Sept. 19, 1950 L. BALTES 2,522,920

ROTARY ABRASIVE HEAD

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Fig. 1

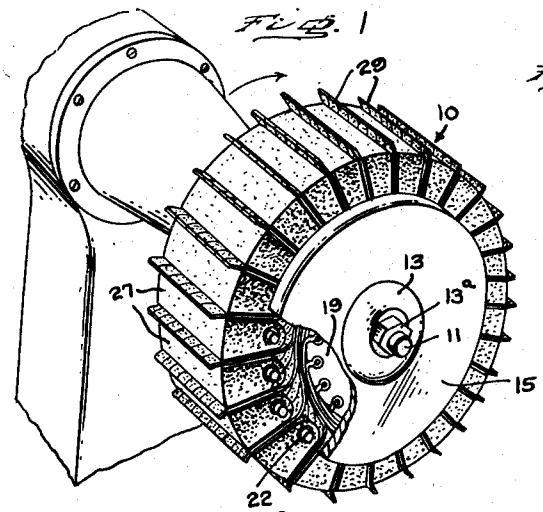


Fig. 4

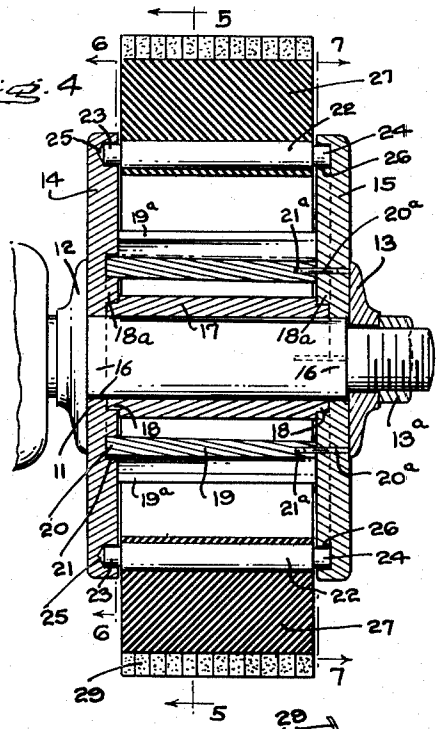


Fig. 9

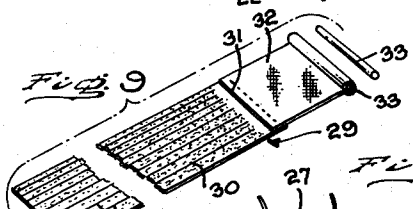


Fig. 2

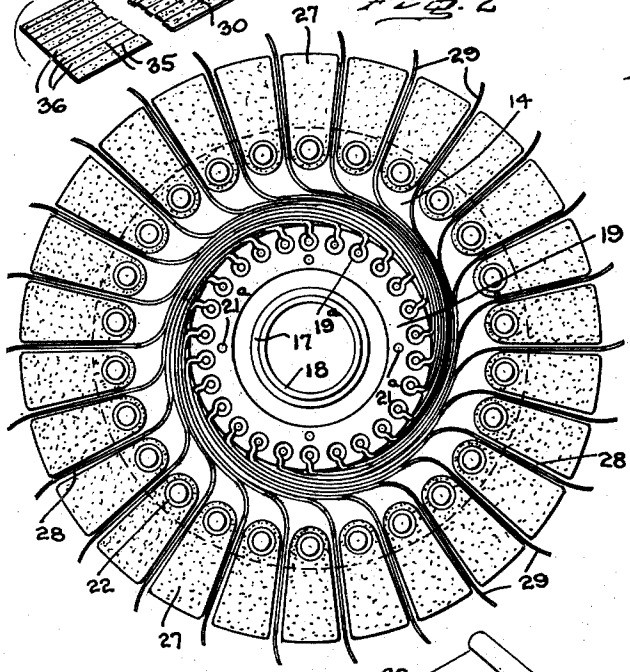


Fig. 3

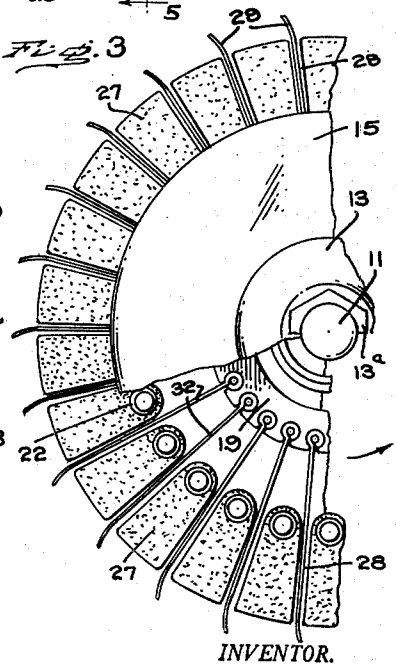
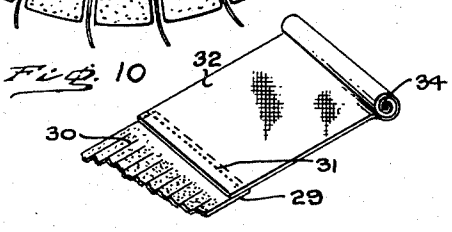


Fig. 10



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Fig. 5

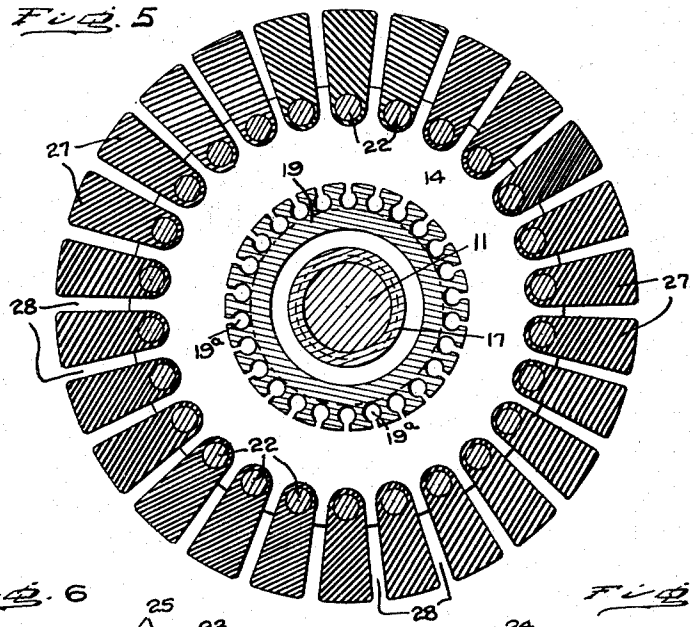


Fig. 6

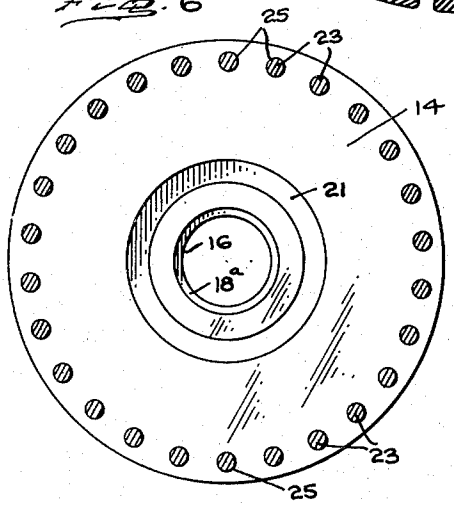


Fig. 7

