Oct. 10, 1950 W. J. PUGH 2,525,509

BELT CUTOFF AND HANDLING MACHINE

Filed Aug. 18, 1947 4 Sheets-Sheet 1

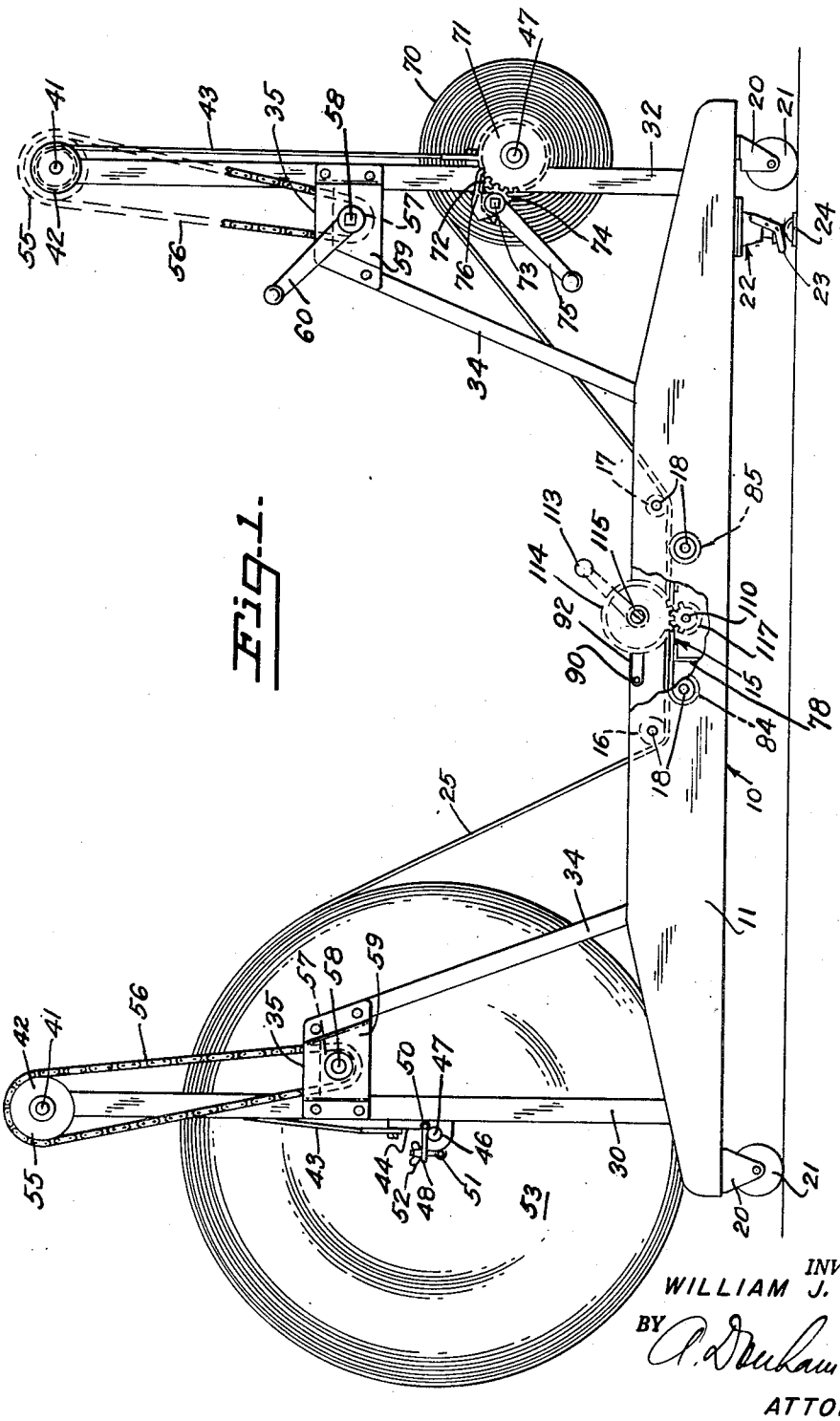


Fig. 1.

