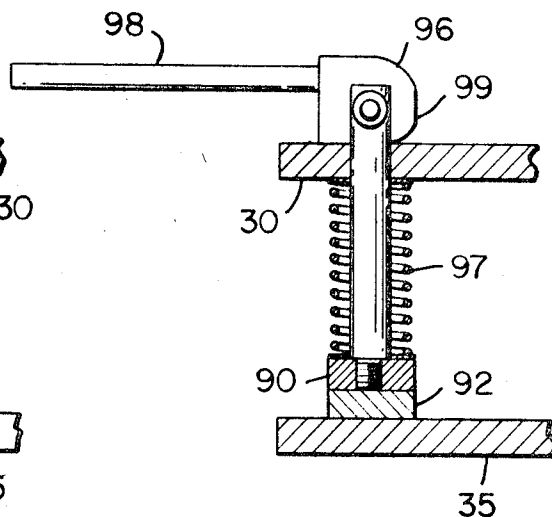


FIG_9

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ROLLING MACHINE ROLLER FINISHING APPARATUS

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3 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for grinding the surface of a rolling machine roller drum while the drum remains mounted on the rolling machine and which includes adjustable supports for supporting the rolling machine in an elevated position during grinding, and drive rolls for rotating the drum to be ground. A multi-faced grinder on the apparatus is positioned to grind the roller drum surface by traversing the drum surface parallel to the axis of rotation of the roller drum.

This invention relates to apparatus for refinishing large diameter rolls and, more particularly, to an apparatus for refinishing the roller drums on steel wheel rollers without the necessity of removing the drums from the machines.

The roller drums on steel wheel rollers or "steam rollers," hereinafter called rolling machines, are subject to substantial wear during use. Such rolling machines are used not only for compacting and smoothing bituminous surfaces but also in compacting aggregate, i.e., broken rock of varying size used as the under surface of drive-ways and of roads and highways. The roller drums of rolling machines become abraded and pitted and, after a comparatively short time in use, no longer meet the stringent requirements of many state highway departments for smoothness and squareness.

When the roller drums are no longer suitable for use because of failure to meet such standards, it has been the practice to remove the roller drum or drums from the rolling machine and ship them to a machine shop for resurfacing on a large lathe or similar apparatus. Unless spare roller drums are available, the rolling machine will be out of service for a period of time ranging from one week to a month or more depending upon the distance the drum must be shipped and the backlog in those few machine shops equipped to handle such large diameter rollers. If the contractor cannot afford such down time, he is required to rent a substitute rolling machine for the period of time his own will be out of service, thus adding to the substantial expenses involved.

The present invention is designed to refinish the surface of these roller drums quickly and simply while the drums remain attached to the rolling machine. This is accomplished in the present construction by a novel arrangement which holds a rolling machine roller drum elevated, rotates the roller drum on its own bearings and refinishes the surface of the drum.

In its broadest scope the present invention permits resurfacing of rolling machine roller drums in the field. No prior art apparatus has been found which permits the accomplishment of such a result.

In its narrow sense the invention accomplishes rotation of a rolling machine roller drum on its own bearings while the roller drum is elevated from the ground. By rotating the roller drum on its own bearings and aligning a smoothing apparatus with the axis of rotation, the roller drum surface may be refinished so that it is both smooth and concentric to its axis of rotation.

The preferred embodiment of the invention combines a reciprocating, multi-faceted grinder with a series of

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small diameter rolls for rotating the drum during the grinding operation and includes adjustable arms for supporting the weight of the rolling machine. These arms not only support the rolling machine, but also permit varying the elevation of the drum so that it rests lightly on the power rolls. This allows controlled rotation of the roller during grinding of its surface. A feature of the invention resides in providing for adjustment of the position of the grinder relative to the roller drum surface so that the refinished surface will be true to the axis of rotation of the roller drum.

In the preferred embodiment, the drive rolls are in sets, spaced apart on two parallel drive shafts to permit the circumference of the paving roller to be driven at two separated longitudinal axes. The driving rolls preferably are turned by means of a motor and gearing or chain drive so that the rotation of the drive rolls is in concert.