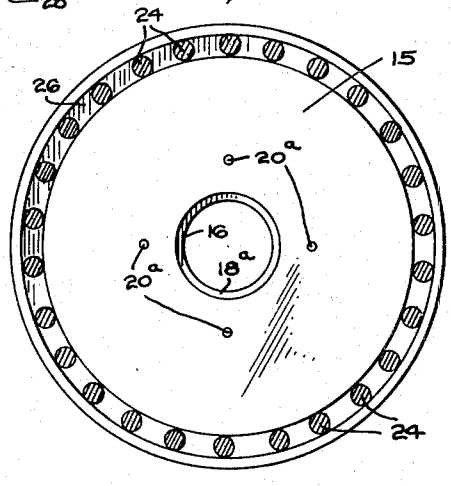
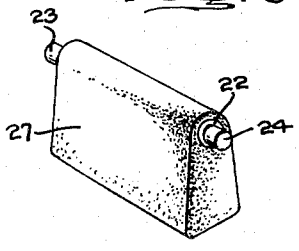


Fig. 8



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ROTARY ABRASIVE HEAD

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Application January 24, 1948, Serial No. 4,197

6 Claims. (Cl. 51—194)

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This invention relates generally to surface-finishing apparatus and more particularly to improvements in the design and construction of a rotary abrasive head of the type adapted for sanding or surface-smoothing articles having surfaces of irregular contour.

