MACHINE FOR MANUFACTURING METAL REINFORCED BINDING TAPE

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1 This invention relates to improvements in a machine for manufacturing binding tape comprising a metal strand provided with a padding.

5 The main objects of this invention are:
First, to provide a machine for manufacturing binding tapes or ties comprising a metal ribbon or strand and a padding adhered thereto, the tape being produced in a continuous strip which may be readily divided into sections of predetermined length for use.

Second, to provide a binding tape comprising a metal ribbon or strand, a padding strip and a backing strip adhered together and readily severable into individual ties with the ends of the metal strand exposed to facilitate tying.

Third, to provide a machine having these advantages in which the padding is formed of multiply tissue, the tissue being supported by a backing which constitutes an effective connection for the metal strand to the padding.

Fourth, to provide a machine of this character which is of very large capacity and adapted to produce a uniform product.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevation of a machine embodying our invention, the figure being shown in two complementary parts, various parts being conventionalized.

Fig. 2 is an enlarged fragmentary view on a line corresponding to line 2—2 of Fig. 3.

Fig. 3 is a fragmentary plan view of the rear portion of the machine showing the relation of certain parts.

Fig. 4 is an enlarged fragmentary view on a line corresponding to line 4—4 of Fig. 5.

Fig. 5 is a fragmentary plan view of some of the parts shown in Fig. 4.

Fig. 6 is a fragmentary view illustrating details of the actuating tappet for the one revolution driving clutch for the cutters.

Fig. 7 is a view illustrating certain of the successive steps in the forming of the padding.

Fig. 8 is a fragmentary view of one of the cutter units.

Fig. 9 is a fragmentary view illustrating the scoring means for the metal strand.

Fig. 10 is a perspective view of the tape illustrating the relation of the severing points of the padding at spaced points to the scoring of the metal strand.

Fig. 11 is an enlarged cross sectional view on a line corresponding to line 11—11 of Fig. 10.

The machine of our invention is especially designed for the making of binding tape comprising a metal ribbon or strand, a padding and a backing strip interposed between the strand and the padding as is illustrated in Figs. 10 and 11, the tape being designated generally by the numeral 1, the metal strand or ribbon 2, the padding with the numeral 3 and the backing strip with the numeral 4. These parts are adhesively secured together, the adhesive connecting the backing to the padding being indicated at 5, the adhesive connecting the metal strand to the backing being indicated at 6. These binding tapes are well adapted for use in binding objects which have a finished surface which it is desired to protect. While the backing strip is highly desirable where the padding is made up of multiply creped tissue, as in the embodiment illustrated, the padding may be of such material as to render the backing strip unnecessary; however as stated, the machine is designed to produce the particular structure illustrated which is a highly desirable one.

In the embodiment of our invention illustrated the frame, designated generally by the numeral 7, is designed to support various operation parts but as the particular frame forms no part of our present invention we do not illustrate or describe the parts thereof in detail or their connections.

The embodiment of our invention illustrated is designed to produce padding from strips of tissue 8 shown conventionally in Fig. 1 and in certain other figures. The character of the material is more clearly indicated in Fig. 7. The tissue strips 8 are supplied to the machine from spools 9 mounted on uprights 10. The strips are guided over rollers 11 into a folder 12 by means of which the edges of the strips 8 are folded inwardly into substantially edge abutting relation as best shown at 13 in Fig. 7. As folders of this general type are known we do not detail the same herein.

The backing strip 4 is desirably of a good grade of kraft paper or the like, having substantial strength and some stiffness. The spool of backing strip stock is shown at 14 in Fig. 1, a second spool 14 being provided for quick change convenience when a spool is exhausted. The backing strip 14 is passed over a printing device designated generally by the numeral 15 and including a printing roller 16. The backing strip at the rear of this printing device passes over the adhesive applying roller 17 by means of which ad-
hesive is applied to the underside of the backing strip, the adhesive being indicated in Fig. 11 at 5. The metal strand or ribbon 2 is supplied from a reel 18 and passes over a machine stop switch 19 designed to stop the machine in the event the strand becomes exhausted. The electrical connections of these stop switches to the motor are not illustrated. The metal strand is passed through the straightener 20 and through a guide 21 into contacting engagement with the adhesive applying roller 22 by means of which the adhesive 6 is applied to the underside of the strand. From this adhesive roller the strand is guided by the roller 23 into superimposed relation to the backing strip. The backing strip is guided by the roller 24 and the guide throat 25 into superimposed relation upon the padding as is best shown in Fig. 4.