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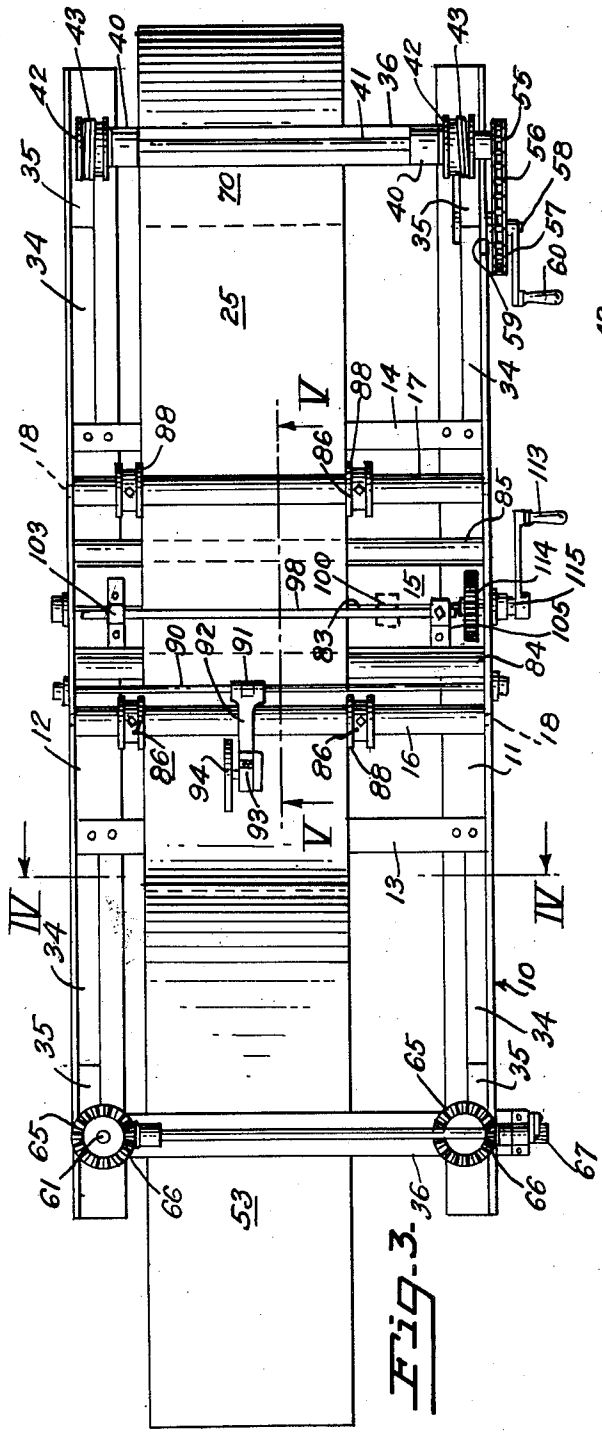


Fig. 3.

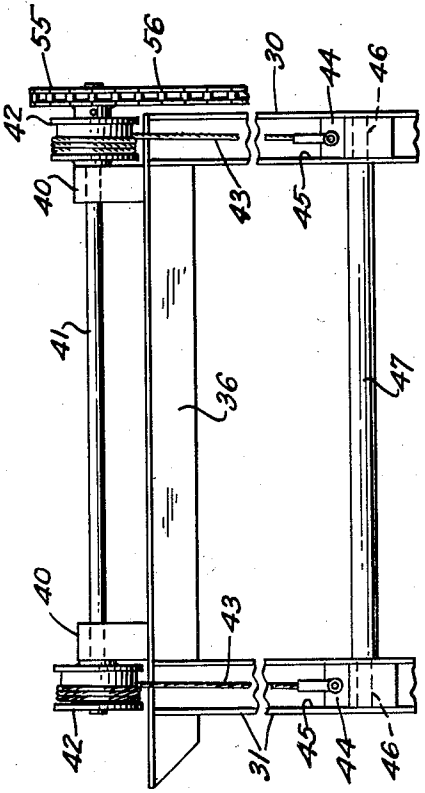


Fig. 2.

