Aug. 22, 1939. J. E. ANDERSON 2,170,672

APPARATUS FOR ABRADING COATINGS FROM RODS

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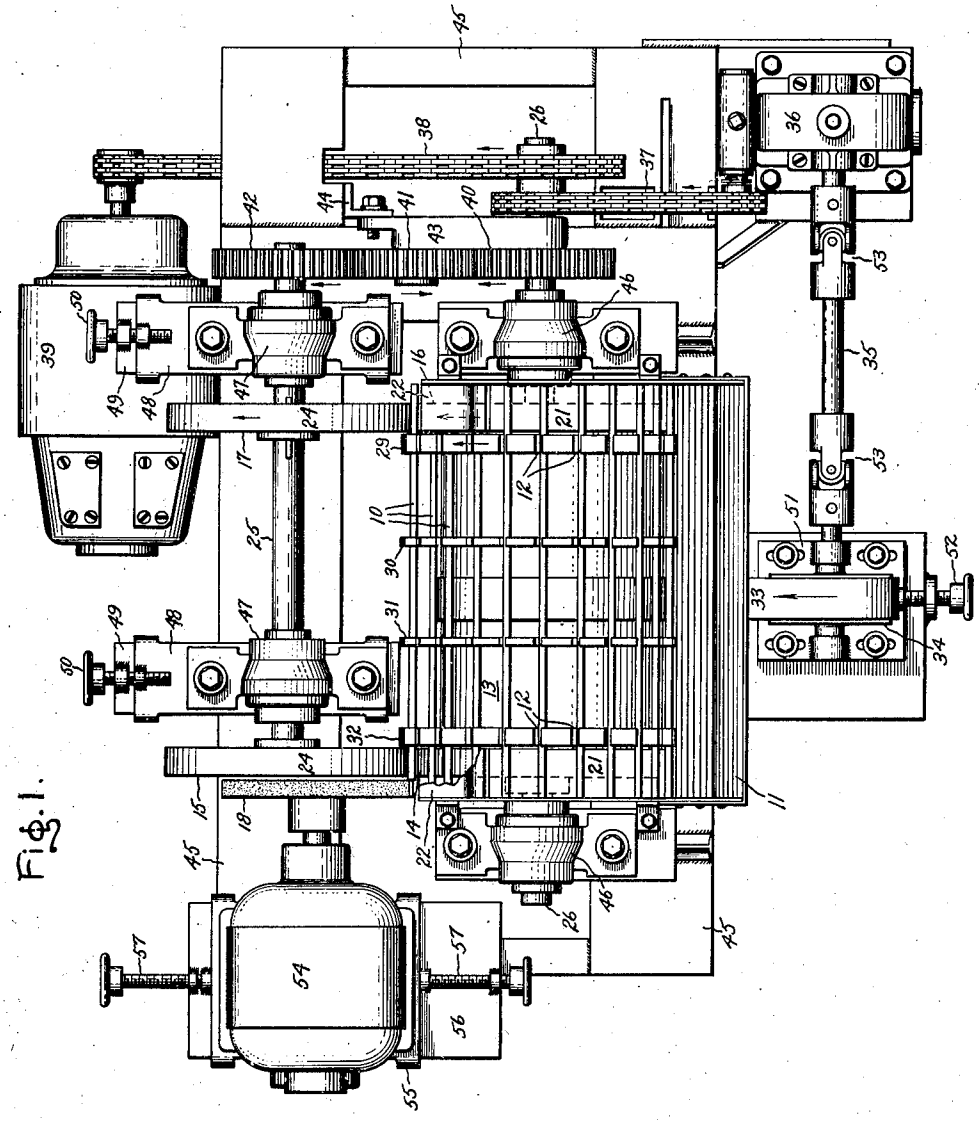

Fig. 1.

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Fig. 2.

