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JULY 13, 1943.
BY A. P. C.

J. J. M. L. MARCHAND
BUNDLE TYING MACHINE
Filed Dec. 15, 1942

Serial No.
469,105
2 Sheets-Sheet 1

Fig. 1.

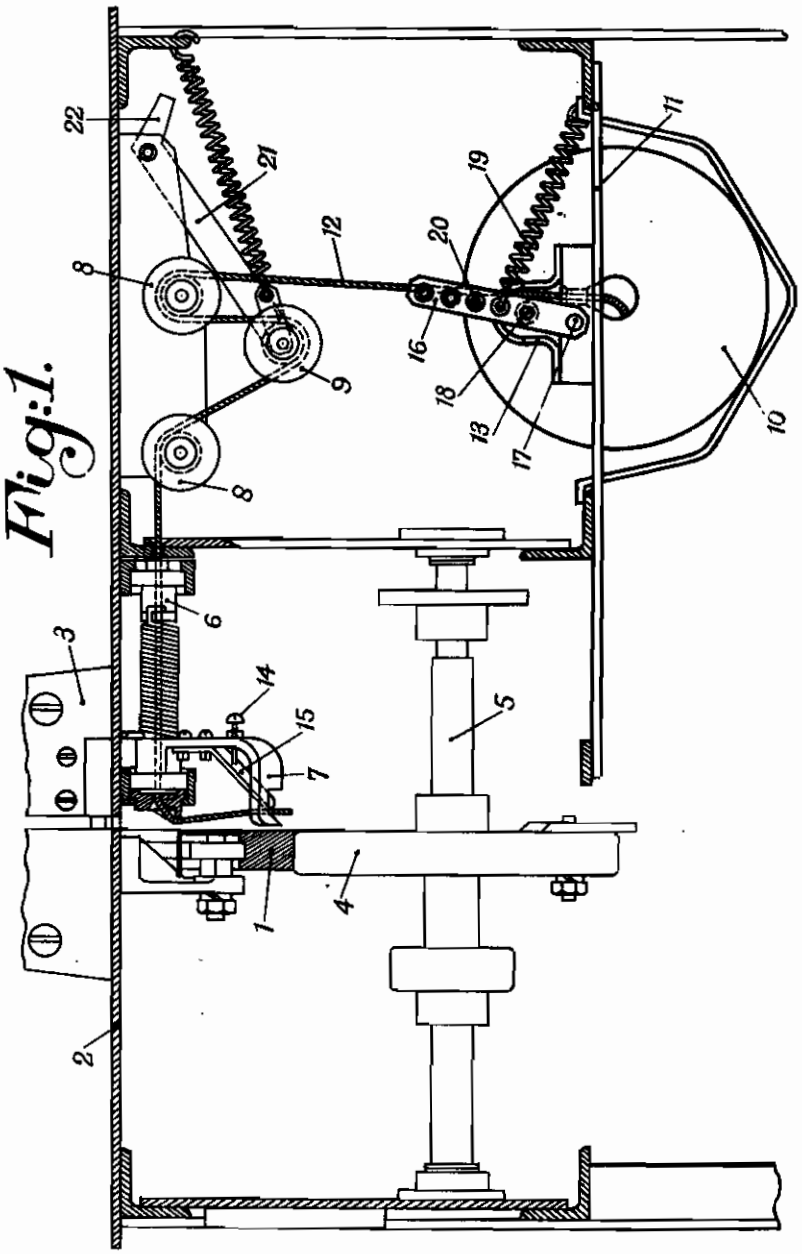

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Fig:2.