Among the principal objects of the present invention is to provide a rotary sanding or abrasive head characterized by the provision of an angularly adjustable inner drum about which are wrapped a plurality of securely anchored individual strips of abrasive-coated material, the general arrangement of the drum within the rotating head being such as to greatly facilitate progressive withdrawal of the strips radially of the head to present new abrasive surfaces to replace those worn out in use.

A further and important object of the present invention is to provide in a rotary abrasive head of the character aforesaid a plurality of circumferentially spaced, radially projecting buffer blocks of resilient, shock-absorbing material, such as rubber, felt or the like, adjoining pairs of which define slots therebetween through which the abrasive strips extend radially of the head, these buffer blocks being so relatively arranged with respect to the inner drum of the head as to insure that all of the slack in the strips internally of the head is taken up when the strips are subjected to the action of centrifugal force during operative rotation of the abrasive head.

Still another object of the present invention is to provide an abrasive head the component parts of which are readily separable to facilitate loading of the head with a new supply of abrasive strips, the head being especially characterized by the fact that the inner drum about which the strips are initially wrapped is readily replaceable by another drum, thereby rendering it possible to maintain on hand and to utilize preloaded drums adapted to instantly replace in the head a drum which is exhausted of its working supply of abrasive strips.

A still further object of the present invention is to provide a rotary abrasive head of the character aforesaid wherein means are provided external of the head for effecting angular adjustment of the inner drum to render effective succeeding portions of the abrasive strips so as to present new abrasive surfaces to replace those worn out in use, said adjustment being readily obtained without removing the head from its driving spindle.

Other objects and advantages of the invention, such as those relating to economies obtained in the manufacture of the head, as well as those resulting from the use thereof, will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of parts, all as shown in the accompanying drawings, as described in detail in the following specification and as finally pointed out in the appended claims.

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In the accompanying drawings which illustrate a preferred construction of a rotary abrasive head embodying the principles of the present invention—

Figure 1 is a perspective view showing the head mounted upon a motor-driven spindle therefor;

Figure 2 is an elevational view of the abrasive head without its outer face plate, the inner drum being shown with its full complement of abrasive strips;

Figure 3 is a partial elevational view of the abrasive head with its outer face plate attached, the latter being broken away to show the abrasive strips fully extended from the inner drum;

Figure 4 is a transverse vertical sectional view of the mounted abrasive head;

Figure 5 is a sectional view taken on the line 5—5 of Figure 4;

Figure 6 is a sectional view taken on the line 6—6 of Figure 4;

Figure 7 is a sectional view taken on the line 7—7 of Figure 4;

Figure 8 is a perspective view of one of the buffer blocks; and

Figures 9 and 10 are perspective views of different forms of abrasive strips adapted for use in the abrasive head of the present invention.

Referring now more particularly to the drawings, it will be observed that the abrasive head of the present invention, designated generally by the reference numeral 10, is adapted to be mounted upon the rotating spindle 11 of a motor driven unit of any conventional type, the head being removably clamped upon the spindle between a pair of end-thrust members 12—13, the member 12 being suitably secured in axially fixed position upon the spindle to provide a fixed abutment engageable by the inner face of the head while the member 13 is pressed against the outer face of the head by a locking nut 13a threaded upon the outer end of the spindle.

The abrasive head 10 is itself formed of a

plurality of readily separable interengageable parts which are adapted to be secured together in relatively immovable assembled relation upon the spindle 11 by the opposed end-thrust members 12 and 13, the general arrangement being such that when the head is clamped in operative position upon the rotatable spindle 11 the several component parts of the head rotate with the spindle as a unit therewith.

