May 1, 1923.

1,453,742

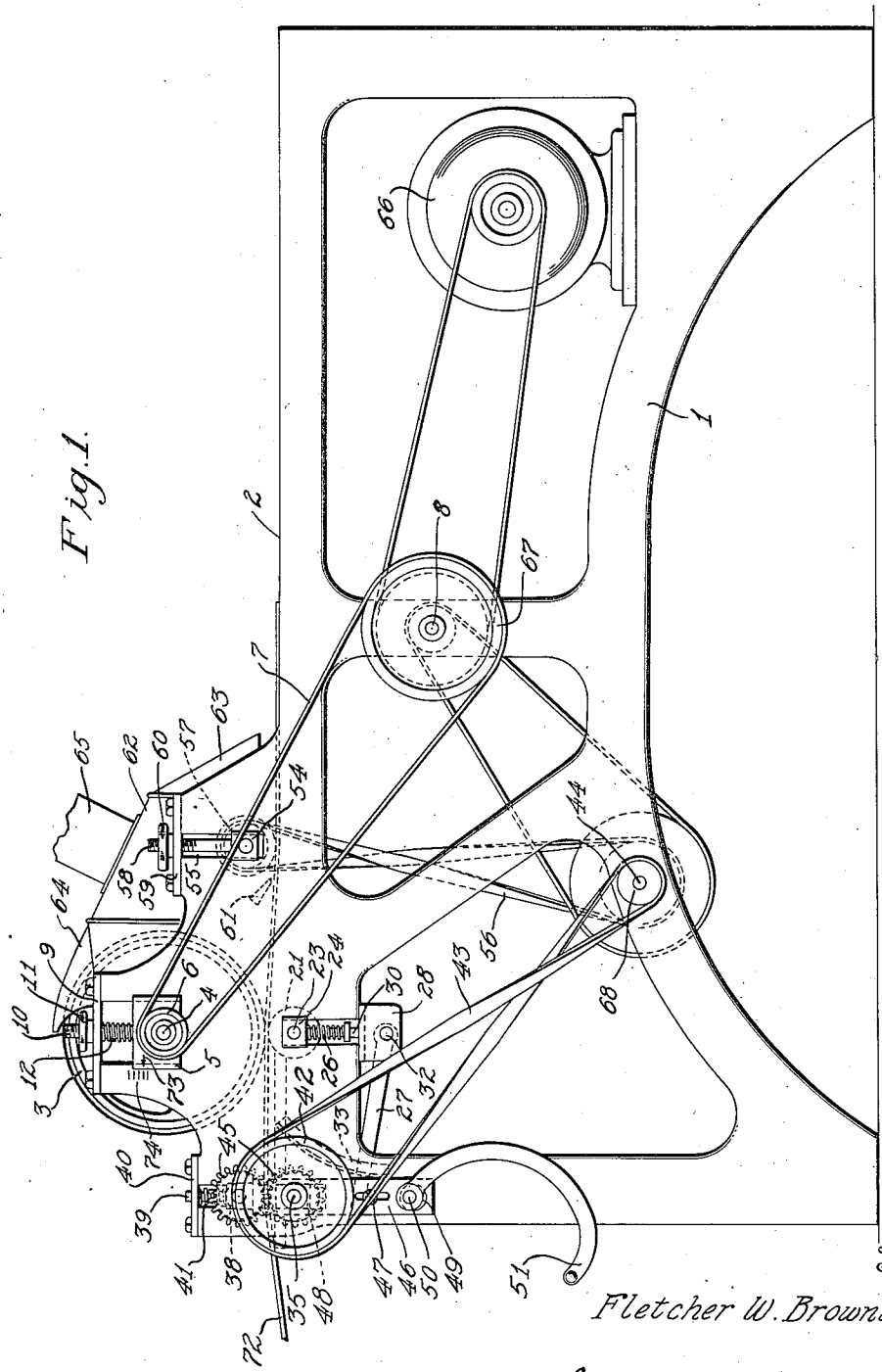
F. W. BROWNING

ABRADING MACHINE

Filed Aug. 28, 1922

3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

Fig. 2.