The adhesive applying rollers are so spaced from the point of superimposing the strand and backing and padding that the adhesive has time to become suitably tacky. The superimposed strand, backing and padding are passed between feeding and pressure rolls 26 and 21 which have parallel rearwardly traveling reaches 28 and 29 respectively. These reaches engage and apply pressure to the superimposed parts holding them in their superimposed relation until the adhesive has had time to set. That is one reason for the machine illustrated being of considerable length. It should be understood that by using a more quickly setting adhesive the machine could be shortened. The feed belts, however, are desirable as they grip and convey the superimposed parts of the strand without displacement particularly of the padding material which is desirably quite soft in order to fully protect the object to which the tape is applied.

The motor 30 is conventionally shown in Fig. 1. The belts are supported by the driving and supporting pulleys 32 and 33. The belt tensioners 34 are provided to maintain the desired tension on the belts. Sprocket and chain connections are illustrated for driving various parts but details of these are not important except as will be pointed out.

The feed and pressure belts draw the material from the supply rolls and advance it rearwardly to the cutter units designated generally by the numerals 35 and 36. The purpose of these cutter units is to sever the padding and backing at spaced points, the cuts being most clearly shown at 31 and 38 in Fig. 10. The purpose of these spaced cuts is to facilitate the removal of the portion 39 of the backing and padding from the strand 2 thereby exposing end portions 40 of the strand to facilitate tying or securing the ends of the strand together. This is ordinarily accomplished by overlapping the ends of the strand and crimping the lapped edges as is quite common practice with metal binding tapes, tools being available for such purposes. To facilitate the breaking of the strand at a predetermined point into individual tie lengths the strand is scored, as indicated at 41 (see Fig. 10), thereby making it practical to sever the strand by flexing at this point and avoiding the use of cutters, also enabling the individual ties being produced of the desired length.

The cutter units 35 and 36 comprise the rotary cutters 42 and 43 with coating press rollers 44 and 45. Guides 46 are provided for each cutter unit. The cutter rollers are provided with cutter blades 47 which are suitably positioned so that they cut through the padding and backing and

desirably have recesses 48 in their cutting edges to receive the strand 2 and thereby avoid the cutting thereof and the dulling of the blades. The rotary cutter 43 has a scoop blade 49 which corresponds in length approximately to the width of the strand 2 (see Fig. 9). This blade cuts a slit 50 in the central part of the padding and backing strip as shown in Fig. 9 and scores the metal strand as indicated at 41.

The cutter rollers have driving connections comprising the sprocket chain 51 and suitable coating sprockets, see Fig. 3. The press rollers 44 and 45 are mounted in adjustable bearings 52 which permits their adjustment to and from the cutter rollers. The cutter roller 42 is driven through the sprocket chain 54 which is connected to the shaft 55 of the roller 42 through a one revolution clutch 56 (see Fig. 3). The details of this one revolution clutch are not illustrated.

The clutch is engaged, however, by means of the clutch lever 57 which is actuated at timed intervals by means of the tappets 58 on the chain 59. This chain 59 is made up of links 60 which may be readily connected or disconnected so that the chain may be lengthened or shortened thereby timing the engagement of the lever with the clutch control lever and controlling the length of the individual ties.

The chain 60 is trained over the driven sprocket 61, the supporting sprocket 62 and the sprocket 63 which is carried by the slide 64 and mounted on the supporting rod 65 (see Fig. 6). When the clutch is disengaged the cutter rollers 42 and 43 are idle and they are so driven that they stop in a position such, for example, as shown in Fig. 2, as to allow the tape to be between the cutter rollers and the pressure rollers as is there indicated. However, when the clutch is engaged the cutter rollers are driven and the padding and the backing strip severed at spaced points 37 and 38 and in proper relation to the scores which are also being formed during this single revolution of the cutters. The section 39 of the tape between the cuts 37 and 38 is in this embodiment pulled off by an operator. The tape passes from this station to the winding spool into a guide 66 by which it is guided to the winding drum or spool 67.

The guide 66 serves as a level wind device to distribute the strand upon the spool or drum, it being carried by the lever 69 pivoted at 70 and oscillated by means of the oscillating wheel 71. The details of this winding device, however, forms no part of our present invention.

To support the feed and pressure belts into gripping relation to the superimposed padding, backing and metal strand we provide guide rollers 68 which are positioned to impart rather abrupt or short curve to the belts at the point where they receive the work, as best shown in Fig. 4. This results in a very effective control of the material in its delivery to the pressure belts. The length of the individual ties is determined by the adjustment of the clutch actuating tappet as described, the chain 59 being shortened to produce shorter ties and lengthened to produce longer ties.