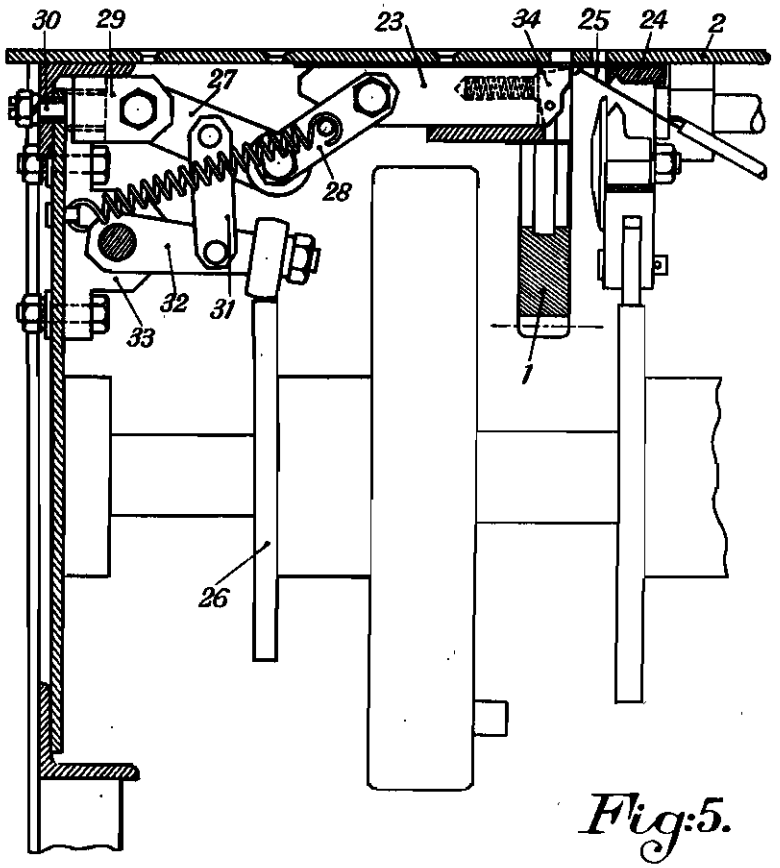


Fig:5.

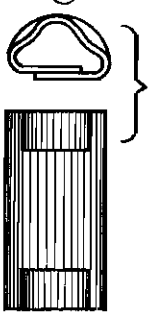


Fig:3.

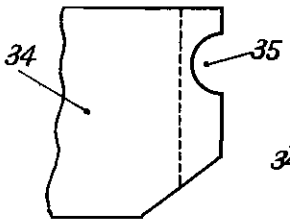
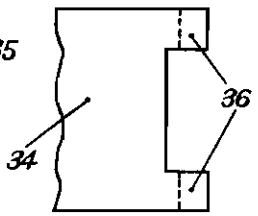


Fig:4.



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ALIEN PROPERTY CUSTODIAN

BUNDLE TYING MACHINE

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Application filed December 15, 1942

The invention relates to an improved machine for tying a bundle of letters, books or like documents or for binding one or more other objects, of the kind as described in the prior U. S. A. Patent No. 2,198,440. This prior machine comprises a member in the form of a tying ring, intermittently rotatable always in one and the same direction during a tying operation and a clamping device mounted on said ring, which seizes the primary end of a typing-medium from a revolving support and pulls it around the articles to be tied. Furthermore means are provided for firmly connecting the adjacent parts of the tying-medium by means of a metal clip, which parts are laid together in overlapping position after the wrapping.

An important object of my invention particularly consists in the perfection of a machine of the kind mentioned in such way as to enable the machine still more to satisfy all requirements, whereas the use of it will completely attune to the ordinary practice, more particularly with regard to the nature of the applied tying-medium.

One feature of the present invention resides in the provision of an adjustable braking-arrangement by means of which the tension of the tying-medium, gripped by the clamping-device on the tying ring, can be accommodated to the strength, stiffness or to the other properties of the material, used for said tying-medium, whereas at the same time doubly adjustable means are provided to accommodate also the extent of deformation of the metal connecting clip to said properties.

According to the invention the tying-medium, coming from a bobbin, before it is led further to the revolving support, passes along a stationary abutment, against which abutment it is pressed by means of a brake-lever, pivotable on a fixed point under the action of a spring, whereby the brake-action of said lever can be varied such, that the spring may be connected to the lever in various distances from the fixed point of rotation. In this way the tension of the tying-medium may be accommodated, e. g. to the more or less flexibility of the material used for said medium.