The grinder assembly in the preferred embodiment is mounted on a separate base from the drive rolls in order to permit the entire grinder assembly to be moved relative to the drive rolls. Thus, the grinder may be set up parallel to the axis of rotation of the roller drum and maintained in that relative position during the entire resurfacing operation. The grinder itself is mounted on a carriage, which in turn is mounted on a pair of parallel, highly finished, steel shafts which serve to support the grinding carriage and accurately guide the carriage as it travels longitudinally parallel to the face of the roller drum. The longitudinal movement of the grinder carriage is accomplished by means of a continuous chain driven by a separate power source. Connection of the grinder carriage to the power source is through a unique lock-on arrangement which permits the grinder carriage to be easily connected to the moving chain drive and to be as easily disconnected therefrom.

The grinding face is made up either of a multi-face grinding wheel having separate wheels, each of a slightly different diameter bonded together, or of a single wheel having multidiameter faces. The use of such a multi-faceted grinding wheel arrangement permits the roller drum to be resurfaced in a single pass since the smallest diameter face, which has the coarsest grit, is used to take the roughing cut. The larger diameter faces then follow over the semi-finished face of the roller drum. The grinding wheel with the finest grit has the largest diameter and makes the finish cut immediately adjacent the other cuts.

The entire combination therefore permits the roller drums on a rolling machine to be refinished quickly and easily in the field while the drums are still on the machine, a result not known heretofore to be available in any single apparatus or in any combination thereof.

Other objects and advantages of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which corresponding numerals represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a perspective view of the refinishing apparatus with the front roller drum of a rolling machine mounted thereof;

FIG. 2 is a fragmentary perspective view of one end of the roller drum showing an alternative method of supporting the rolling machine;

FIG. 3 is a plan view of the grinding apparatus showing the relative relationship of the drive mechanism and the grinding carriage;

FIG. 4 is a cross section of the grinding apparatus along the line 4—4 in FIG. 3 and showing a roller drum mounted on the drive rolls and the grinding wheel in position to resurface the circumference of the roller drum;

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FIG. 5 is an enlarged fragmentary view of the stepped grinding wheel making a cut across the face of the roller drum;

FIG. 6 is an enlarged front view showing the transverse feed lock for the grinder carriage;

FIG. 7 is a side view of the transverse feed lock in partial section;

FIG. 8 is an enlarged front elevation of the cross feed lock for the grinder carriage; and

FIG. 9 is a side elevation of the grinder carriage cross feed lock in partial section.

The general arrangement of the apparatus is shown in FIG. 1. The apparatus comprises four major parts: the grinder carriage assembly A which includes the transverse feed and cross feed for the grinder; the drive assembly B for the roller drum; the adjustable compression rods C which support the weight of the rolling machine; and the axle spindles D. The roller drum of the rolling machine is designated as E.

As may be seen in FIG. 4, the entire grinder assembly is mounted on a substantial frame or base 22. The multifaceted grinding wheel 24 and its drive motor 26 are connected together by V-belts 28. The drive motor, grinding wheels and V-belts together with their supporting bearings are all mounted on a supporting plate 30, which in turn is carried on a pair of parallel shafts 32 by means of bushings 33. The parallel shafts 32 are in turn mounted on the grinder carriage 34. A cross feed screw is attached between the grinder carriage 34 and the support plate 30 in order to move the mounted grinding wheel along the shafts 32 toward and away from the roller drum. The screw of the cross feed is turned by means of handle 36. Provision is made by means of the cross feed locks 42 to maintain the relative transverse position of the grinder mounted on plate 30 with respect to the grinder carriage and with respect to the circumference of the roller drum to be refinished.

The grinder carriage 34 is carried on a plurality of ball bushings 38 or similar way bearings which ride along a pair of highly finished steel shafts 40 rigidly mounted on the frame 22. The combination of ball bushings and the shafts 40 permits the grinder assembly to move on an accurate lateral path along the face of the roller drum.

This movement is accomplished automatically by means of a powered chain feed. A continuous roller chain 44 is mounted on sprockets 46 at either end of the grinder carriage frame 22. A small motor 48 and gear reducer 50 provide appropriate power to move the chain 44.