Essentially, the abrasive head 10 embodies a pair of opposed equi-diameter circular face plates 14 and 15 respectively provided with central openings 16—16 of a size adapted to snugly receive the spindle 11 projected therethrough, these opposite face plates being maintained in spaced, parallel relation by an intervening spacer sleeve 17 of an internal diameter adapted to snugly receive the spindle 11. Preferably, the opposite ends of the spacer sleeve 17 are reduced in external diameter, as at 18—18, to provide short end projections which respectively engage in complementally shaped annular seats 18a—18a formed in the inner surfaces of the face plates 14 and 15 to insure axial alinement of the face plates and their intervening spacer sleeve 17.

Also disposed between the opposed face plates 14 and 15 in concentric relation with respect to the rotating axis of the abrasive head is a drum member 19 the inner end of which is provided with an axial extension 20 adapted to be received in an annular groove 21 formed in the inner surface of the face plate 14. The opposite or outer end of the drum member abuts flatwise against the inner surface of the face plate 15 and is retained against rotation relatively to said abutting face plate by means of a plurality of circumferentially spaced pins 20a press-fitted or otherwise secured in the face plate and projecting respectively into sockets 21a formed in the abutting end of the drum member 19.

Formed in the external surface of the drum member are a plurality of circumferentially spaced slots 19a each of substantially key-hole shape in cross-section, the reduced extremities of these slots presenting in directions extending radially outwardly of the external cylindrical surface of the drum member. As appears most clearly in Figure 4, the slots 19a are each of a length substantially equal to the axial spacing between the face plates 14 and 15, the opposite ends of the slots being closed by the face plates when the drum member and said face plates are assembled as shown in Figure 4. While in the form of construction illustrated, the drum member 19 is shown provided with twenty-six of the slots 19a, it will be understood that a greater or lesser number of such slots may be provided as desired. The spacing of the slots 19a is preferably uniform.

Extending between the face plates 14 and 15 immediately adjacent their peripheral edges are a plurality of circumferentially spaced cylindrical rods 22 equal in number to the number of slots 19a in the inner drum member 19. These rods 22 are each provided at their opposite ends with extensions 23—24 of reduced diameter, the extensions 23 being respectively received within circumferentially spaced sockets 25 formed in the inner surface of the face plate 14, while the opposite extensions 24 are commonly received within an annular groove 26 formed in the inner surface of the face plate 15. The rods 22 are thus retained in position between the face plates 14 and 15 with their axes in substantially parallel relation and disposed in a circular plane concentric with the axis of rotation of the abrasive head 10.

Supported upon each of the transversely extending rods 22 for projection radially outwardly of the abrasive head is a buffer block 27 formed of rubber, felt or other such resilient material, each block being generally of the form and shape best shown in Figures 2, 3, 5 and 8. As appears in these figures, the several blocks 27 are each generally of such trapezoidal shape in transverse cross-section that when mounted upon their respective supporting rods 22 the proximate surfaces of each adjoining pair thereof are disposed in spaced, substantially parallel relation to provide a passageway 28 therebetween through which a flexible strip 29 of abrasive-coated material may be radially projected. A passageway 28 is provided for each of the slots 19a in the drum member 19. Each buffer block 27 is of a length approximately equal to the axial spacing between the plates 14 and 15.

The flexible strips 29 of abrasive-coated material may be of the form shown in Figure 9 or of that shown in Figure 10, both forms being characterized by the provision of a longitudinally extending web 30 of flexible material suitably coated upon one surface thereof with comminuted particles of a suitable abrasive, such as "Carborundum," sand, steel or the like. The inner extremity of the coated web is stitched, stapled or otherwise secured, as at 31, to an anchor tape 32 of suitable flexible material, the terminal end of said tape being wrapped about a dowel pin 33 or the like (see Figure 9) or rolled upon itself, as at 34 (see Figure 10) to provide the same with a cylindrical enlargement adapted to be inserted axially into the cylindrical portion of any one of the key-hole slots formed in the drum member 19. One such strip 29 is thus anchored in each of the slots 19a, the freely extending portions of the abrasive-coated strips being each of a length adequate to permit the same to be wrapped about a substantial portion of the drum periphery and then extended radially outwardly of the abrasive head through one of the passageways 28 formed between adjoining pairs of the buffer blocks 27.