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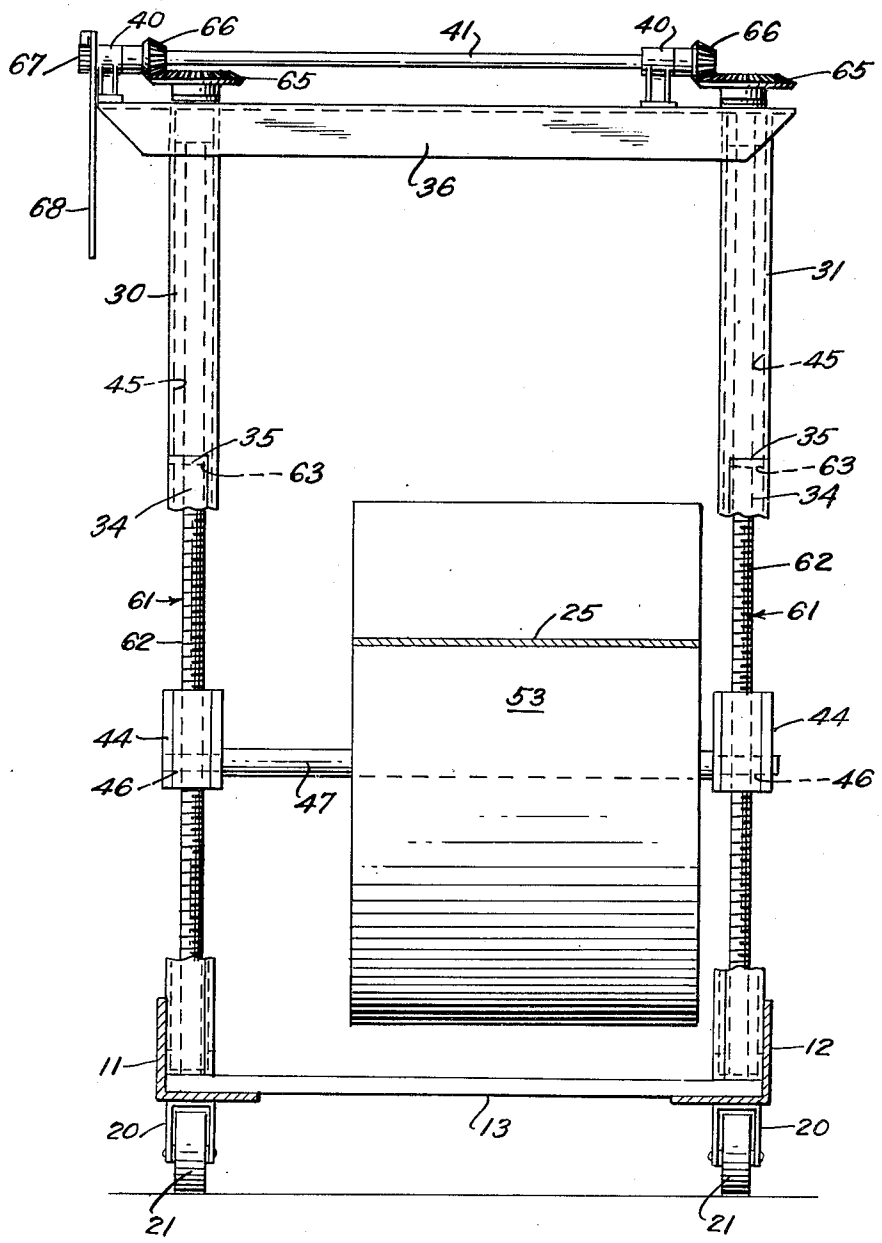


Fig. 4.

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Fig. 5.

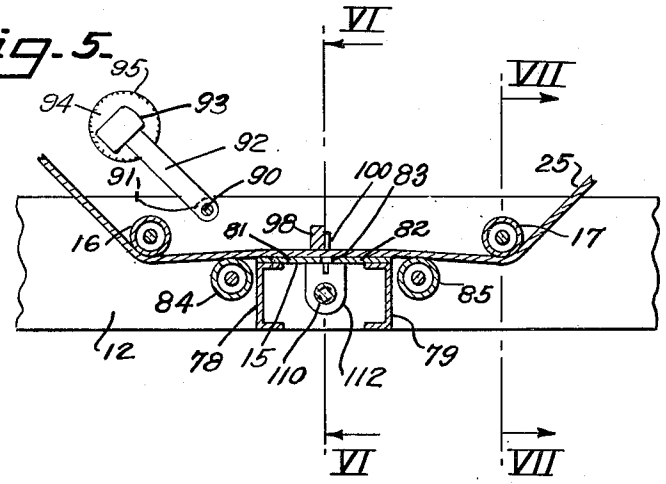


Fig. 6.