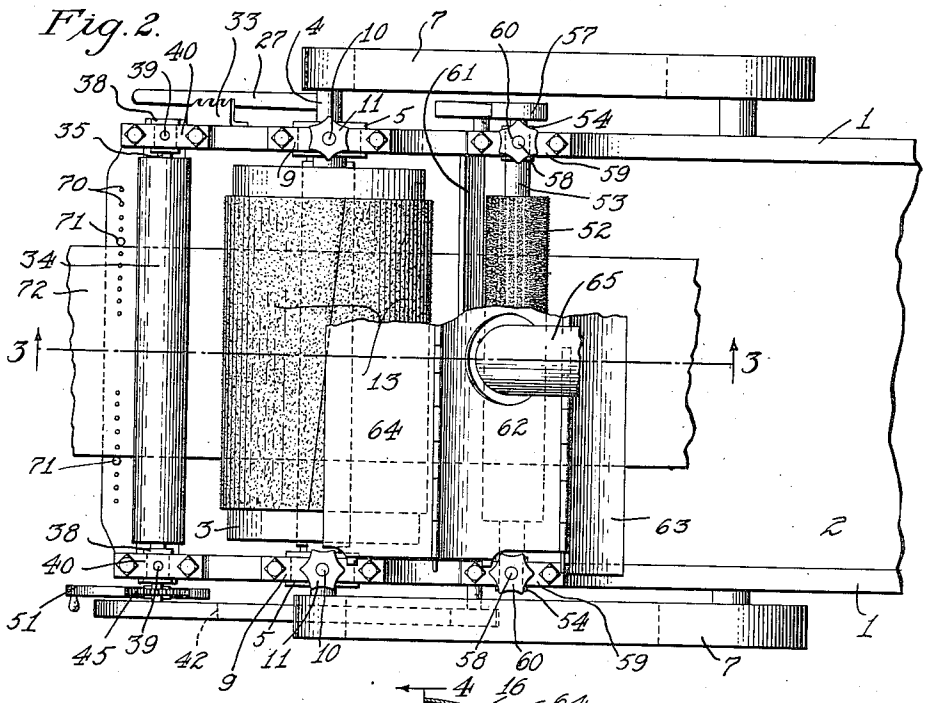

Fig. 3.