A unique carriage feed lock 52 is mounted on the carriage. The details of its construction are shown in FIGS. 6 and 7. The feed lock comprises a sprocket segment 53 rigidly mounted on a pair of carrying spindles 54 which pass through the grinder support plate 30. Link 55 passes through cam 56 and connects the spindles 54. Springs 57 are retained between the sprocket segment 53 and the plate 30. A handle 58 serves to operate the locking mechanism. FIGS. 6 and 7 show the lock in operative condition, that is, when the sprocket segment is engaged with the roller chain 44 to traverse the grinder carriage across the face of the rolling machine roller drum. When the handle is moved 90° to the vertical position, the sprocket segment 53 is lifted and is disengaged from the roller chain 44 since the link is located off-center with respect to the cam surface 59.

When the handle 58 of the carriage feed lock 52 is in the position shown in FIG. 7, the sprocket segment 53 engages the roller chain 44. When the motor 48 is turned on, the chain will be moved and will traverse the grinder carriage along the roller drum.

The details of the cross feed locks 42 are shown in FIGS. 8 and 9. The construction of these locks is similar to that of the carriage feed locks 52 illustrated in FIGS. 6 and 7, the primary difference between them being that the sprocket segment 53 in the carriage feed locks 52 is replaced by a pad 90 to which is affixed a block of friction material 92. The other parts of the lock are the spindles

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94, the link 95, the cam 96, the springs 97, the handle 98, and the cam surface 99. These locks are mounted on the grinder support plate 30, the friction material bearing against the base portion 35 of grinder carriage 34.

The grinding wheel 24 may be a composite wheel having a plurality of stepped faces or, as is shown in FIG. 5, may be made up of a series of separate wheels fastened together coaxially. The coarsest grit grinding face 60 has the smallest diameter, with slightly larger diameter grinding faces 61, 62 and 63 having successively finer grit. FIG. 5 also shows that the grinding wheel is traversed so that the smallest diameter grinding face 60 is the first to contact the roller drum E. This face 60 commences the smoothing operation across the rough roller drum surface 64; the operation is completed by the finest grinding face 63 which takes the finish cut, leaving a straight, smooth surface 66 on the roller drum E.

The details of the drive assembly B may be seen in FIG. 3. The drive rolls 68 are mounted on a pair of parallel shafts 70. These shafts are supported by a plurality of pillow block bearings 71 for maximum support. Power for the drive rolls is supplied by a motor 72 which is connected to a gear reducer 73 which, in turn, is connected through a chain and sprocket drive 74 to the shafts 70.

Compression rods C, received on either end of the base 75 of the drive assembly B, are used to support the weight of one end of the rolling machine. These compression rods are made up of lower support member 76, turnbuckle 77, and upper support member 78. At the end of the upper support member 78 is a split support block 70 made up of a lower jaw 79 and an upper jaw 80 fastened together by bolts 81. The support members 76 and 78 are threaded so that the length of the compression rod assemblies may be adjusted to control the compression of the roller drum E against the drive rolls 68. The relationship of these parts is shown in FIG. 4.

The lower support member 76 of the compression rods C is formed with an eyelet 83 adapted to receive a shaft 85 of substantial diameter. The shaft in turn is rigidly affixed to the base 75 by means of clamps 87. Provision is made in the base 75 for affixing the clamps 87 at numerous points along the base so that the compression rods may be properly spaced apart for supporting roller drums of varying lengths.

The compression rod assemblies C must be used with axle spindles D in order to support the rolling machine. There are various methods used by the manufacturers of rolling machines to fasten the roller drums to the machine. On some machines a simple axle spindle as is shown in FIG. 1 may be affixed to the roller axle. Occasionally, the rolling machine axle will not accommodate a single spindle and a flat steel plate having a pair of steel shafts 82 to accommodate the compression rod assemblies C, as is shown in FIG. 2, is required.