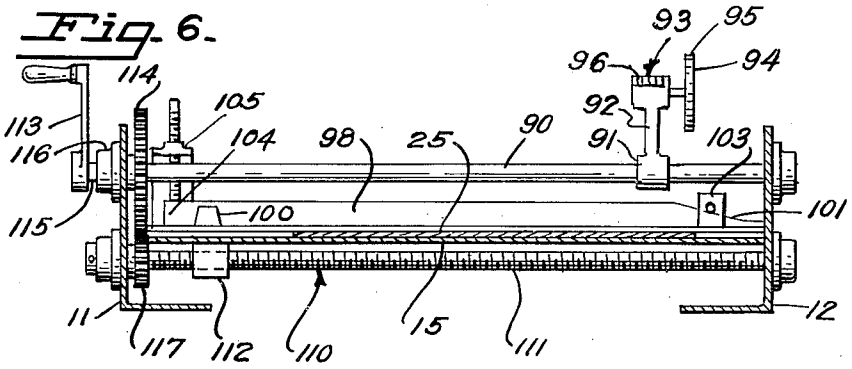
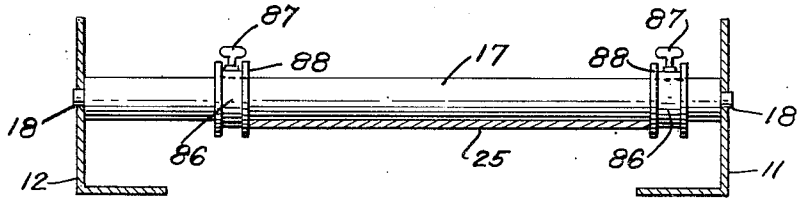


Fig. 7.



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UNITED STATES PATENT OFFICE

2,525,509

BELT CUTOFF AND HANDLING MACHINE

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Application August 18, 1947, Serial No. 769,203

5 Claims. (Cl. 242—56)

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This invention relates to a belt handling and cut-off machine.

The invention has application to the handling, measuring, and cutting of any flat strip material which is kept in rolls, for example, woven fabrics, rubber, or leather, and is particularly well-suited for handling rubber and leather belting, such as conveyor belts and transmission belts. The standard factory roll of belting is approximately 500 to 600 feet long, but almost all retail sales of belting are for shorter lengths. More than 75 per cent of the retail sales demand is for strips 50 to 250 feet in length. In every case where a length shorter than the full roll is desired, the retailer must measure accurately the desired length from the long stock roll, cut it off, and make a new roll from the cut-off strip. The problem of doing this accurately and without dirtying or injuring the belting has long existed in this art.

This invention solves the problems heretofore existing and replaces the cumbersome, inefficient, and costly procedure now prevalent. The current practice is for several men to lift the heavy stock roll from its storage position, carry it or roll it on the floor to a convenient place and unroll some of it on the floor, in lengths as long as possible. They measure the unrolled length with a tape measure, mark the place, and attempt, usually with mediocre success, to roll up the measured portion in an even roll. Then they carry this rolled-up portion across the floor as they unroll some more belting from the original roll, measure it, mark it, and roll it up, continuing this tedious process until the desired length has been measured. Then one of them, using a metal straight edge as a guide, severs the belt by hand with a sharp knife. This process is fraught with inaccuracies; in addition, it wastes warehouse space, requires the time and strength of several men, and gets the material dirty from contact with the floor.

One object of this invention is to provide a belt-handling and cut-off machine which can be operated by one man to do every operation—lift, hold, move, measure, reroll, and cut rolls of belting and other like materials.

Another object of the invention is to provide a machine which can measure, sever, and reroll belting in a floor area no bigger than the machine itself occupies and in a short period of time.

Another object of the invention is to provide a machine for measuring and severing material which at all times keeps the material from contact with the floor.

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Another object of the invention is to provide a machine, operable by a single man, which will enable him to measure belting and deliver it to a customer more quickly than several men can do without the machine.

Another object of the invention is to provide a machine which makes it possible to save time, labor, and space in the operations of delivering a measured roll of belting and at the same time perform the operating better, with a gain in accuracy in measurement and with a perfect line of severance free from fraying.

Other objects and advantages of the invention will be apparent from the following description and from the drawings, in which:

Fig. 1 is a view in front elevation of a machine embodying the principles of this invention, part of the center frame being cut away to show the cut-off table;

Fig. 2 is an end view in elevation of the left end of the device of Fig. 1, parts being broken away between the top of the frame and the brackets which support the axle, and also below the brackets;

Fig. 3 is a plan view of a modified form of the device of Fig. 1, except that on the left end a threaded lifting means is used while at the right end a cable-lifting mechanism is used;

Fig. 4 is an end view in elevation, taken on the line IV—IV of Fig. 3;

Fig. 5 is a detail view of the cut-off table taken along the line V—V of Fig. 3;

Fig. 6 is another detail view of the cut-off table taken along the line VI—VI of Fig. 5.