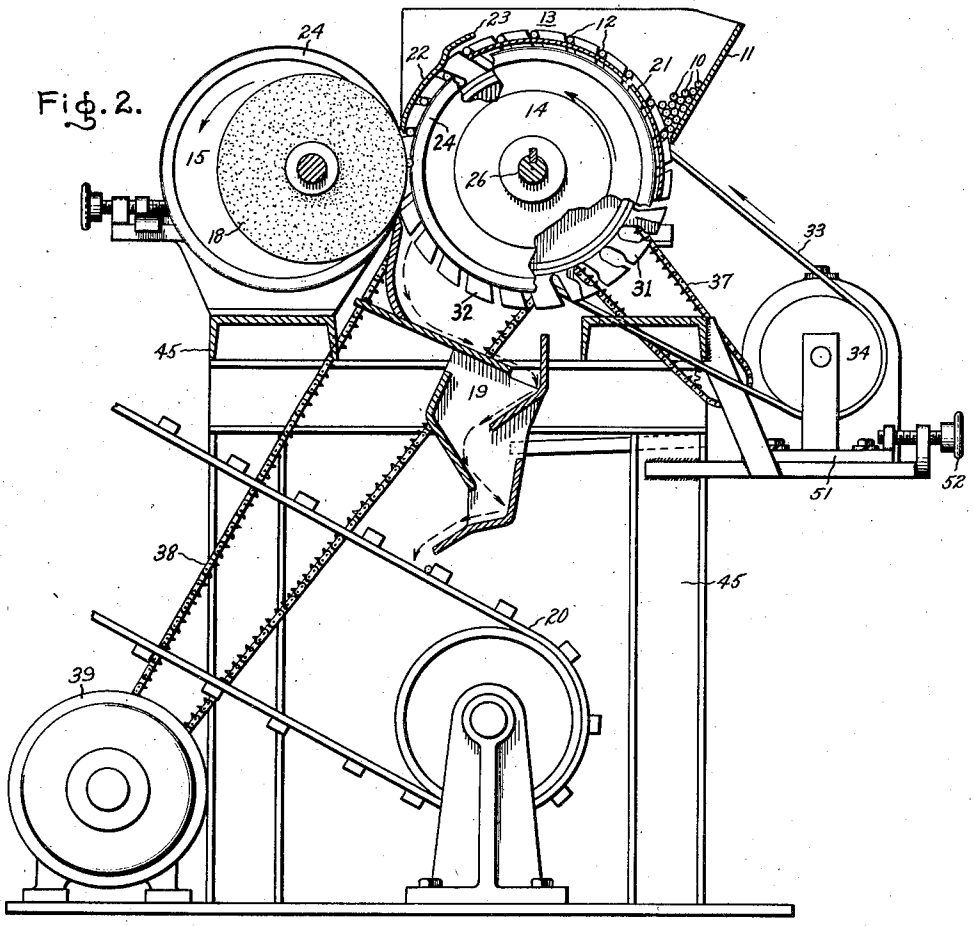

Fig. 3.

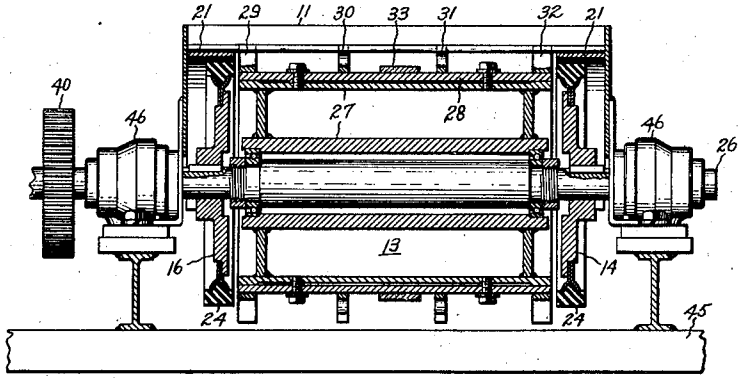

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Fig. 4.