In use, the rolling machine is brought to a convenient area where the refinishing may be done. The first step is to affix an axle spindle D to the paving machine. The machine is raised by means of high-capacity lifting jacks such as the jack 84 shown in FIG. 1. The drive assembly B is then placed under the elevated roller E, the jacks having raised the rolling machine only enough to place the drive assembly B in position under the roller drum E. The compression rods C are then affixed to the drive assembly and to the axle spindle D at either end of the roller drum E. The compression rods may then be adjusted by turning the turnbuckles 77 to vary the elevation of the roller drum and to place the proper amount of pressure on the drive rolls 68.

Then, the grinder assembly A is placed in position adjacent to the roller drive assembly B and aligned with the axis of rotation of the roller drum E. This may be accomplished by means of a dial indicator or a similar device fastened to the grinder base plate 30, and traversed across the face of the roller drum.

After the grinder carriage is aligned with the axis of rotation of the roller drum, the base of the grinder car-

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riage assembly A and the base of the drive roll assembly B are fastened together by means of a steel plate 86 affixed to one of the bases and having an elongated hole 89 within which a bolt or bolts 88 traverse for adjustment. Tightening of the bolts 88 will lock the two bases in a fixed, relative position.

At this point the grinding wheel 24 is placed in position at one end of the roller drum E and the transverse adjustment is made by means of crank 36 so that the smallest diameter 60 of the grinding wheel may start making its cut first. The motor 72 of the drive assembly is then started to rotate the roller drum E. Motor 48 is started to cause the chain 44 to move in its path parallel to the edge of the roller drum, and the grinder motor 26 is started. The carriage feed lock is then moved to engage the sprocket segment 53 with the moving chain 44 in order to begin the traverse of the grinder carriage along the rotating face of the roller drum. Provision may be made for a micro switch or similar switch at one end of the grinder carriage assembly so that when the grinder carriage has completed its passage across the roller drum face, motor 48 will be shut down and the traversing movement stopped automatically.

After the finish cut has been taken, the surface may be checked for alignment by traversing a dial indicator affixed to the grinder carriage along the finished roller drum. If the results are satisfactory, the apparatus may be removed from its position, that end of the rolling machine lowered, and the process repeated using the same steps on the other roller drum on the rolling machine.

These and other modifications of my invention may be practiced, it being understood that the form of my invention as described above is to be taken as a preferred example of the same. Such description has been by way of illustration and example for purposes of clarity of understanding. Various changes and modifications may be made without departing from the spirit of my invention as limited only by the scope of the appended claims.

I claim:

1. In a machine for grinding large diameter rollers, the combination comprising: means to rotate an elongated, large diameter roller while said means is in contact therewith; and carriage movable along the roller and having a rotatable grinding wheel mounted for transverse movement thereon; and a plurality of supports disposed at opposite ends of the roller, said supports being adjustable to vary the pressure of the contact between the roller and the rotation means, power means engageable with said carriage for moving said carriage along the workpiece; means coupled with the mounting of said grinding wheel for moving said wheel transversely to said carriage

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for contacting said workpiece; and means to lock said mounting against transverse movement after the mounting has been placed in a position in which the grinding wheel is in contact with the roller surface, said locking means comprising friction material mounted for engagement with the carriage, a spring secured between said friction material and said grinding wheel mounting for biasing said friction material against said carriage and means for moving said friction material out of engagement.

2. The apparatus of claim 1 and including means for coupling said power means and said carriage and wherein said coupling means comprises: a sprocket segment movable into engagement with a moving chain, a spring secured between said plate and said grinding wheel mounting for biasing said segment against said moving chain, and means for moving said segment out of engagement with said chain.

3. In a machine for grinding large diameter rollers, the combination comprising: means to rotate an elongated, large diameter roller while said means is in contact therewith; a carriage movable along the roller and having a rotatable grinding wheel mounted for transverse movement thereon; a plurality of supports disposed at opposite ends of the roller, said supports being adjustable to vary the pressure of the contact between the roller and the rotation means, the rotation means and the support means mounted together on a base and the carriage carrying the grinding wheel separately mounted on its own base, and locking means coupling the bases to permit the carriage base to be moved into a position in alignment with the workpiece and locked in that position so that the carriage moves only in a path parallel to the longitudinal edge of the workpiece.

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U.S. Cl. X.R.

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