Fig. 7 is a view in section along the line VII—VII of Fig. 5.

Considered broadly, the machine includes a main frame 10 mounted on wheels or casters 21 and having a truck floor brake 22 by which the machine can be locked at a chosen location. A pair of rigid uprights 30, 31 and 32, 33 adjacent each end of the frame 10, support the mechanism by which the rolls of belting 25 are raised and lowered. The lifting may be done by a cable means, a threaded means, or some other equivalent means.

The brackets 44 are slidable on the uprights and have bearings 46 to support the axles 47 which carry the rolls of belting. Preferably there is a braking means 48 on the brackets 44 to control or to stop the rotation of each axle 47. The axle 47 which supports the core 54 onto which the new, measured roll 70 is to be wound has a crank 75 by which the belting is rolled up.

Mounted on the lower frame 10, somewhere be-

tween the two lifting means, is a measuring and cut-off table 15. Bars or rollers 16, 17, 84, and 85 are supported in the frame 10 adjacent the table 15 to flatten and to align the material passing over it. A meter 93 is mounted on a rod 90 over the table 15 in such a way that it can be swung down over the belting 25 to measure it and can be swung out of the way after the length has been measured (see Figs. 1 and 5). When the meter 93 is swung out of the way a hold-down clamp 98 may be inserted to hold the belting 25 firmly against the table 15; then, through a slit 83 in the table 15, directly below the place where the meter 93 measured the length, a knife blade 100 is moved to sever the belting with a perfect, straight, clean cut.

The steel frame 10 is preferably symmetrical, though not necessarily so. As illustrated in Figs. 1 and 3, two strong L-shaped side plates 11 and 12 are held together and braced by the cross braces 13, 14 and by the cut-off table 15, which may be bolted, riveted or welded together. The cylindrical bars 16 and 17 may be similarly secured to the frame 10 or they may be pivoted in the side plates 11 and 12 at 18 for free rotation therein.

Adjacent each of the four corners of the frame 10 is a bracket 20, in each of which is mounted a caster 21. The casters on one end are preferably swivel mounted. A truck floor brake 22 may be fastened on the bottom of each of the base bars 11 and 12 near the end with the swiveled casters. When the foot lever 23 of the brake 22 is pressed down, the brake shoe 24 is forced against the floor and holds the frame 10 in a fixed position on the floor. A slight upward pressure by the operator's toe against the bottom of the lever 23 releases the brake so that the frame 10 again may be moved about on the wheels 21.

The four corner uprights 30, 31, 32 and 33 are here made from U-beams placed in an upright position adjacent the four corners of the frame 10 and are secured to the side plates 11 and 12. The diagonal brace beams 34 are also secured to the side plates 11 and 12 and the horizontal thrust beams 35 are secured at one end to them and at the other end to the upright U-beams 30, 31, 32 and 33. Each pair of uprights 30, 31, 32 and 33 is also braced at the top by a cross bar 36.

Two bearing supports 40 on top of each cross bar 36 support the shaft 41 for free rotation. In the embodiment illustrated in Figs. 1 and 2 a drum 42 is keyed to each shaft 41 adjacent each end. One end of the cable 43 is fastened to the drum 42, and the cable 43 winds or unwinds around the drum 42. The other end of the cable 43 is fastened to the bracket 44 which slides freely in the vertical slot 45 formed by the inside of the U of each of the beams 30, 31, 32, and 33.

Each bracket 44 is provided with a semicircular bearing recess 46 in which a cylindrical shaft or axle 47 may turn. The clamp 48, which provides a means of braking, controlling, or preventing the revolution of the axle 47, is pivoted at 50 on the bracket 44 so that it can be swung back to the position shown in dotted lines in Fig. 1 when the axle 47 is being inserted or removed. When the clamp 48 is down over the axle 47, the stud 51 in the bracket 44 passes through the perforation in the clamp 48, and the wing nut 52 is threaded on it. By tightening or loosening the wing nut 52, the pressure of the clamp 48 on the shaft 47 may be increased or decreased and the freedom of rotation of the shaft 47 is thereby controlled.

