G. L. RICE.

MACHINE FOR MAKING COMBINATION FIBER PAPER TWINE.

APPLICATION FILED JUNE 27, 1918.

1,320,922. Patented Nov. 4, 1919.

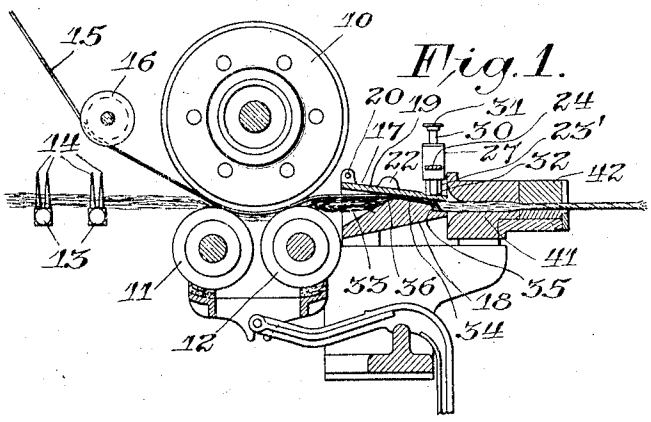


Fig. 1.

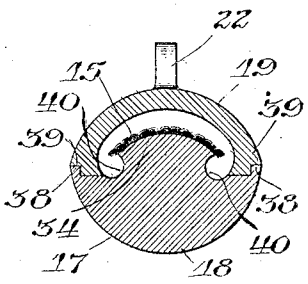


Fig. 6.

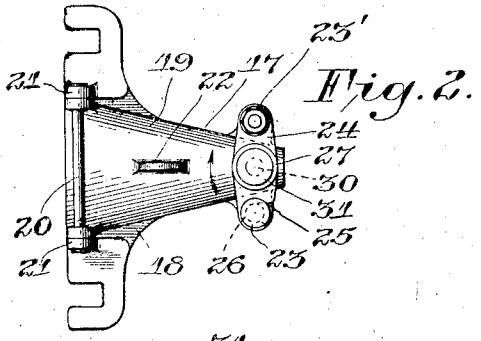


Fig. 2.

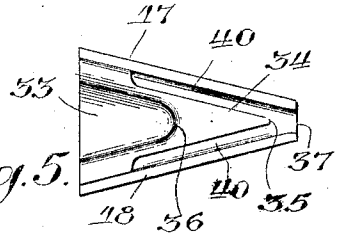


Fig. 5.

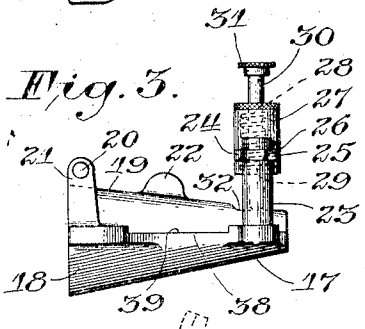


Fig. 3.

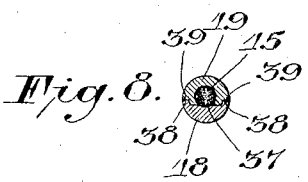


Fig. 8.

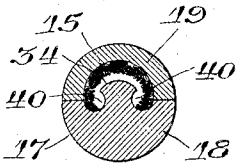


Fig. 7.

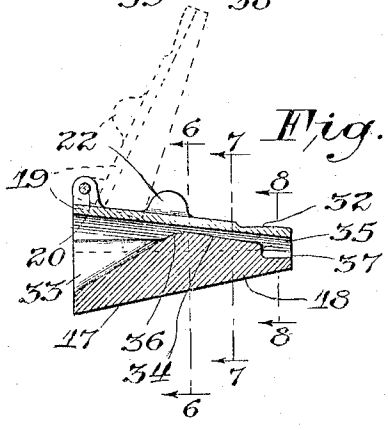


Fig. 4.

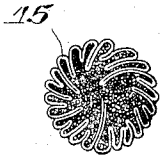


Fig. 9.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING COMBINATION FIBER-PAPER TWINE.

1,320,922. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed June 27, 1918. Serial No. 242,182.

To all whom it may concern:

Be it known that I, GEORGE L. RICE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Combination Fiber-Paper Twine, of which the following is a full, clear, and exact specification.