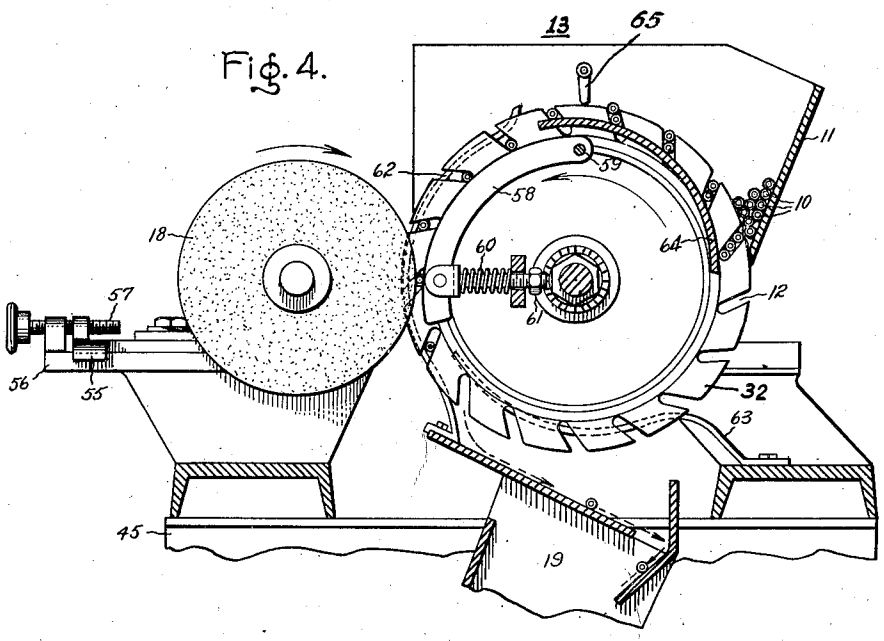
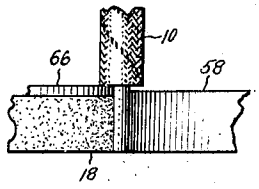


Fig. 5.



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UNITED STATES PATENT OFFICE

2,170,672

APPARATUS FOR ABRADING COATINGS FROM RODS

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Application November 27, 1936, Serial No. 113,045

8 Claims. (Cl. 51—103)

My invention relates to apparatus for abrading the coating from a selected portion of a rod or a rod like article such as wires, tubes and the like.

The coating may be removed for various purposes. In the manufacture of flux coated welding electrodes it is necessary to remove a portion of the coating from each electrode to provide a contact area through which the welding current may be supplied to its metallic core. Such electrodes are usually manufactured by processes which uniformly apply the fluxing material to the full lengths of the core rods and some means must be provided for removing from each electrode a portion of this coating which when dried firmly adheres to the surface of its core rod.

It is an object of my invention to provide apparatus for removing a selected portion of the coating on a rod or a rod like article.

It is a further object of my invention to provide apparatus by means of which coated rods are fed from a stacked pile with their ends alined with one another to a means for rotating said rods and simultaneously abrading the coating from a portion of their periphery.

Further objects of my invention will become apparent from a consideration of the machines illustrated in the accompanying drawings; Figs. 1, 2 and 3 of which illustrate one embodiment of my invention; Fig. 4 of which illustrates another embodiment thereof characterized by a different construction of the rotating and abrading means; and Fig. 5 of which illustrates a modified form of an abrading disk which may be employed with either of the embodiments illustrated in the preceding figures. In the embodiment of my invention illustrated in Figs. 1, 2 and 3, a top view of the machine is shown in Fig. 1; a side sectional view taken from the left of Fig. 1 is shown in Fig. 2; and a rear sectional view of the hopper, feed cylinder, and feed wheels taken from the rear of Fig. 1 is shown in Fig. 3.

In both of the illustrated embodiments of my invention means are provided for feeding a plurality of rods from a stacked pile in spaced parallel relationship with one another along the same path of travel to a rotating and abrading means which removes selected portions of their coatings. The feeding means comprises means for supporting the rods in a vertically stacked pile with their ends alined with one another and a slotted conveyor means having horizontally disposed, spaced, parallel slots which expose portions of the peripheries of the rods located therein. The rotating and abrading means comprises relatively movable convex surfaces arranged opposite one another and adapted to engage singly and successively the exposed portions of the rods while they are supported in the slots of the conveyor. The arrangement is such that only one rod per slot is supplied from the stacked pile to the rotating and abrading means.

In the embodiment of my invention illustrated in Figs. 1, 2 and 3, coated rods 10 are fed by gravity from a hopper 11 into parallel, spaced slots 12 in that portion of the periphery of a rotating cylinder 13 which extends into the hopper. This cylinder carries a rod in each slot from the hopper to and between pairs of rotating wheels 14, 15 and 16, 17 which engage and rotate each rod about its own axis as it passes the abrading disk 18 which removes the coating from the end of each rod. After the rods have passed this abrading disk they fall from the cylinder slots through a baffled passageway 19 on to a conveyor 20 which transports them away from the machine.