A large sprocket wheel 55 is keyed to the shaft 41 and a smaller sprocket wheel 57 is keyed to the shaft 58. The shaft 58 is journaled in the plates 59, which are secured to the braces 34 and 35, and a ratchet wrench 60 or crank may be placed over the keyed end 60a of the axle 58. The drive chain 56 passes around the two sprocket wheels 55 and 57 to form a reduction gear system by which the handle 60 may be used to revolve the shaft 41, thereby causing the drums 42 to wind up or unwind the cable 43 and thus to raise or lower the brackets 44, the axle 47 and the roll 53 of belting 25 supported thereon.

The modified form of device illustrated in Fig. 4, and at the right hand end in Fig. 3, is preferred where there is a very heavy load which might tend to overstrain a cable. Each slot 45, formed by the U-shape of the beams, partially encloses a vertical shaft 61 on which there is a thread 62 extending from near its bottom end to the point 63 a little more than half way up. The vertical shafts 61 are journaled in the cross bars 36, and on their ends above the bars 36 bevel gears 65 are keyed. Keyed to the shaft 41 and in mesh with the bevel gears 65 are the bevel gears 66. The shafts 41 may have sprocket wheels like the wheels 55, 57 (Fig. 1) for a reduction gear system such as that previously described, or the ratio of the bevel gears 65 and 66 may give sufficient mechanical advantage so that the shaft 41 can be rotated directly by the ratchet wrench 68 attached to the keyed shaft end 67.

In this modified form of device the supporting brackets 44 may be the same as those previously described, except for the internally-threaded collar which rides on the thread 62. Identical gears 65, 66 are used for each bracket, so that each pair of brackets 44 remains parallel when they are raised or lowered. Other means, such as a hydraulic ram, for lifting and lowering the rolls of belting may be provided. The important thing is to have a type of lifting means which is supported by the frame 10, so it can be moved into position to pick up a roll of belting 25 from the floor or from a shelf, and can then lift the roll into a convenient position where it may roll or unroll freely.

Preferably a reduction gear apparatus is provided to assist in winding the roll 70 of measured belting. Fig. 1 illustrates a reduction gear apparatus suitable for this purpose. The larger toothed wheel 71 is keyed to one end of the axle 47. A bracket 72, bolted on the U-beam 32, supports for free rotation a short shaft 73, to which are keyed the smaller geared wheel 74 and the crank handle 75. The teeth on the wheels 71 and 74 are engaged and the dog 76 locks the axle 47, except when the dog 76 is purposely lifted. When the handle 75 is turned counter-clockwise the belting 25 is wound onto the shaft 47. As the material is pulled from the old roll 53, it forms the new roll 70. It is very convenient for the operator to stand beside the machine and turn the crank 75 while watching the measuring dial 93 to know when he has reached the desired point to cut off the belting.

The cut-off table 15 (see Fig. 5) is divided by the slit 83 into two aligned portions 81 and 82, both of which are preferably flat plates secured on top of the U-beams 78 and 79, which are in turn secured to the side plates 11 and 12.

Adjacent each edge of the cutting table 15 is a

cylindrical bar 84, 85, whose top surfaces are approximately level with the table surface 15, and beyond each of these are the cylindrical bars 16, 17 whose bottom surfaces extend a little below the top of the cutting table. All four of these bars 16, 17, 84 and 85 are supported between the side plates 11 and 12. They may be bolted to the plates 11 and 12 or they may be pivotally supported therein at 18 for free rotation. On each of the bars 16 and 17 are two guide collars 86, each of which has a set screw 87, so that the collars 86 may be moved along the bars and set for any width of belting 25 to pass between the guide flanges 88.

After the roll of belting 53 has been lifted into a position where it is free to rotate, the outside end of the belting 25 is brought from the roll 53 and passed under the roller 16 between the guide flanges 88 and then over the top of the bar 84. From there the belting 25 is brought across the cutting table 15, over the bar 85, under the roller 17 between guide flanges 88, and then up to the shaft 47 preparatory to forming the new roll 70. The bars or rollers 16, 17, 84 and 85 align the belting properly with respect to the table 15 and the slit 83, and make it lie substantially flat against the surface of the cut-off table.

The side plates 11 and 12 also support the rod 90, which is above and parallel to the slit 83 and on which may slide or rotate the collar 91. An arm 92 attached to the collar 91 supports the meter 93 at its other end. The collar 91 is shiftable and enables the meter 93 to be lowered into position on the belt 25 at any desired location across the width of the table 15. Since the rod 90 is parallel to the slit 83, the wheel 94 of the meter 93 contacts the belting 25 exactly over the center of the slit 83, whenever the meter 93 is swung down to the belt. In this way the meter reads the amount of belting material 25 which has passed the point 83 where it is to be cut.