My invention relates to mechanism for making a combination paper and fiber twine.

One of the most severe uses to which twine can be put is the use in connection with automatic binding machinery, such as the binding mechanism of harvesting machines. When used on this class of machines the twine is exposed to the weather and in passing through the knotting mechanism is subjected to twisting and bending strains and other unusual strains and stresses.

In order to withstand this harsh and severe treatment the elements of which the twine is composed must be securely interlocked and intertwisted. Thus, in a combination twine formed of fiber and paper, it is not sufficient that the paper be wrapped about the fiber, but the elements must be securely interlocked in such a manner that they will not be separated from each other during the passage of the twine through the binding and knotting mechanism.

The object of the present invention, therefore, is to produce a strong and flexible fiber paper twine in which the paper and fiber are securely interlocked and intertwisted to form a unitary structure which will withstand the severe and harsh treatment and still preserve its unitary construction.

The construction illustrated in the present application is an improvement upon the type shown and described in my copending application, Serial No. 228,494, filed April 13, 1918. In the present instance the objects of the invention are accomplished more particularly by distributing the fiber across the width of the paper prior to folding the paper about the fiber to form the paper envelop.

In carrying out my invention the paper and fiber are positively drawn and fed,—preferably being fed simultaneously by suitable drawing and feeding means such as rollers working under pressure—and the paper which comes into contact with the upper or pressure roller forms a feeding and drawing surface for the fiber which is disposed between the paper ribbon and the lower feed rollers. The paper is creased longitudinally by the pressure of the rollers which forces the fiber against the paper. This construction results in the paper and fiber being fed at exactly the same speed and tension. After passing through the feeding means the two elements are passed through suitable mechanism such as a former, wherein the fiber is distributed evenly across the width of the paper and the paper is thereafter wrapped around the fiber to form an envelop, the side edges of the paper being turned inwardly toward the center of the paper tube. After passing through the former, the paper tube with the fiber inclosed therein is passed through suitable crushing and condensing means, such as a crusher and nipper, and from this mechanism passes to the spinning mechanism.

I have illustrated in the accompanying drawings one embodiment of my invention, and in these drawings,—

Figure 1 is a side elevational view partly in section illustrating my improved apparatus;

Fig. 2 is a top plan view on an enlarged scale of the improved former;

Fig. 3 is a side elevation of the construction shown in Fig. 2;

Fig. 4 is a longitudinal sectional view of the construction shown in Figs. 2 and 3;

Fig. 5 is a top plan view of the bottom member of the former;

Figs. 6, 7 and 8 are cross sectional views taken on lines 6—6, 7—7 and 8—8 of Fig. 4; and

Fig. 9 is a cross sectional view, greatly enlarged, of the twine produced by my improved apparatus.

The feeding mechanism for the paper ribbon and the sliver is substantially the same as that shown in my Patent No. 1,217,067, granted Feb. 20, 1917, and consists of a large feeding roller 10 mounted above and adapted to contact with two small feeding rollers 11 and 12, the rollers 11 and 12 being positively driven by suitable gearing mechanism. These rollers may be supported in any suitable way, the roller 10 preferably being journaled in a slidable journal box and having suitable weighting devices for

pressing it in contact with the rollers 11 and 12, as clearly shown in the patent above referred to.

The fiber in the form of a sliver is fed to the feeding rollers by the usual gill bars 13 and gill pins 14, this construction being old and common and therefore not being illustrated in detail in connection with this application. The ribbon of paper 15 is drawn by the feeding rollers from a suitable source of supply, such as a roll, and before reaching the feeding rollers passes under an idler 16. The paper roll supporting means is shown and described in my co-pending application above referred to and it is therefore not necessary to illustrate this construction in detail.