The hopper 11 is of substantially the same length as the rods 10 and serves to aline them with one another and the slots 12 in the cylinder 13. These slots which extend the full length of the cylinder are of substantially the same width as the width of a single rod and are of sufficient depth to hold more than one rod. A pair of straps 21 in each end of the hopper 11 directly over the wheels 14 and 16 is positioned across the ends of the slots to limit their effective depth to the thickness of a single rod at the discharge side of the hopper. It is to be noted that the slots are inclined to the radius of the cylinder in the direction of its rotation to facilitate the entry and discharge of electrodes. Guards 22 at each end of the hopper serve to hold the rods in the slots 12 until they are about to pass between the pairs of wheels 14, 15 and 16, 17. The front portions 23 of the guards 22 are slightly elevated from the surface of the cylinder to engage and dislodge electrodes that may ride on the cylinder on top of electrodes supported in its slots.

The pairs of wheels 14, 15 and 16, 17 are each provided with treads 24 of a compressible elastic material such as rubber. These treads are spaced from one another less than the thickness of the coated rods opposite that portion of the cylinder between the tops and bottoms of its slots ahead of the hopper in the direction of rotation of the cylinder. Each pair of wheels 14, 15 and 16, 17 rotates in the same direction but at a different velocity. In the arrangement illustrated the wheels 14 and 16 rotate in the same direction

as the cylinder 13 and at a greater velocity than the wheels 15 and 17. Consequently, each rod as it is fed between the pairs of wheels 14, 15 and 16, 17 rotates about its own axis within the central portion of a cylinder slot 12 and travels downwardly across the abrading disk 18. Each rod is fed relatively to the abrading disk by the pairs of wheels 14, 15 and 16, 17 at a velocity equal to half the difference of the velocities of these pairs of wheels. The direction of rotation of the abrading disk is usually of little importance and may be against or with the direction of travel of the rods between the pairs of wheels 14, 15 and 16, 17.

Wheels 15 and 17 are keyed to and rotate with a shaft 25 and wheels 14 and 16 are keyed to and rotate a shaft 26. The shaft 26 also acts as a support for a freely rotating pulley 27 to the surface of which a sleeve 28 is attached. This sleeve acts as a support for four spaced rings 29, 30, 31 and 32, each of which is provided with slots that are alined with one another. The slots in the outside rings 29 and 32 have substantially parallel side walls spaced from one another slightly more than the width of the rods while the slots in the inside rings 30 and 31, although provided with openings of equal width to the slots in rings 29 and 32, are enlarged at their bases to at least twice the thickness of the rods to permit free rotation of those rods that are not perfectly straight. It is, of course, apparent that the surface coating on the rods may be abraded from portions thereof not at the ends of the rods in which case the slots in the rings next to the abrading means are provided with substantially parallel side walls and the slots in the adjacent disks are enlarged to accommodate free rotation of the rods that are not perfectly straight. The pulley 27, sleeve 28 and slotted rings 29 to 32 inclusive are in effect a slotted cylinder and have been so identified above. When so considered, each slot of the cylinder is enlarged between a point adjacent the abrading means and a point spaced therefrom.

A single machine may be readily adapted for rods of different lengths and sizes by having a plurality of sleeves 28 whose rings 29 to 32 inclusive are properly spaced and provided with slots suitable for accommodating the desired rod lengths and sizes. With such an arrangement it is only necessary to substitute the proper sleeve for the desired rod size. A spacer may be provided at one or both end walls of the hopper 11 to adapt it to rods of different lengths or separate hoppers for each rod length may be used.