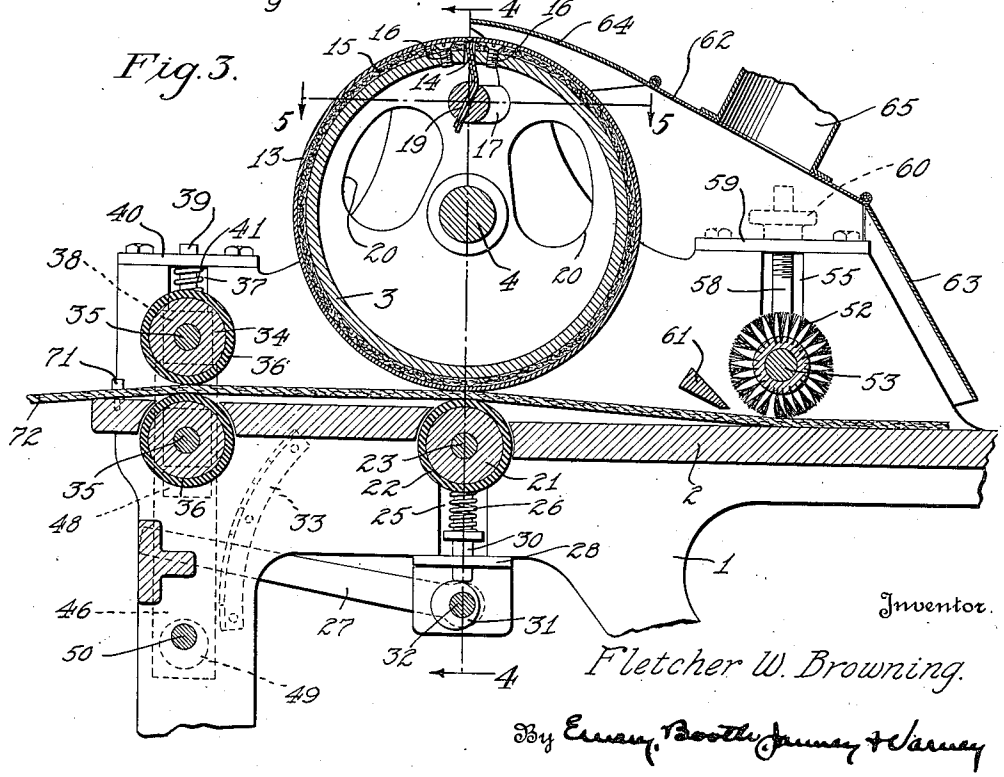

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Fig. 4.

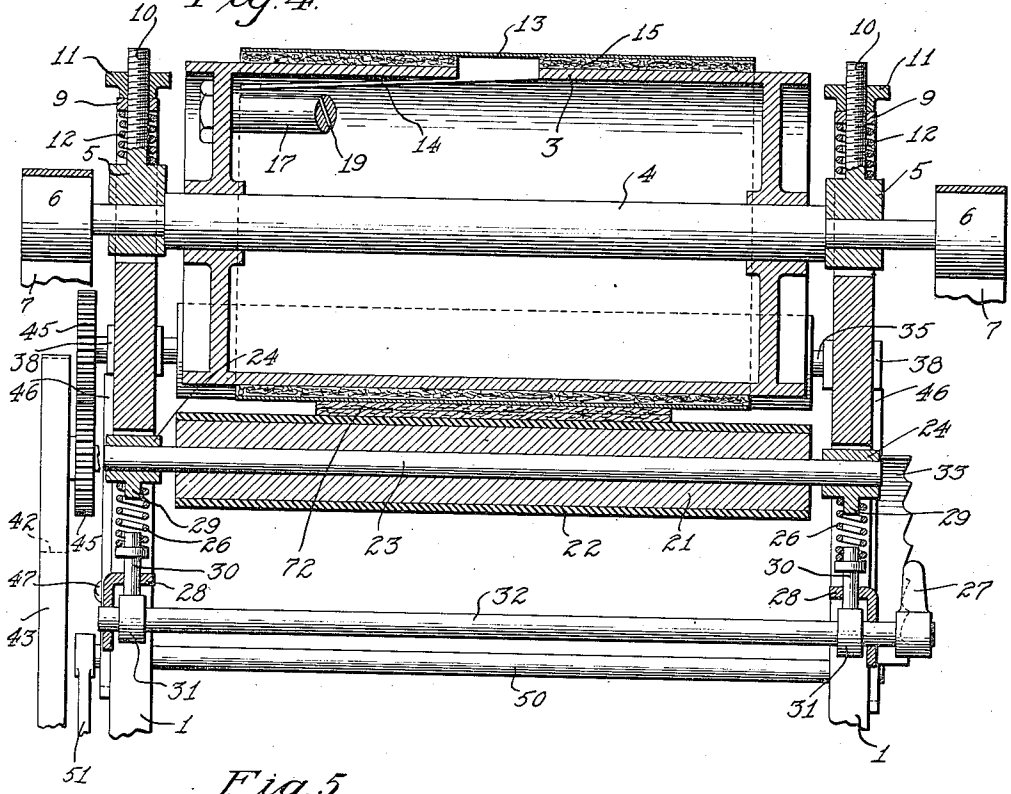
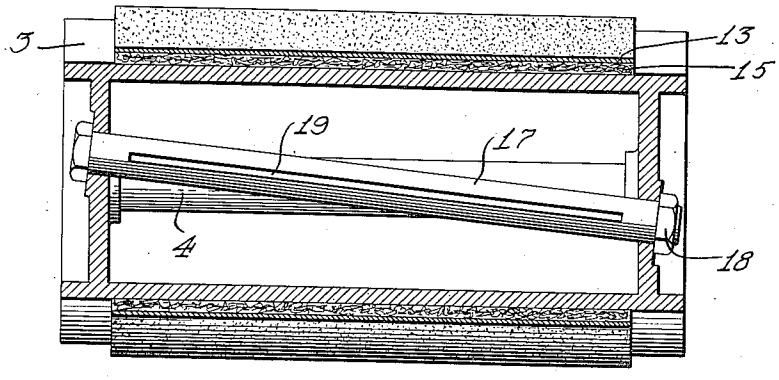


Fig. 5.