The meter 93 is a standard item, preferably of the type whose rotatable wheel 94 has a roughened periphery 95 to engage and be turned by the surface of the belting 25. The exact circumference of the disc 94 may be some convenient standard distance, such as one foot. By a structure well known in the measuring art, rotation of the wheel 94 produces a calibrated reading on a dial or an indicator 96 and shows the distance the periphery 95 of the wheel 94 has been moved by the belting 25.

When the indicator 96 on the meter 93 shows that the desired length of belting 25 has passed by the slit 83 the brakes 48 may be set, and the arm 92 which holds the meter 93 is lifted off the belt 25 and swung back around the rod 90 into the position shown in Fig. 5. The holding bar 98 can then be placed in position along one edge of the slit 83 to hold the belt 25 tightly against the table 15 while the knife 100 severs the belting.

The tapered end 101 (Fig. 6) of the holding bar 98 is inserted into the stationary pivot clamp 103 at the side of the table opposite the operator, and bears against it at some point along the taper 101, according to the thickness of the belting being cut. The rectangular end 104 of the bar 98 is inserted in the adjustable clamp 105, which is then tightened, and the bar 98 presses the belt 25 firmly against the table top 15.

The shaft 110, mounted directly below the slit 83, has a screw thread 111, on which the internally threaded knife holder 112 rides and by which the knife blade 100 is impelled along the

slit 83. The knife 100 may be moved by a motor or by hand. As illustrated in Fig. 6 the crank handle 113 and the geared wheel 114 are keyed to the shaft 115, which is journaled in the bracket housing 116. The geared wheel 114 engages the smaller geared wheel 117, which is keyed on the shaft 110, so that when the crank handle 113 is turned, the threaded shaft 110 rotates, and the collar 112, bearing the knife 100, is moved along the slit 83. Since the bar 98 holds the belting 25 firmly anchored on the table 15, the knife blade 100 cuts through it in a perfectly straight line, leaving no frayed edges or irregularities. Moreover, it cuts exactly at the spot where the meter 93 has measured the length of the belt 25.

In operation the machine is wheeled on its casters 21 up to the stock roll of belting 53 and is locked there by the brake 22 in a position where the roll 53 is evenly spaced between the uprights 30 and 31. The brackets 44 are lowered below the center of the roll 53. An axle 47 and a core 54 to which the axle 47 is keyed are inserted through the center of the roll 53 with its ends projecting beyond the uprights 30 and 31. Then the brackets 44 are raised enough to engage the ends of the axle 47 in the bearings 46. The clamps 43 may then be swung down over the axle 47 and tightened to give the desired freedom of rotation. The brackets 44, axle 47, and roll 53 are then raised off the floor by the lifting mechanism. If the location of the machine is inconvenient for the cutting operation, the machine may then be wheeled wherever desired and secured there by the brake 22.

A portion of the belting 25 is then unrolled and fed in under the bar 16, over the bar 84, and over the cutting table 15 to the center of the slit 83. The wheel 94 of the meter 93 is then brought down and placed on top of the edge of the belting 25 with its dial set at a zero reading. Then the material is measured as it is pulled over the rest of the table 15, over the bar 85 and under the bar 17 to the second core 54 on which the new roll 70 is to be formed. After the belting 25 is fastened on the second core 54, the crank 75 may be turned counter-clockwise to wind up the desired amount of belting onto the new roll 70.

When the desired length has passed under the meter 93, the geared wheel 71 on the axle 47 is locked by the dog 76 to hold the roll 70 in place, and the brakes 48 may be tightened if desired. The meter 93 is swung out of the way, and the holding bar 98 is placed in position. The crank handle 113 is then turned to move the knife blade 100 in the slit 83 and the belt is severed. The holding bar 98 is then lifted away, and the free end of the belting 25 is rolled up on the second roll 70. If no further belting from the roll 53 is needed, the free end of that roll 53 is also rewound, and the stock roll 53 may be returned to its storage position. The measured roll 70 may be wheeled to the desired location where it can be wrapped for storage or delivery to the customer.

In the preferred form of the invention, the cutting means is provided; however, the cutting means may be done by hand before or after the desired amount of material has been measured onto the roll 70.