The feeding rollers 10, 11 and 12 positively draw the paper and the sliver forwardly and feed them to the former 17 which is mounted on the frame of the machine in advance of the feeding rollers. In the present instance the former 17 is made in two sections, a stationary section 18, and a hinged section 19 which is pivotally mounted on a pin 20 carried by upwardly extending lugs 21 secured to or formed integral with the stationary section 18 of the former. The exterior surface of the former is conical in shape and a lug 22 extends upwardly from the hinged section 19 and is utilized in lifting the hinged section. The hinged section may be held securely in place on the stationary section by any suitable latching mechanism, and in this instance the stationary section is provided with vertical posts 23 and 23′ located respectively at each side of the front end of the former. Post 23′ has pivotally secured at its upper end a bridge plate 24 which is adapted to swing over the hinged section, and is provided at the end opposite the hinged end with an open slot 25 which is disposed in alinement with the groove 26 formed at the upper end of the post 23. The bridge plate 24 has formed integral therewith and intermediate its ends a plunger casing 27 which incloses a spring 28 having one end in bearing contact with the upper end of the casing and having its opposite end in bearing contact with a fixed collar 29 carried by a plunger 30. The plunger 30 carries at its upper end a head 31 by means of which it may be lifted against the tension of the spring 28. The hinged section 19 of the former has the upper surface of its front end cut away as shown at 32, in order to form a suitable bearing surface for the lower end of the plunger 30.

In Fig. 2 the hinged section is shown in locked position on the stationary section, and when it is desired to gain access to the interior of the former, the plunger 30 is lifted by means of the button or head 31 and against the tension of the spring 28, and the bridge member 24 is rotated on its pivot in the direction of the arrow (see Fig. 2) until it reaches a position approximately 180° from the locked position. When the bridge plate and plunger have been rotated to the open or unlocked position, they no longer obstruct the lifting of the hinged member 19 and this member may be lifted by means of the lug 22 to the position shown in dotted lines in Fig. 4. The interior of hinged section 19 is cut away or hollowed out as shown in the sections in Figs. 6, 7 and 8, the interior wall conforming in shape to a half of a hollow cone. The stationary section 18 is provided at its rear end with a concave portion 33, the side walls of which converge, and at its front end is provided with a convexed tapered portion 34, the side walls of this convex portion coming to a point at 35. The concave portion and the convex portion merge into one another as shown at 36, forming a smooth curve. The front end of the stationary section 18 is concave as shown at 37, and in conjunction with the front end of the upper or hinged section forms a complete circle. The side walls of the stationary section are provided with upwardly extending ribs 38 which engage correspondingly disposed grooves 39 formed in the side walls of the hinged section. The interior portion of the stationary section is also provided with grooves 40 located at the opposite sides of the convex portion 34 and extending rearwardly approximately half the length of the concave portion. These grooves 40 are substantially semi-circular in section and extend forwardly to the concave front end portion 37. The reason for making the interior of the stationary section in the form above described, will be clear from a reference to Figs. 6, 7 and 8, where the positions of the fiber and paper are illustrated as they pass through the former. The paper enters the former above the fiber as shown in Fig. 1, and comes into contact with, and is guided by, the inner wall of the hinged section and is thereby transversely curved as shown in Fig. 6. The portion of the fiber not already in contact with the paper, due to the pressing and creasing operation above described, as it enters the former is guided by the concave rear portion 33, and as it reaches the convex portion 34 is distributed transversely or spread across the width of the paper which is disposed above it. The fiber and paper are held in contact with the convex surface 34 by the upper hinged section of the former which is resiliently actuated to allow the hinged section to automatically adjust itself to the thickness of the fiber and paper.

As stated above in this specification, the pressure of the roller 10 on the paper ribbon forces the ribbon against the loose fibers

and thereby produces longitudinal creases in the paper. These creases are shown in Figs. 6 and 7 and the fiber as shown therein is distributed across the width of the paper and certain portions of the fiber are disposed in the creases. As the paper approaches the forward end of the former, the side edges of the paper are curled as shown in Fig. 7, since the conical shape of the former tends to make the paper assume a smaller space as it approaches the front end thereof. The edges of the paper therefore are forced into grooves 40 disposed at the side of the convex portion 34. As the paper reaches the front end of the former, the inwardly curved edges are further curved and finally assume substantially the position shown in Fig. 8. After leaving the former the paper passes through a crusher 41 and a nipper 42 and thence to suitable spinning mechanism. After being spun the relative positions of the fiber and paper are such that the side edges of the paper are folded inwardly toward the center of the twine and the paper covering has a plurality of inwardly projecting portions, the individual members of the fiber being disposed between adjacent inwardly projecting portions. A cross section of the finished twine as shown in Fig. 9, illustrates the construction of the twine as above described.