According to another feature of the invention means are provided to equalize the deformation and the size of the connecting clip to the thickness of the tying-medium. For that purpose, the sliding matrix, which effects the deformation of the clip in co-operation with a stationary abutment, is moved by means of a lever-system actuated from a cam-shaft, said system comprising a toggle-lever, one arm of which is pivotally connected to the sliding matrix, whereas the other is pivotable in a fork, which is adjustable in the direction of the sliding movement of the matrix. Furthermore a lever, directly moved by the cam-shaft and acting on the toggle-lever through a connecting bar, is pivotably mounted in a bearing, adapted to be slidably adjusted in a transverse direction to the sliding movement of the matrix.

A further feature of the invention relates to means for increasing the solidity or strength of the clip-connection and thus to attune the same also to any relatively stiff material of the tying-medium. For that purpose the end face of the sliding matrix, situated opposite to the stationary abutment is provided with a semi-circular groove, being interrupted over a given length in the middle by a recess of greater depth transversely to the groove, such that at both sides of said recess, projecting teeth are obtained hollowed by the groove-parts, which at the pressing of the metal connecting clip will squeeze the ends of the same more than its middle part.

In providing a machine of the described character, the possibility is obtained to lead round the tying-medium or to hold fast the same throughout the complete operation of the machine with such a tension as is required with regard to the kind of material used for the tying-medium and at the same time to make the connection of the ends of it by the metal clip more or less intensive, likewise corresponding to the used material. In consequence also various material may be used for the tying, that is as well thin or thick, as also relatively stiff or flexible material. Thus also ordinary paper may be applied as a tying medium, which then is rolled or twined in the form of a string or the like and is adapted to be tied around the bundle with the same effect and in exactly the same manner.

Other advantages and features of invention will be disclosed during the description of a practical embodiment of the invention illustrated in the accompanying drawings, in which similar reference characters represent corresponding parts in all the views.

Fig. 1 is a view of the braking-arrangement for the passing tying-medium.

Fig. 2 illustrates—also in view—the adjustable mechanism for the sliding movement of the matrix, when forming the metal connecting clip. For the sake of clearness some of the principal parts of the machine are shown in both figures, although they do not relate directly to the invention.

Fig. 3–5 show same details at a larger scale.

Referring to the drawings, 1 indicates that part of the tying ring, that is visible underneath the table 2, which ring rotates above said table in the guard casing 3. The driving toothed wheel 4 is mounted on the shaft 5 and engages with the toothed rim on the outer peripheral edge of the ring. On the hollow shaft 6, the revolving support 7 is secured. The pulleys 8 and 9 are provided for the purpose of leading the tying-medium. In this figure the path of said tying-medi-

um from the bobbin 10 up to the ring 1 is clearly illustrated.

According to the invention, the tying-medium —only as an example in the following indicated as a "string"—drawn off from the bobbin 10 and passing through an opening in the framework 11, is led through a slot in a brace 13, fast connected to the frame and after that over the pulleys 8, 9, 8 and through the hollow shaft 6 up to the recess of the support 7, in which the end of the string is tightened by means of the blade spring 15 adjustable by a set-screw 14. In the brace 13 the string is pressed with friction against the flat inner side of the brace and that by means of a brake-lever 16, pivotable at 17 on a fixed point and provided e. g. with a pressing-pin 18, situated at the side of the string. A spiral spring 19 is connected at one end to the lever 16 and with its other end to a fixed point of the framework. Under the action of said spring the lever with its pin 18 continuously presses the string against the sidewall of the brace, in such way that it brakes said string during the wrapping with a certain friction, when being pulled through. The free arm of the lever 18 is provided with a number of holes 20, equally divided on its length. When the end of the spring 19 e. g. is connected to one of the upper holes, the effective part of the lever is increased for the braking action, by that the distance between the fastening-point and the point of rotation will be greater. In this way it is possible to adjust the force of braking and thus also the resulting tension, with which the string is led further through the machine, according to the thickness, strength or to the nature of the applied tying-medium.