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Patented May 1, 1923. 1,453,742

UNITED STATES PATENT OFFICE.

FLETCHER W. BROWNING, OF KINGSPORT, TENNESSEE.

ABRADING MACHINE.

Application filed August 28, 1922. Serial No. 584,796.

To all whom it may concern:

Be it known that I, FLETCHER W. BROWNING, a citizen of the United States, and resident of Kingsport, Sullivan County, Tennessee, have invented an Improvement in Abrading Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to abrading machines particularly adapted for treating the surface of strip material, such as leather belts, and aims to provide an expeditious and effective means for treating materials of varying hardness and thickness.

Referring to the accompanying drawings, wherein I have shown one illustrative embodiment of my invention—

Figure 1 is a side elevation of a machine for treating leather transmission belts;

Fig. 2 is a top plan view of the machine certain parts being broken away;

Fig. 3 is a partial sectional elevation taken on the line 3—3 of Fig. 2;

Fig. 4 is a partial sectional view taken on the line 4—4 of Fig. 3; and

Fig. 5 is a sectional view of the drum taken on the line 5—5 of Fig. 3.

The machine selected for illustration, referring to Figs. 1, 2 and 3 of the drawings, comprises a frame or table 1 having suitable side and end frame members and a horizontal top plate 2 to support the work, which is fed from one end under an abrading roll or drum 3. This drum is mounted upon a horizontal shaft 4 extending across the table, and having its ends journaled in vertically adjustable boxes 5, which are mounted to slide up and down in suitable slots in housings formed by upwardly projecting portions of the two side frames. The journals are adjusted so that the bottom of the drum is slightly above the top plate or platen 2 of the table.

The shaft 4 is rotated by any suitable means, such as the pulleys 6 on each end driven by belts 7 from a countershaft 8 located beneath the table. For adjusting the drum 3, cross bars 9 are secured across the tops of the journal housings, and the ends of the shaft 4 are supported therefrom by stud bolts or screw threaded stems 10 (Fig. 4) which are secured to the journal boxes 5 and project upwardly through openings in the cross bars 9 and have hand wheels or nuts 11 on their upper ends to adjust the journal boxes and drum vertically. A compression spring 12 surrounds each of the stud bolts 10 between the cross bars 9 and journals 5 to prevent chattering or vibrations of the abrading drum when it is driven at very high speeds.

Preferably the drum is covered with a sheet of suitable abrasive 13 such as sand paper, for example. In order to secure the sheet in place on the drum a narrow slot 14 is cut across the drum to receive the ends of the sheet. This slot is cut at an acute angle to the axis of the drum to insure smooth running contact between the periphery of the drum and the work. To cushion the sheet of abrasive, a backing or lagging of yieldable material 15, such as felt for example, is cemented to the outer surface of the drum or attached to it by any suitable means, such as the screws 16 adjacent the edges of the slot 14 (Fig. 3). A bolt 17 is arranged beneath and substantially parallel to the slot 14 in the drum and is adapted to be secured against rotation in the ends of the drum by a clamping nut 18. This bolt has a longitudinal slot 19 of the same length as the slot in the periphery of the drum to receive and hold the ends of the abrasive sheet (see Figs. 3, 4 and 5). Hand holes 20 for giving access to the interior of the drum are preferably cut in the ends on the same diametrical side as the bolt 17 (see Fig. 3), in order to balance the drum to compensate for the weight of the bolt 17 on one side of the shaft 6. The sheet of abrasive material 13 may be secured to the drum on the felt covering 15 by inserting the ends of the sheet through the slot 14 in the drum and through the slot 19 in the bolt, (see Figs. 3 and 4), the slot 19 being in alinement with the slot 14. The ends of the sheet may be guided in the slot 19 by the operator inserting his hand through the hand holes 20 in the end of the drum. The bolt is then turned so that the slot 19 occupies a different plane from that of the slot 14 (Fig. 3) to tighten and hold the sheet of abrasive material under tension on the drum, and the nut 18 on the bolt tightened to hold it in position, thus securing and maintaining the abrasive material under tension on the drum.