From the above description it will be seen that my improved former evenly distributes the fiber across the width of the paper, turns the ends of the paper inwardly and disposes the individual fibers in the longitudinal creases in the paper. This results in a secure interlocking of the paper and fiber, and when twisted the interlocked paper and fiber formed by my improved apparatus will be intertwisted and a twine will result in which the elements are securely locked together in such a manner that they will not be separated by severe and harsh treatment such as that experienced in automatic binding mechanism.

While I have in the above specification described one embodiment which my invention may assume, it should be understood that the invention is capable of modifications and that modifications may be employed without departing from the spirit and scope of the invention as expressed by the following claims:

1. A machine for making a combination fiber paper twine, including, in combination, means for feeding non-twisted fiber and a ribbon of paper, and means for distributing the fiber evenly across the width of the paper.

2. A machine for making a combination fiber paper twine including, in combination, means for drawing and feeding non-twisted fiber and a ribbon of paper, and means including a convex fiber engaging surface for distributing fiber across the width of the paper.

3. A machine for making combination fiber paper twine including, in combination, means for feeding non-twisted fiber and a ribbon of paper and for creasing the paper longitudinally, and means for distributing the fiber across the width of the paper in said creases.

4. In a machine for making twine, the combination of means for drawing and feeding non-twisted fiber and a ribbon of paper, means for distributing the fiber across the width of the paper and for curling the edges of the paper inwardly.

5. In a machine for making twine, the combination of means for drawing and feeding non-twisted fiber and a ribbon of paper, means for distributing the fiber across the width of the paper and for curling the edges of the paper containing a part of the distributed fiber inwardly.

6. In a machine for making twine, means for feeding non-twisted fiber and a web of paper, and means for forming a paper web into a tube about said fiber with the lateral edges of the paper turned inwardly toward the center of the tube and into said fiber.

7. In a machine for making twine, a former having in combination, fiber guiding means and fiber spreading means.

8. In a machine for making twine, a former having paper guiding means and means for distributing non-twisted fiber across the width of said paper.

9. In a machine for making twine, a former having paper guiding means for curving the paper transversely and turning the edges of the paper inwardly toward each other, and means for distributing the fiber evenly across the width of the paper.

10. A former for fiber paper twine machines having two sections, the upper section having means for guiding and folding the paper and the lower section having means for guiding and distributing the fiber.

11. A former for fiber paper twine machines having an upper section provided on its interior with a concave guiding surface and the lower section provided on its interior with a convex distributing surface disposed adjacent said concave guiding surface of the upper section.

12. A former for twine machines having an opening therethrough and having a concave guiding surface disposed above said opening and a convex distributing surface disposed below said opening.

13. A former for twine machines having an opening therethrough and having a concave guiding surface disposed above said opening, and a convex distributing surface disposed below said opening, said opening

being substantially circular at the front end of said former.

14. A former for twine machines having an opening therethrough, a convex distributing surface disposed below said opening, the interior of the former being grooved adjacent the side edges of said convex surface.

15. A former for fiber paper twine machines having a fixed fiber guiding and distributing section and a movable paper guiding section.

16. In a former for fiber paper twine machines, a fiber engaging section having means for spreading the fiber and means for guiding the fibers to said fiber spreading means.

17. In a former for fiber paper twine machines, means for spreading the fibers, and concave means for guiding the fibers to said fiber spreading means.

18. In a former for fiber paper twine machines, convex means for spreading the fibers, and means for guiding the fibers to said convex fiber spreading means.

19. In a former for fiber paper twine machines, convex means for spreading the fibers and concave means for guiding the fibers to said fiber spreading means.

20. In a former for fiber paper twine machines, a convex portion for spreading the fibers and a concave portion for guiding the fibers to said spreading means, said concave portion merging in said convex portion.

21. In a former for fiber paper twine machines, a convex fiber spreading portion having the side walls thereof converging toward the front of said former.

22. A former for fiber paper twine machines having a fixed section and a movable section, one of said sections having fiber guiding means and the other section having paper guiding means, and yieldable means for holding said sections in operative relation with respect to each other.

23. In a former for fiber paper twine machines, means for guiding a paper ribbon, means for guiding the fiber, and resilient means for controlling the relative positions of the fiber and paper with respect to each other.

24. A former for fiber paper twine having two sections, the upper section having means for guiding and holding the paper and the lower section having means for guiding and distributing the fiber, and resilient means for forcing one of said sections toward the other section.

In testimony whereof I affix my signature.

GEORGE L. RICE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."