The guiding pulley 9 is mounted at the end of a lever 21, pivotable on a fixed point under the action of a spring, for the purpose to prevent undue slack in the string e. g. when tying bundles or objects of very small dimensions. In this case the pulley 9, being normally held in its uppermost position through the tension of the string, is moved downwards by the action of the spring. In the embodiment of the invention as illustrated in the drawing, the lever 21 is provided with an abutment 22, which bears against the framework at a given lowermost position of the pulley 9, thus preventing a further movement in downward direction of said pulley. In this way it will be prevented, that the string is jammed between the sliding matrix 23 and the lower side of the table 2, when no any bundle is present in the machine.

According to Fig. 2 the matrix 23 is slidably mounted underneath the table 2 and is adapted to roll up and press together a small strip of metal, in co-operation with a stationary abutment 24. Said strip at every turn is cut from a metallic band 25, advanced in intermittent steps, and thus deformed to a connecting clip. The lever-system provided for the sliding movement of the matrix and contrainedly moved from the cam-shaft 26, is adjustable as well in the direction of the movement of said matrix as transversely to this direction. For this purpose the system is provided with a toggle-lever 27, 28, one arm 28 of which is pivotably connected to the matrix 23, whereas the other arm 27 is pivotable on a fork 29. Said fork is screwed with an inner screw-threaded part by a screw-nut on a corresponding part of a set-bolt 30, which nut serves as a safety-nut. By screwing the bolt, the fork 29 can be adjusted over a given distance in an horizontal direction. When this adjustment is effected in such way, that the fork e. g. is moved to the left in Fig. 2, then the matrix 23 is moved also to the left and the distance between the matrix 23 and the abutment 24 is increased and the reverse.

The lever 32, which is connected to the toggle-lever 27, 28 by means of the bar 31, is provided at one end with a roller, situated against the cam-disc 26 and with the other end pivotably mounted in a bearing 33. Said bearing is connected to the framework by means of bolts, which are adjustable upwards and downwards in slots of this framework. At a lowering of the bearing, thus in that case also of the point of rotation of the lever, the matrix 23 is adjusted in such way, that a greater length is cut off from the metallic band, that is moved between the matrix and the abutment. Thus it will be possible to exactly accommodate the connection of the ends of the string by the metal clip to the thickness as well as to the strength or generally to the nature of material applied for the tying-medium. Together with the adjustment of the distance between the matrix and the stationary abutment by means of the fork 29, also the deformation of the metal clip is brought to a more or less greater intensity.

The sliding matrix 23 preferably is provided, as illustrated in the drawing, at its side turned to the abutment 24 with a head 34, oscillably mounted on a fixed pin under action of a spring, whereas the free end of the metallic band 25 abuts against the end face of said head 34. In the end face a semi-circular groove 35 is provided (Figs. 3, 4), which does not extend to the full width, however for a large part is interrupted in the middle by a recess 37 of greater depth. In this way at both sides of the recess 37 projecting hollow teeth 36 are formed. Now when the matrix 23 is pressed against the abutment 24, the clip, cut from the metallic band and situated therebetween, the end of which turned to the matrix already has been curved, is rolled up, thus forming a sleeve around the overlapping ends of the string and at the same time is pressed and deformed by means of the projecting hollow teeth, giving a shape as indicated on an highly enlarged scale in Fig. 5. The middle part of the clip situated opposite the recess is only turned or rolled up, even is still adapted to freely bend outwards to a small extent, whereas both the ends of the clip are firmly squeezed round the ends of the string therebetween by the mentioned teeth and thus assure an effective tightening.

An exact adjustment of the fork 29 and the bearing 33 of the lever-system for the matrix 23 respectively enables not only to vary the distance between the matrix and the stationary abutment in correspondence with the thickness of the ends of the string to be connected, however at the same time to effect more or less intensive the deformation of the ends of the metal clip by the teeth 36, according to the nature of the material applied for the tying-medium. In this way under all circumstances an immovable connection is obtained.

It will be evident, that the provision of a separate head 34 for the matrix not always will be required, rather the end face of the matrix 23 itself, situated opposite to the abutment, may be shaped without more as described formerly for the head.

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