The work may be held in contact with the abrading drum by a presser roller 21 (see Figs. 3 and 4) having a lagging 22 of suitable material, such as rubber, mounted be-

low the drum 3 on a transverse shaft 23 parallel to the shaft 4 of the drum. The roller shaft is carried by journal boxes 24 which are slidably mounted in vertical slots 25 in the frame. The journal boxes are supported by springs 26 from an adjusting device controlled by the lever 27 (see Fig. 1). The lever and adjusting device are mounted in angle bars 28 secured to the frame across the slots 25. Each of the journal boxes 24 has a projection or boss 29 provided on its lower side (see Fig. 4), which cooperates with a collar pin 30 carried by each of the cross bars 28 to position the springs. The collar pins 30 are mounted to reciprocate in holes in the flanges of the angles 28 in vertical alinement with the bosses or projections 29 on the journals 24, and are engaged by cams 31 carried on a shaft 32 which is oscillatably mounted below the collar pins 30 in alining openings in the vertical flanges of the angle bars 28 (Fig. 4). The hand lever 27 is attached to one end of the shaft 32 and may be raised and lowered by the operator to oscillate the cam shaft and vary the compression of the roller supporting springs and thereby vary the pressure of the work against the abrading drum. A notched segment 33 (Fig. 2) is secured to the side of the frame and is adapted to hold the lever 27 in adjusted position. The lever may be sprung outwardly out of engagement with the teeth on the segment to move it to different positions of adjustment.

A pair of feed rollers 34 are mounted on parallel shafts 35 near the feeding end of the table. These rollers preferably have lagging 36 (see Fig. 3) of any friction producing material, such as rubber for example, and are preferably mounted in front of the abrading drum to grip the belt or other material and pay it out to the abrading drum at the desired speed. They are preferably self adjusting to suit the thickness of the material. As illustrated, they are arranged for relative vertical movement in journal boxes 38 which are slidable in slots 37 in the side members of the frame. The journal boxes 38 of the lower feed roller rest at the bottom of the vertical slots, and the journal boxes of the upper feed roller are provided with vertical pins 39 projecting upwardly through openings on cross bars 40 secured on opposite sides of the slot. The upper roller may be yieldably supported by compression springs 41 surrounding the pins 39 between the cross bars 40 and the journals 38 to exert downward pressure on the feed roller. The lower roller has a pulley 42 (see Fig. 1) secured on one end of the shaft adapted to be driven by a crossed belt 43 from a countershaft 44 below the table. The upper roller may be positively driven from the lower roller shaft by gears 45 having deep teeth to permit them to remain in mesh when the upper roller is separated by relatively thick strips passing through the rolls.

Any suitable means such as a pair of cam lifter plates 46 (see Fig. 1) may be provided for lifting the upper roller 34 to release the grip on the work. As shown, these plates coact with the upper journal boxes 36. The lifter plates 46 are slidably mounted on the frame, preferably by screws 47 passing through longitudinal slots (see Fig. 1). A rectangular slot 48 may be cut in each of the plates to receive the journal boxes of the lower roller and permit relative movement. The lifter plates are raised by cams 49, which engage in circular openings in the lower ends of the lifter plates. The cams 49 are mounted on a transverse shaft 50 provided with a suitable lever 51 conveniently located at the end of the frame where it may readily be turned to raise or lower the upper feed roller at the will of the operator.