The embodiment of our invention illustrated is highly practical, of large capacity and produces a highly desirable product. We have not attempted to illustrate other embodiments or adaptations as we believe the disclosure made will enable those skilled in the art to embody or adapt our invention as may be desirable.
claim as new and desire to secure by Letters Patent is: 1. In a machine for manufacturing binding tape comprising a metal ribbon strand, a padding strip, and a padding backing strip of paper interposed between the strand and padding and adhesively secured to both, comprising a coating pair of feeding and pressure belts having parallel rearwardly traveling reaches, means for supporting a plurality of strips of tissue padding material and guiding the strips into multiply strip relation, a folder for molding the edges of the multiply strip inwardly into approximately edge abutting relation providing a padding, means for supporting and guiding a backing strip into superimposed relation upon the infolded edge side of the padding strip, an adhesive roller over which the backing strip is passed prior to its being superimposed upon the padding strip, means for supporting and guiding the metal strand into superimposed relation upon the backing strip, an adhesive roller over which the metal strand is passed prior to its being superimposed upon the backing strip, means for guiding the material so superimposed between said belts, the belts acting to feed the superimposed material and apply pressure thereto, cutter units disposed in spaced relation at the rear of said belts, said cutter units comprising cutter rollers and coating press rollers, the cutter rollers having blades acting to sever the padding and backing, the rear cutter roller being provided with a scoring blade acting to cut through the padding and backing and score the strips intermediate the points of severing the padding and backing, the severing of the padding and backing at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand at each said of the scoring thereof, said cutter rolls being disposed on one side of said binding tape, said metal strand supporting and guiding means being positioned to guide said metal strand onto the side of the backing and padding strips opposite from said cutter rollers to facilitate severing said backing and padding strips by the blades on the cutter rollers without severing the metal strand, and means for operating said cutter rollers in timed relation to said feeding belts.

3. In a machine for manufacturing binding tape comprising a metal ribbon strand, a padding strip, and a padding backing strip of paper interposed between the strand and padding and adhesively secured to both, comprising a coating pair of feeding and pressure belts having parallel rearwardly traveling reaches, means for supporting a plurality of strips of tissue padding material and guiding the strips into multiply strip relation, a folder for folding the multiply strip into the padding strip, means for supporting and guiding a backing strip into superimposed relation upon the padding strip, an adhesive applying means over which the backing strip is passed prior to its being superimposed upon the padding strip, means for supporting and guiding the metal strand into superimposed relation upon the backing strip, an adhesive applying means over which the metal strand is passed prior to its being superimposed upon the backing strip, means for guiding the material so superimposed between said belts, the belts acting to feed the superimposed material and apply pressure thereto, cutter units disposed in spaced relation at the rear of said belts, said cutter units comprising cutter rollers and coating press rollers, the cutter rollers having blades acting to sever the padding and backing, the rear cutter roller being provided with a scoring blade acting to cut through the padding and backing and score the strips intermediate the points of severing the padding and backing, the severing of the padding and backing at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand at each said of the scoring thereof, said cutter rolls being disposed on one side of said binding tape, said metal strand supporting and guiding means being positioned to guide said metal strand onto the side of the backing and padding strips opposite from said cutter rollers to facilitate severing said backing and padding strips by the blades on the cutter rollers without severing the metal strand, and means for operating said cutter rollers in timed relation to said feeding belts.

4. In a machine for manufacturing binding
tape comprising a metal ribbon strand, a padding strip, and a padding backing strip of paper interposed between the strand and padding and adhesively secured to both, comprising a coacting pair of feeding and pressure belts having parallel rearwardly traveling reaches, means for supporting and guiding a backing strip into superimposed relation upon the padding strip, means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding a backing strip onto the backing strip, and means for applying and guiding 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feeding the superimposed material, and for facilitating the removal of the portion thereof between said feeding points for exposing portions of the metal strip between said belts.
between the spaced cuts in the padding cut by the spaced cutters, means for operating said cutters in timed relation to each other for the cutter blades on the cutter rollers to cut two longitudinally spaced cuts in the padding for each score in the metal strand scored by the scoring blade on said rear roller to provide a succession of separate groups of cuts and scores in the binding tape, each group comprising two longitudinally spaced cuts in the padding with a score in the metal strand between said spaced scores, the spacing of the padding at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand at each score of the scoring thereof.

13. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected thereto, said machine comprising cutter units operatively associated with said feeding means and disposed in spaced relation to each other in the line of feed of said feeding means to sever the padding transversely thereof at longitudinally spaced points to provide a series of longitudinally spaced cuts in the padding, said cutter units comprising cutter rollers and coating press rollers, the cutter rollers having blades provided with cutting edges disposed with portions thereof to coat with the press rolls to sever the padding at longitudinally spaced points and having other portions thereof spaced from the press rolls to permit passage of the metal strand, the severing of the padding at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand between the spaced points of severing of the padding by the spaced cutter blades, and driving means for said cutter rollers including a one revolution clutch, and means for engaging and operating the driving means for the cutter rollers.

14. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected thereto, said machine comprising cutter units operatively associated with said feeding means and disposed in spaced relation to each other in the line of feed of said feeding means to sever the padding transversely thereof at longitudinally spaced points to provide a series of longitudinally spaced cuts in the padding, said cutter units comprising cutter rollers and coating press rollers, the cutter rollers having blades provided with cutting edges disposed with portions thereof to coat with the press rolls to sever the padding at longitudinally spaced points and having other portions thereof spaced from the press rolls to permit passage of the metal strand, the severing of the padding at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand between the spaced points of severing of the padding by the spaced cutter blades, and means for operating said feeding means including means for adjusting the timing of the operation of the cutters relative to that of the feeding means to adjust the distance between successive pairs of cuts, said cutters being disposed relative to said binding tape to cut only the padding and for delivery of the binding tape therefrom, by said feeding means, as a continuous member having a series of longitudinally spaced pairs of cuts in the padding.

15. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected to the metal strand in lapping side by side relation thereto, said machine comprising cutters operatively associated with said feeding means and disposed in spaced relation to each other in the direction of the line of feed of said feeding means to sever the padding transversely thereof at spaced longitudinally spaced points of severing, the cutters and the scoring blade being disposed to cut the portion of the padding disposed in lapping side by side relation to the metal strand, the range of cutting movement of the cutters in said lapping portion of the padding being approximately to the metal strand, the range of cutting movement of the scoring blade being slightly greater than that of the cutters in said lapping portion of the said padding to permit the scoring blade to cut through the padding and score the metal strand between the spaced cuts in the padding cut by the spaced cutters, means for operating the spaced cutters and scoring blade in timed relation to each other for the cutters to cut two longitudinally spaced cuts in the padding for each score in the metal strand scored by the scoring blade to provide a succession of separate groups of cuts and scores in the binding tape, each group comprising two longitudinally spaced cuts in the padding cut by the cutters and a score in the metal strand scored by the scoring blade between the spaced cuts in the padding cut by the spaced cutters, means for operating the spaced cutters and scoring blade in timed relation to each other for the cutters to cut two longitudinally spaced cuts in the padding for each score in the metal strand scored by the scoring blade to provide a succession of separate groups of cuts and scores in the binding tape, each group comprising two longitudinally spaced cuts in the padding cut by the cutters and a score in the metal strand scored by the scoring blade between the spaced cuts in the padding cut by the spaced cutters, means for operating the spaced cutters and scoring blade in timed relation to each other for the cutters to cut two longitudinally spaced cuts in the padding for each score in the metal strand scored by the scoring blade.
severing the backing and padding strips without severing the strand, and means for operating said cutters in timed relation to said feeding belts.

8. In a machine for manufacturing binding tape comprising a metal strand, a padding strip, and a backing strip of paper interposed between the padding strip and the backing strip, means for severing the backing and padding strips without severing the strand, and means for operating said cutters in timed relation to said feeding belts.

9. In a machine for manufacturing binding tape comprising a metal strand, a backing strip of paper interposed between the metal strand and the padding strip, the backing strip and the metal strand into superimposed relation, means for applying adhesive to opposed surfaces of the superimposed parts, means for feeding and applying pressure to the superimposed parts after the application of the adhesive, cutters disposed in spaced relation at the rear of said pressure applying and feeding means, the cutters acting to sever the padding and the backing strip at spaced points, a scoring blade acting to cut through the padding and the metal strip, the scoring blade being disposed in spaced relation to the metal strip, and driving means for said cutters including a one revolution clutch, and means for engaging said cutters including a member connected to and operable by the driving means for the cutters.

10. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected to the metal strand in lapping side by side relation thereto, said machine comprising cutter units operatively associated with said feeding means and disposed in spaced relation to each other in the line of feed of said feeding means to sever the padding transversely thereof at longitudinally spaced points, said cutter units comprising cutting rollers and coating press rollers, the cutting rollers having blades acting to cut a series of longitudinally spaced cuts in the padding, the rear cutter roller being provided with a scoring blade disposed rearwardly of the padding cutting blade on said rear roller in the direction of rotation thereof to cut through the padding and score the strand intermediate the points of severing the padding, the cutter blades and the scoring blade being disposed to cut the portion of the padding disposed in lapping side by side relation to the metal strand, the range of cutting movement of the cutters in said lapping portion of the padding being approximately to the metal strand, the range of cutting movement of the scoring blade being slightly greater than that of the cutter blades in said lapping portion of the padding to permit the scoring blade to cut through the padding and score the metal strand between the spaced cuts in the padding cut by the spaced cutters, means for operating said cutters in timed relation to each other for the cutter blades on the cutter rollers to cut two longitudinally spaced cuts in the padding for each score in the metal strand scored by the scoring blade on said rear roller to provide a succession of separate groups of cuts and scores in the binding tape, each group comprising two longitudinally spaced cuts in the padding with a score in the metal strand between said spaced cuts through the padding, the severing of the padding at the spaced points facilitating the removal of the portion thereof between said severing points for exposing portions of the strand at each side of the scoring thereof, and driving means for said cutter rollers including a one revolution clutch, and means for engaging said cutters including a member connected to and operable by the driving means for the cutter rollers.

12. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected to the metal strand in lapping side by side relation thereto, said machine comprising cutter units operatively associated with said feeding means and disposed in spaced relation to each other in the line of feed of said feeding means to sever the padding transversely thereof at longitudinally spaced points, said cutter units comprising cutting roller and coating press rollers, the cutting rollers having blades acting to cut a series of longitudinally spaced cuts in the padding, the rear cutter roller being provided with a scoring blade disposed rearwardly of the padding cutting blade on said rear roller in the direction of rotation thereof to cut through the padding and score the strand intermediate the points of severing the padding, the cutter blades and the scoring blade being disposed to cut the portion of the padding disposed in lapping side by side relation to the metal strand, the range of cutting movement of the cutters in said lapping portion of the padding being approximately to the metal strand, the range of cutting movement of the scoring blade being slightly greater than that of the cutter blades in said lapping portion of the padding to permit the scoring blade to cut through the padding and score the metal strand.
blade to provide a succession of separate groups of cuts and scores in the binding tape, each group comprising two longitudinally spaced cuts in the binding cut by the cutters and a score in the metal strand scored by the scoring blade between said spaced cuts in the padding, the severing of the padding facilitating the removal of the portion thereof between the said severing points for exposing portions of the strand, and means for operating said feeding means and cutters, said operating means including means for adjusting the timing of the operation of the cutters relative to that of the feeding means to permit the metal strand and the padding thereon between successive pairs of said points of severance of the padding by said spaced cutters to be adjusted in length.

17. A machine of the class described comprising means for feeding a binding tape comprising a metal strand and padding adhesively connected to the metal strand in lapping side by side relation thereto, means for severing the padding transversely thereof at points spaced longitudinally of the padding to provide a series of longitudinally spaced cuts in the padding, means for scoring the strand intermediate only alternate points of severing the padding, the severing of the padding facilitating the removal of the portion thereof between the severing points on the opposite sides of the scoring of the strand for exposing portions of the strand at each side of the scoring thereof, the scoring of the strand facilitating the severing thereof between portions of the padding unremoved from the strand, means for operating said feeding means cutting means and scoring means in timed relation to each other, said pad severing means and strand scoring means being disposed relative to each other and to said binding tape for delivery of the binding tape therefrom, by said feeding means, as a continuous member having a series of longitudinally spaced cuts in the padding and a series of longitudinally spaced scores in the strand, two successive spaced cuts in the padding being disposed intermediate two successive scores in the strand.

18. In a machine for manufacturing binding tape, means for guiding a metal strand and a padding strip into superimposed relation, means disposed at one side of the padding strip for severing the same transversely thereof, said severing means being disposed to sever the padding strip without severing the metal strand, said guiding means including means disposed to guide said metal strand onto the side of the padding strip opposite from said severing means to facilitate severing said padding strip by said severing means without severing said metal strand, means for feeding said metal strand and padding strip to said severing means, and means for operating said severing means in timed relation to said feeding means.

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