By means of the foregoing device, I have provided a machine operable by one man, which can be wheeled up to a stock roll of belting weighing thousands of pounds, lift the roll onto the machine, measure off part or all of the roll while forming the measured part into a roll on the

other end of the machine, sever the belting at an accurately determined length, lower the measured roll onto a truck for delivery to the customer and then return the stock roll to its storage bin. Heretofore all these operations have been done much slower and mostly by manual handling at great cost for labor; and if a light-colored belting was involved, usually with the dealer ending up with the customer accusing him of selling second-hand belting because by the time the men were through measuring, cutting and rolling it around on the floor, it was dirty and rendered useless for many purposes.

While, for purposes of compliance with the statute, I have shown a preferred form of apparatus, I do not intend thereby to limit this patent to that particular form of apparatus or to forego equivalents except as is required by the claims.

I claim:

1. A belt-handling and cut-off machine including a main frame, wheels supporting said main frame, a floor brake supported by said frame, a pair of upright members adjacent each end of said frame, bearing means on top of each of said uprights, a shaft supported for free rotation by each pair of bearing means, a reduction gear system for rotating said shafts, a pair of cable drums on each said shaft adjacent the top of said upright members, a cable fastened to each of said drums, a bracket attached to the other end of each cable and slidable along said upright members, an axle supported horizontally in each pair of brackets, another reduction gear system for turning at least one of said axles, a pawl to lock said last-mentioned reduction gear system, a flat plate supported on a level by said main frame and having a lateral slit, a plurality of bars supported by said main frame adjacent and parallel to the edges of said flat plate, adjustable flanged guide collars on one or more of said bars, a rod supported by said main frame above and parallel to said slit, a collar movable along and rotatable about said rod, said collar having an arm, a calibrated measuring wheel supported by said arm directly over said slit, a threaded shaft rotatably-positioned beneath said slit, means to rotate said shaft, a threaded collar on said shaft which moves when said shaft is rotated, a knife blade carried by said collar and extending vertically through said slit, and means to clamp material to said plate adjacent said slit during the cutting operation.

2. A belt-handling and cut-off machine including a main frame, wheels supporting said main frame, a pair of upright members adjacent each end of said frame, a carrying bracket slidable along each of said upright members; means to raise and lower said carrying brackets so that each pair remains substantially equidistant from the floor, an axle supported horizontally in each pair of brackets, a reduction gear system for turning at least one of said axles, a flat plate supported on a level by said main frame and having a lateral slit, a plurality of adjustable flanged guide collars supported by said main frame adjacent and parallel to the edges of said flat plate, a rod supported by said main frame above and parallel to said slit, a collar movable along and rotatable about said rod, said collar having an arm, a calibrated measuring wheel supported by said arm adjacent said slit, a threaded shaft rotatably positioned beneath said slit, means to rotate said shaft, a threaded collar on said shaft which moves when said shaft is rotated, a knife blade carried by said collar and extending vertically through said slit, and means to clamp material to said plate adjacent said slit during the cutting operation.

3. An apparatus to facilitate the measuring and cutting of belting comprising a main frame movably mounted so that it can be moved up to a roll of belting, means thereon for supporting said roll of belting for rotation about a horizontal axis, said means being adjacent one end of said main frame so that the support for said roll moves generally vertically within a plane in line with the end of said frame, means for raising and lowering said supporting means, and rewind means spaced on said frame for forming a new roll from belting unwound from said first-mentioned roll.

4. An apparatus for measuring and cutting belting comprising a main frame movably mounted so that it can be moved up to a roll of belting, means thereon for supporting a roll of belting for rotation about a horizontal axis, said means being adjacent one end of said main frame so that the support for said roll moves generally within a plane in line with the end of said frame, means for raising and lowering said supporting means, rewind means spaced on said frame for forming a new roll from belting unwound from said first-mentioned roll, measuring means situated between said supporting means and said rewind means, and cutting means positioned adjacent said measuring means.

5. Apparatus for handling rolls of belting, comprising a main frame movably mounted so that it can be moved up to a roll of belting, means thereon for supporting said roll of belting for rotation about a horizontal axis, said means being adjacent one end of said main frame so that the support for said roll moves generally vertically within a plane in line with the end of said frame, means for raising and lowering said supporting means, means on said frame for rewinding belting unwound from said supporting means for forming a new roll, an operation table on said frame between said supporting means and said rewinding means, guide means for keeping said belting aligned as it passes over said operation table, rollers for preventing said belt from buckling as it passes over said operation table, and a meter for measuring the length of belting passing over said table.

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