In order to clean the dust from the finished strips I provide a suitable rotary brush 52 mounted above the table and behind the abrading drum. The brush is carried on a shaft 53 having journal boxes 54 adjustably mounted in suitable slots 55 in the side frames. The brush is rotated from the countershaft 44 by any suitable means such as a cross belt 56 which drives the pulley 57 fixed on one end of the brush shaft. The brush is adjustably mounted so that it may be raised or lowered to compensate for wear and to sweep or clean strips of different thicknesses, by any suitable means such as threaded studs 58 secured in the journal boxes 54 passing through openings in the cross bars 59 and having hand wheels or nuts 60 above the cross bars (see Figs. 1 and 3). A guide member such as the cross bar 61 (Fig. 3) is secured to the frame in front of the brush to guide the work below the brush. In order to remove the dust or to reclaim the abraded particles a hood 62 having hinged sections 63 and 64 and a conduit 65 leading to a source of suction is arranged over the brush and a portion of the abrading drum (Fig. 3). The hinged sections may be raised for making repairs or for inspection purposes. This hood covers the space between the brush and drum and prevents the dust from escaping.

Any suitable driving mechanism may be employed for driving the feed rollers, abrading drum and brush but I prefer to employ a motor 66, mounted under the table, to drive the countershaft 8 which carries a pair of pulleys 67 for the belts 7 from the abrading drum. The sizes and arrangement of the pulleys and shafts are such as to drive the drum at a high speed in a counterclockwise direction as seen in Fig. 1. The feed roller countershaft 44 has suitable pulleys 68 and 69 for the crossed belts that drive the feed

rollers and brush. This second countershaft is preferably driven from the first countershaft at a much lower speed. The feed rollers and brush are rotated in the direction indicated by the arrows in Fig. 1.

It will be observed that the abrading drum 3 is driven at a much higher speed than the feed rollers 34. The peripheral speed of the abrading drum may exceed that of the feed rollers by three to five thousand feet per minute so as to produce the proper abrading action on the strips. The direction of rotation of the abrading drum is such as to tend to pull the material through the feed rolls and thereby maintain the material under tension and faciliate the treatment.

For guiding strip material into the feed rollers, I preferably provide a row of perforations or holes 70 immediately in front of the feed rollers 34 to receive pins 71. Thereby strips of various widths may be suitably guided through the feed rollers and under the abrading drum so as to register properly with the sheets of abrading material on the drum to utilize them to the best advantage. Sheets corresponding approximately in width to the belt being treated may be employed when possible, and thus economy in the use of sand paper or other abrading material may be effected.

In the practical operation of my machine for treating the grain side of leather belts, for example, the pins 71 are inserted in the holes 70 to accommodate the width of the strip 72 of leather belting to be dressed and the motor is started. The operator feeds the end of the long strip of leather (say a three hundred foot strip of two ply belting) between the feed rollers 34 and it is paid out automatically at the proper speed between the abrading drum 3 and the presser roller 21. The presser roller 21 exerts an upward pressure on the flesh side of the strip of leather so that the grain side is yieldably held in engagement with the abrading surface of the drum at the proper pressure to remove most effectively the desired portion of the hard scales of the epidermis. The strip passes under the guide bar 61 and brush 52 which rotates in the opposite direction to the travel of the strip and cleans its surface. The strip as it leaves the table may be wound on a drum, not shown, to keep it under tension under the brush. The operator can observe the treated surface of the strip after it has passed through the machine and may increase or decrease the pressure exerted by the presser roller by manipulating the hand lever 27 to vary the compression of the compression springs 26 so as to remove more or less of the epidermis as desired.

It sometimes happens that multiple ply belts vary slightly in thickness from one side to the other and in such case the operator may raise or lower one side of the abrading drum by means of one of the hand wheels or nuts 11 to produce a uniformly abraded surface across the entire width of the strip. In order to determine when the drum is in a horizontal position an arrow or pointer 73 may be cut in each of the journal boxes 5 to cooperate with suitable scales 74 marked on the frame adjacent the boxes 5 (see Fig. 1). It will be seen that a strip of belting of any length may be fed through the machine and its grain surface abraded in a single operation. The degree of coarseness of the abrading material may be adapted to the character of surface being treated and the speed of the machine and the wear upon the abrading material during the run of a long strip may be compensated for by applying greater pressure to the presser roller. After the sand paper or other abrasive substance becomes gummed with leather dust it may be easily removed and a new sheet inserted.

I have discovered that leather belting having its grain surface treated in my machine may be used with its grain side next to the pulleys and the coefficient of friction is greater than that of untreated belts. Such belts will last longer because they need not be stretched as tightly as a belt having a hard surface.