The cylinder 13 is rotated on the shaft 26 through the agency of a belt 33 which connects it with a driving pulley 34. This pulley is connected by a shaft 35, gear reduction 36 and chain transmission 37 to the shaft 26 which is positively driven by a chain transmission 38 connected to the drive shaft of a motor 39. The shaft 26 is also connected through gears 40, 41 and 42 with shaft 25. Gears 40 and 42 are attached to shafts 26 and 25 and gear 41 is free to rotate on a shaft projecting from a link 43 one end of which is rotatably supported on shaft 26 and the other end of which is adjustably bolted to a support 44 forming part of the frame 45 of the machine. This adjustable support for gear 41 accommodates adjustments of shaft 25 relative to shaft 26. Shaft 26 is supported in bearings 46 attached to the frame of the machine while shaft 25 is supported in bearings 47 attached to slides 48 which rest on ways 49 forming part of the machine frame. Screws 50 connecting the slides 48 and ways 49 provide means for adjusting shaft 25 relatively to shaft 26 and consequently wheels 15 and 17 relatively to wheels 14 and 16.

The gear reduction 36 and the gears 40 and 42 are so selected that the cylinder 13 rotates at substantially the same velocity as is imparted to the rods 10 by the pairs of feed wheels 14, 15 and 16, 17. Under certain conditions of operation the peripheral speed of the cylinder may be slightly greater or less than the speed imparted by the rods 10 by the wheels 14, 15 and 16, 17.

Pulley 34 is adjustably supported on the frame 45 of the machine by a slotted plate 51 which is attached to the frame by bolts passing through the slots. An adjusting screw 52 connects the plate 51 with the frame 45 of the machine. This adjustment is for belt tightening and shaft 35 is provided with universal couplings 53 to permit the movement of pulley 34 relative to gear reduction 36 which is attached to the frame 45 of the machine.

The abrading disk 18 is mounted on the shaft of a motor 54 attached to a slide 55 which may be adjusted along a way 56 forming part of the machine frame by adjusting screws 57 connecting the slide and way. This adjustment compensates for disk wear and enables the disk to be located properly relatively to the rods fed past it.

The operation of the machine of Figs. 1, 2 and 3 is apparent from what has been stated above in describing its organization and arrangement of parts.

The machine illustrated in Fig. 4 is substantially the same as that illustrated in Figs. 1, 2, and 3, except that the abrading disk 18 forms part of the means for rotating the electrode in engagement therewith. In this machine the relatively movable surfaces arranged opposite one another and adapted to engage the projecting end portions of rods 10 located in slots 12 of cylinder 13 are the surfaces of the disk 18 and of the shoe 58. The convex surfaces of the disk and shoe are oppositely disposed to one another with the narrowest space between them ahead of the hopper 11 and to one side of the cylinder 13 opposite the path of travel of the central portion of the ends of slots 12. The shoe 58 is pivotally supported at 59 at the hopper and biased toward the disk by a spring 60. The movement of the shoe toward the disk is limited by an adjusting nut 61. The movement of the shoe 58 relative to the abrading disk 18 maintains each rod in contact with the abrading disk throughout a predetermined arc of its surface. The convex surface of the shoe extends across the slots 12 in the vicinity of the disk 18 and positions the rods 10 against the disk while the rods are in the mid portions of slots 12. The rotating disk 18 rolls each rod in each slot 12 along the surface of the shoe in the same manner as the pairs of wheels 14, 15 and 16, 17 did in the machine of Figs. 1, 2 and 3. The speed of rotation of the cylinder 13 determines the velocity of the rods 10 relative to the abrading disk 18.

A member or members 62 extending along the periphery of cylinder 13 between the hopper 11 and disk 18 retain the rods 10 in the slots 12 of the cylinder. A like member or members 63 extending along a portion of the periphery of the cylinder beyond the disk 18 serve as ejectors for removing rods from the slots 12 before they again enter the hopper 11.

A cam surface or surfaces 64 extending across

the ends of the slots in the hopper 11 eject all but one rod per slot before the slot leaves the hopper. A weighted finger 65 may be employed in conjunction with the ejector 63 for displacing those rods that ride on the rods in slots 12 but extend above the surface of the cylinder.

Any suitable type of abrading disk may be employed. In the machines illustrated and above described the disk is a cylindrical grinding wheel. A wire brush or similar abrading disk may be used. Under certain conditions a cupped grinding wheel or cupped wire brush may be effectively used.

In order to obtain a smooth sectional cut which is perpendicular to the longitudinal axis of the core rod, the side of the abrading disk toward the center of the rod may be reenforced with a disk 66. This disk is of the same diameter as the abrading disk and cooperates therewith to produce a clean cut through the coating on the rod. Under certain conditions the extra duty falling on the side of the grinding disk toward the center of the rod is sufficient to produce a rough edge on this side of the abrading disk which results in a rough and irregular cut. In Fig. 5 the shoe 58 of Fig. 3 is shown opposite the composite abrading disk 18, 65.