Figures 1 and 2 show the abrasive head 10 of the present invention with its full complement of abrasive-coated strips 29 respectively disposed with their outer ends projecting radially outwardly of the head between adjoining pairs of the buffer blocks 27. The extent of projection of the ends of the strips outwardly beyond the rotary head may be varied as desired by the simple expedient of rotating the inner drum member 19 relatively to the plate 14 and the buffer blocks fixedly associated therewith in a direction counter to the normal direction of rotation of the head, thereby providing each strip with sufficient slack to permit it to be extended radially to the desired extent. It will be understood, of course, that rotation of the inner drum member relatively to the plate 14 and the buffer blocks is effected only when the locking nut 13a is sufficiently loosened to permit free rotation of the plate 15 about the spindle 11. Inasmuch as the plate 15 is keyed to the drum member 19 by the pins 20a, angular adjustment of the drum member is readily effected by rotating the plate 15 to the desired extent, it being noted in this connection that said plate 15 is free to rotate relatively to the block supporting rods 22 by virtue of the fact that the ends 24 of said rods ride freely in the continuous annular groove 26 of the plate 15, while the drum member 19 is free to rotate relatively to the plate 14 by

virtue of the fact that its inner extension **20** rides freely in the annular groove **21** of the plate **14**.

Upon tightening the lock nut **13a** upon the spindle, the plate **15** is clamped securely in its angularly adjusted position, thereby securely locking the head operatively upon its rotating spindle **13** with the several abrasive strips **29** thereof projecting radially through the several passageways **28** provided between the buffer blocks **27**. Upon rotation of the head at its normal operative speed, the slack portions of the abrasive strips are drawn taut by centrifugal force, the freely projecting tips of the abrasive strips being thus maintained exposed for yielding contact with the surfaces of the work to be smoothed or polished. As said tips become worn out, additional portions of the strips may be brought into use by angularly adjusting the inner drum member **19** as described hereinbefore, the abrasive strips **29** being thus gradually unrolled from the drum member until finally they extend therefrom as shown in Figure 3.

It will be noted that in this finally extended condition of the abrasive strips only the anchoring tape portions **32** thereof are disposed interiorly of the head, these tape portions being each of a length approximately equal to the distance extending radially from a slot **19a** in the drum member **19** to the outer surface of the rotary abrasive head. Inasmuch as these anchoring tape portions **32** are not coated with abrasive material, there is no waste of the relatively expensive abrasive-coated material, all of the latter being entirely consumed prior to re-loading the abrasive head with a new supply of abrasive-coated strips.

Re-loading of the head when the abrasive strips thereof need to be replaced either because of their having been worn out in use or because of the necessity of employing a different type of abrasive is readily effected upon removal of the face plate **15** and the inner drum member **19**, the latter being then either refitted with a new set of abrasive strips or replaced by a pre-loaded drum. In either event the drum with the abrasive strips wound about its periphery is re-inserted in the head with the freely extending portions of the strips respectively threaded through the passageways **28** formed between adjoining pairs of the buffer blocks **27**, the drum being then locked in angularly adjusted position relatively to the plate **14** as hereinbefore described by tightening the spindle nut **13a** against the member **13** which bears in turn against the external clamping plate **15**, whereupon all of the component parts of the head are securely locked together as a unit upon the rotatable spindle **11**.

The abrasive-coated webs **30** of the strips **29** may be longitudinally slashed, as at **35**, to provide each strip with a series of ribbon-like elements **36** or they may be of solid form (not shown), the choice depending upon the nature of the work to be performed. The buffer blocks **27** are preferably formed of a resilient material, such as rubber, felt or the like, and so provide yielding and yet substantial backings for the abrasive strips, permitting the latter to conform to the contours of the work surfaces to be smoothed or finished. The mounting of the buffer bars **27** upon their several supporting rods **22** is such as to permit the blocks to yield individually under pressure of the work applied against the freely extending tips of the abrasive strips, the blocks thus exerting a stabilizing influence upon the abrasive strips and minimizing loose play and fluttering thereof during operation of the head.

What is claimed as new and useful is:

1. A rotary abrasive head comprising a pair of axially spaced end plates, a coaxial drum adapted to be clamped between said plates for rotation therewith, one of said plates having an annular groove therein for accommodating one end of said drum to provide for angular adjustment of said drum relatively to said grooved plate, an annular series of circumferentially spaced rods extending transversely between marginal edge portions of said plates, each of said rods having one end thereof doweled in said grooved plate and the opposite end thereof fitted in an annular groove formed in the marginal edge portion of the other plate, said marginally grooved plate being thereby angularly adjustable relatively to said annular series of rods, a plurality of circumferentially spaced buffer blocks fitted respectively on said rods for radial projection outwardly of the abrasive head, and a series of abrasive-coated strips each wrapped about said drum member with their inner ends detachably anchored to the drum member and their outer ends extending outwardly of the head through passageways formed between adjoining pairs of said circumferentially spaced buffer blocks.