My machine is equally applicable to treat strips of any material, susceptible of abrasion, where a smooth surface is desired; and it will be understood that it is not limited to the treatment of leather belting.

Having thus described one illustrative embodiment of my invention and without restricting myself thereto, what I claim is:—

1. In a machine for abrading flexible strip material, in combination, a table, an abrading drum adjustably mounted above said table, a presser roller yieldably mounted below said drum, cam means for varying the pressure of said presser roller, manual means for operating said cam means, feed rollers for gripping and feeding said material, and means under the control of the operator for manipulating said feed rollers.

2. In an abrading machine for treating strips, in combination, a table, an abrading drum adjustably mounted on said table, presser means yieldably mounted below said drum, a pair of feed rollers adapted to grip the strip mounted at one end of the table, one of said feed rollers being yieldably mounted, cam means for adjusting one of said rollers, and means for positively driving both of said feed rollers and said abrading drum.

3. In a machine for abrading flexible strips, in combination, a table, a drum adjustably mounted above said table, an abrasive material on the periphery of said drum, a presser roller yieldably mounted below

said drum adapted to press the strip against the abrasive substance, manually operable means for varying the pressure exerted by said presser roller at the will of the operator, strip feeding means under the control of the operator, and means for driving the feeding means and said drums.

4. In a machine for abrading strips, a table, a horizontal drum above the top of the table having an abrasive material on its periphery, a yieldable presser roller mounted below the top of the table and extending upwardly therethrough and adapted to press the work into engagement with the abrasive, a manually operable cam shaft constructed and arranged to vary the pressure of said roller against the work, a pair of feed rollers for gripping the work and paying it out to the abrading drum, and means for driving said drum and feed rollers.

5. In a machine for abrading strips, in combination, a table, an abrading drum adjustably mounted on the table, a presser roller slidably mounted below the drum, compression springs normally urging said presser roller toward the drum, cam means for varying the compression of said springs, manual means for operating said cam means and means for paying out the work between the presser roller and abrading drum.

6. In a machine for abrading strips, in combination, a table, an abrading drum on the table, presser means below the drum, a pair of feed rollers in front of the drum, one of the feed rollers being yieldably mounted above the other, cam operated means for raising and lowering said upper roller, said means comprising lifting plates below the upper roller bearing, a cam cooperating with each of said lifter plates, manual means for operating said cams simultaneously, and means for driving said feed rollers and drum.

7. In an abrading machine, in combination, a table, an abrading drum on the table, presser means below the drum, a pair of feed rollers in front of the drum, one of the feed rollers being yieldably mounted, means for raising and lowering said yieldable roller, comprising a pair of slidably mounted lifter plates cooperating with the bearings of said roller and manual means for operating said lifter plates, means for driving one of said feed rollers, gearing for driving the yieldable feed roller from the shaft of the other roller, and driving means for said drum.

8. In an abrading machine, in combination, a table, an abrading drum on the table, presser means below the drum, a pair of feed rollers in front of the drum, one of the feed rollers being yieldably mounted above the other, cam operable means for raising and lowering said upper roller, means for driving the lower one of said feed rollers, gearing for driving the upper feed roller from the shaft of the lower roller, said gearing comprising a pair of pinions having long teeth adapted to remain in mesh when the upper roller is raised, and means for driving said drum.

9. In apparatus for treating the grain of leather belts, means for abrading the working surface of the completed belt, and means for maintaining the uniformity of the abrading action throughout the length of the belt.

10. In apparatus for treating the grain of leather belts, means for abrading the surface of the completed belt, yielding presser means for holding the belt in engagement with the abrading means, and means to vary the pressure exerted by the presser means to produce a uniformly abraded surface throughout the length of the belt.

11. In apparatus for abrading the grain side of leather belts, rotary abrading means for removing a portion of the epidermis, means for feeding the belt to the abrading means, yielding means for holding the belt in contact with the abrading means, and means to vary the pressure exerted by the yielding means while the belt is being treated to produce a uniformly abraded surface throughout the length of the belt.

In testimony whereof, I have signed my name to this specification.

FLETCHER W. BROWNING.