Machines embodying my invention are not limited in their use to the removal of flux coatings from the ends of welding electrodes as they may be used for removing insulating coatings from any desired portions of conductors and the like by properly positioning the rotating and abrading means relatively to the feeding means. Various modifications and applications of my invention will occur to those skilled in the art in view of the particular embodiments above illustrated and described, and it is to be understood, therefore, that I intend to cover all such modifications as fall within the true spirit and scope of my invention as pointed out in the claims annexed hereto.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. Apparatus for successively abrading a portion of the periphery from each of a plurality of rods, comprising a conveyor provided with slots, means for supplying a single rod to each slot of said conveyor means, and means for rotating said rods and for abrading selected portions thereof while said rods are supported within said slots of said conveyor means, said slots of said conveyor means having a width slightly greater than the width of said rods at a point adjacent said rotating and abrading means and at a point spaced therefrom and being enlarged along the portions between said points to permit free rotation in said slots of those rods that are not perfectly straight.

2. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of substantially the same length as said rods and of sufficient depth to accommodate a plurality of said rods stacked vertically in parallel relationship with one another, a cylinder a portion of whose periphery extends into the bottom part of said hopper and forms a support for the middle portions of said rods in contact therewith, said cylinder having in its periphery a plurality of circumferentially spaced longitudinally disposed parallel slots whose depths are sufficient to hold more than one of said rods, whose ends and tops are slightly greater in width than the width of said rods and whose bottoms in the mid portion of said cylinder are at least twice the width of said rods, means for rotating said cylinder, means in said hopper for limiting the effective depth of said slots in said cylinder to the thickness of a single rod at the discharge side of said hopper, spaced relatively movable surfaces ahead of said hopper in the direction of rotation of said cylinder, the space between said surfaces being less than the thickness of said rods and being located on one side of said cylinder opposite that portion of the cylinder between the tops and bottoms of said slots, and means for moving said surfaces relatively to one another to impart to said rods in said cylinder slots a resultant motion in the direction of rotation of said cylinder.

3. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods comprising, a conveyor provided with spaced parallel slots of substantially the same width as the width of said rods and of sufficient depth to hold one of said rods, means for supplying a single rod to each slot of said conveyor, means for moving said conveyor at a substantially constant speed, oppositely disposed wheels having compressible elastic treads spaced from one another less than the thickness of said rods opposite a portion of said conveyor between the tops and bottoms of said slots, means for rotating said oppositely disposed wheels in the same directions with their oppositely disposed treads traveling in different directions at different velocities, and an abrading disk adapted to engage successively the peripheries of each of said rods when it is engaged and rotated by said oppositely disposed wheels.

4. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of substantially the same length as said rods and of sufficient depth to accommodate a plurality of said rods stacked vertically in parallel relationship with one another, a cylinder a portion of whose periphery extends into the bottom part of said hopper and forms a support for the middle portions of said rods in contact therewith, said cylinder having in its periphery circumferentially spaced longitudinally disposed parallel slots of slightly greater width than the width of said rods and of sufficient depth to hold more than one of said rods, means for rotating said cylinder, means in said hopper for limiting the effective depth of said slots in said cylinder to the thickness of a single rod at the discharge side of said hopper, oppositely disposed wheels having compressible elastic treads spaced from one another less than the thickness of said rods opposite that portion of said cylinder between the tops and bottoms of said slots ahead of said hopper in the direction of rotation of said cylinder, means for rotating said oppositely disposed wheels in the same directions with the tread of the wheel on the same side of a rod as said cylinder moving at a different velocity than the tread of the oppositely disposed wheel, and an abrading disk adapted to engage successively the peripheries of a portion of each of said rods when it is engaged and rotated by said oppositely disposed wheels.

5. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of sufficient depth to accommodate a plurality of said rods, a cylinder a portion of whose periphery extends into said hopper and forms a support for said rods in contact therewith, said cylinder having in its periphery circumferentially spaced longitudinally disposed parallel slots of slightly greater width than

the width of said rods and of sufficient depth to hold one of said rods, means for rotating said cylinder, a shoe and an abrading disk having convex surfaces oppositely disposed to one another with the narrowest space between them ahead of said hopper and within that portion of said cylinder between the tops and bottoms of said slots, means for rotating said disk, and means yieldingly biasing said shoe toward said disk for reducing the space between said shoe and said disk to less than the thickness of said rods.

6. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of substantially the same length as said rods and of sufficient depth to accommodate a plurality of said rods stacked vertically in parallel relationship with one another, a cylinder a portion of whose periphery extends into the bottom part of said hopper and forms a support for the middle portions of said rods in contact therewith, said cylinder having in its periphery circumferentially spaced longitudinally disposed parallel slots of slightly greater width than the width of said rods and of sufficient depth to hold more than one of said rods, means for rotating said cylinder, means in said hopper for limiting the effective depth of said slots in said cylinder to the thickness of a single rod at the discharge side of said hopper, a shoe at one end of said cylinder having a convex surface portion extending in the direction of rotation of said cylinder across the ends of a plurality of its slots, an abrading disk located opposite the convex surface portion of said shoe and beyond said hopper in the direction of rotation of said cylinder, means for rotating said abrading disk, means for pivotally supporting said shoe at said hopper, and means yieldingly biasing said shoe toward said abrading disk for reducing the space between the convex surfaces of said shoe and said disk to less than the thickness of said rods.

7. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of substantially the same length as said rods and of sufficient depth to accommodate a plurality of said rods stacked vertically in parallel relationship with one another, a cylinder a portion of whose periphery extends into the bottom part of said hopper and forms a support for the middle portion of said rods in contact therewith, said cylinder having in its periphery circumferentially spaced longitudinally disposed parallel slots whose depths are sufficient to hold more than one of said rods, whose ends and tops are slightly greater in width than the width of said rods and whose bottoms in the mid portion of said cylinder are at least twice the width of said rods, means for rotating said cylinder, means in said hopper for limiting the effective depth of said slots in said cylinder to the thickness of a single rod at the discharge side of said hopper, means for successively rotating a single rod about its longitudinal axis and simultaneously abrading selected portions thereof, said means including relatively movable convex surfaces arranged opposite one another ahead of said hopper in the direction of rotation of said cylinder and having between them a space less than the thickness of said rods located on one side of said cylinder opposite that portion of the cylinder between the tops and bottoms of said slots, means for moving said surfaces relatively to one another to rotate said rods singly and successively and simultaneously move them bodily in the direction of rotation of said cylinder, and means extending along the periphery of said cylinder between said hopper and said spaced relatively movable surfaces for holding rods in the slots in that portion of said cylinder between said hopper and said surfaces.

8. Apparatus for successively abrading a portion of the periphery of each of a plurality of rods, comprising a hopper of substantially the same length as said rods and of sufficient depth to accommodate a plurality of said rods stacked vertically in parallel relationship with one another, a cylinder a portion of whose periphery extends into the bottom part of said hopper and forms a support for the middle portions of said rods in contact therewith, said cylinder having in its periphery circumferentially spaced longitudinally disposed parallel slots whose depths are sufficient to hold more than one of said rods, whose ends and tops are slightly greater in width than the width of said rods and whose bottoms in the mid portion of said cylinder are at least twice the width of said rods, means for rotating said cylinder, means in said hopper for limiting the effective depth of said slots in said cylinder to the thickness of a single rod at the discharge side of said hopper, a shoe at one end of said cylinder having a surface portion extending in the direction of rotation of said cylinder across the ends of a plurality of its slots, an abrading disk located opposite said shoe and beyond said hopper in the direction of rotation of said cylinder, means for rotating said abrading disk, means for pivotally supporting said shoe at said hopper, means yieldingly biasing said shoe toward said abrading disk for reducing the space between said shoe and said disk to less than the thickness of said rods, means extending along the periphery of said cylinder between said hopper and said spaced shoe and disk for holding said rods in the slots in that portion of said cylinder between said hopper and said spaced shoe and disk, and means extending along a portion of the periphery of said cylinder beyond said spaced shoe and disk for positively ejecting said rods from the slots in said cylinder before said slots again enter said hopper.

JASPER E. ANDERSON.