2. In a rotary abrasive head of the character defined in claim 1 wherein the drum is keyed to the marginally grooved plate by coacting pin and socket elements respectively provided in said drum and plate, said elements being disengageable to permit complete removal of said plate from said drum.

3. A rotary abrasive head adapted for mounting upon a rotatable spindle comprising a pair of axially spaced end plates, a coaxial drum adapted to be clamped between said plates for rotation in unison therewith, a plurality of abrasive-coated strips adapted to be wound in overlapping relation about the peripheral surface of said drum, an annular series of solid buffer blocks formed of relatively resilient material supported between the marginal edges of said plates in concentric relation to said drum, said buffer blocks being disposed in circumferentially spaced relation to provide a passage between each pair of said blocks for radial projection therethrough of the outer free extremity of one of said strips, and a plurality of rods extending transversely between the marginal edge portions of said end plates and through the inner ends of said buffer blocks for supporting the latter as aforesaid, at least one of said end plates being adjustable angularly about its supporting spindle to effect angular displacement of said series of buffer blocks relatively to said drum and so vary the extent of radial projection of said strips outwardly of the head.

4. A rotary abrasive head comprising a pair of axially spaced end plates adapted for relative angular adjustment, a coaxial drum adapted to be clamped between said angularly adjustable plates for rotation in unison therewith, a plurality of abrasive-coated strips adapted to be wound in overlapping relation about the peripheral surface of said drum, an annular series of solid buffer blocks formed of relatively resilient material supported between the marginal edges of said plates in concentric relation to said drum, said buffer blocks being disposed in circumferentially spaced relation to provide a passage between each pair of said blocks for radial projection therethrough of the outer free extremity of one of said strips, said strips being respectively

adapted for progressive projection outwardly of the passages upon positionally adjusting said drum angularly with respect to one of said end plates and said annular series of buffer blocks, and a plurality of rods extending transversely between marginal edge portions of said end plates and through the inner ends of said buffer blocks for supporting the latter as aforesaid, each buffer block and its supporting rod being individually removable as a unit from the abrasive head upon separation of said end plates.

5. A rotary abrasive head comprising a pair of axially spaced end plates adapted for relative angular adjustment, a coaxial drum adapted to be clamped between said angularly adjustable plates for rotation in unison therewith, a plurality of abrasive-coated strips adapted to be wound in overlapping relation about the peripheral surface of said drum with the free ends thereof extending radially of the head, and an annular series of solid rubber buffer blocks supported between the marginal edges of said plates in concentric relation to said drum, said buffer blocks being each of substantially trapezoidal form in transverse cross-section and being disposed in circumferentially spaced relation to provide therebetween a series of radially extending, substantially parallel-walled passages for respective projection therethrough of the outer free extremities of said abrasive strips, the inner ends of said blocks being bound between marginal edge portions of said plates when the latter are clamped together.

6. A rotary abrasive head comprising a pair of axially spaced end plates adapted for relative angular adjustment, a coaxial drum adapted to be clamped between said angularly adjusted plates for rotation in unison therewith, an annular

series of solid buffer blocks of resilient shock-absorbing material supported between the marginal edges of said plates in concentric relation to said drum, a plurality of rods extending transversely between marginal edge portions of the end plates for supporting said blocks between said plates, said buffer blocks being circumferentially spaced to provide an annular series of passages extending radially of the head and said drum being provided in its peripheral surface with a plurality of circumferentially spaced parallel slots extending lengthwise of the drum, one such slot being provided for each radial passage between said buffer blocks, each slot being of enlarged cross section internally of the peripheral surface of the drum, and a plurality of abrasive-coated strips wound in overlapping relation about said drum with the free ends thereof extending radially of the head through the passages formed between said buffer blocks, the inner extremities of said strips being rolled into the form of cylindrical enlargements adapted to be slipped endwise into the enlarged portions of said slots of the drum whereby to removably anchor said strips to said drum.

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