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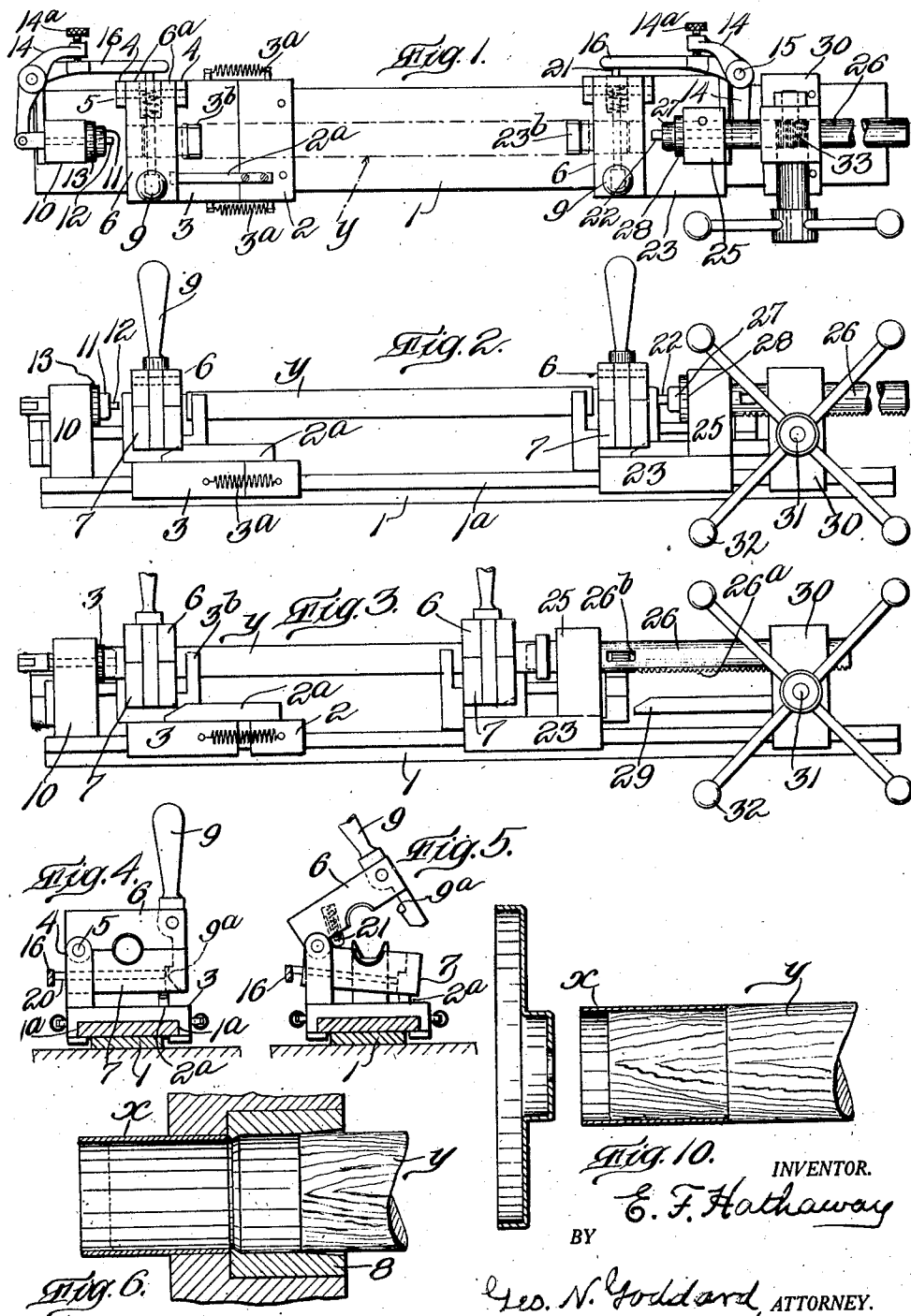
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Filed April 11, 1927

2 Sheets-Sheet 1



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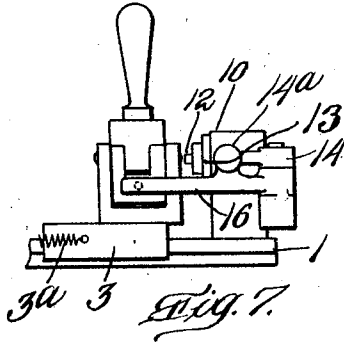
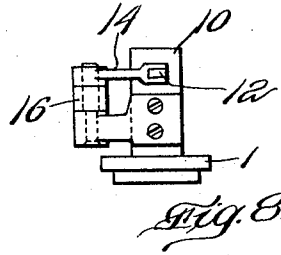
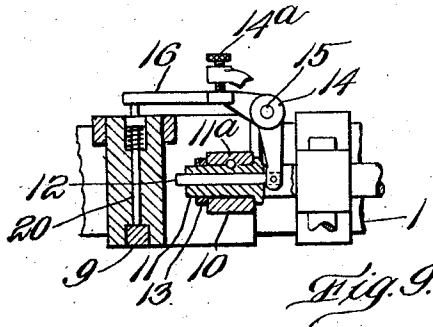
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2 Sheets-Sheet 2



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MACHINE FOR AFFIXING FERRULES TO WOODEN ROLLERS OR THE LIKE.

Application filed April 11, 1927. Serial No. 182,763.

This invention relates to the application or affixing of metallic ferrules to the ends of a barrel or roller of a yarn-spool, such, for example, as is used in Axminster tube-frames, and is intended to provide a simple and efficient means for securing the ferrules upon rollers with a sufficient degree of tightness to insure against their accidental removal or displacement, and also to secure the accurate positioning of the ferrule upon the roller so that the ferrule, when applied, may project a predetermined and uniform distance beyond the end of the roller.

The invention is particularly directed for producing the type of yarn spool having a wooden barrel united to a flanged metallic head by means of a ferrule secured to the end of the barrel and projecting the proper distance beyond the end of the wooden barrel or roller to receive interiorly the attaching flange or concentric boss of the metallic head.

A common fault found with this class of spools is that under the influence of atmospheric conditions the ferrule and the head become loose on the roller, thus interfering with the proper functioning of the device and materially shortening its life. The present invention overcomes this trouble by providing means by which the ferrule is quickly and easily applied to the wooden roller by substantially compressing the end of the roller, as it is telescoped into a ferrule of smaller diameter than the normal diameter of the roller, so that by such compression the natural expansion of the wood exercises a powerful and durable grip upon the ferrule which obviates the trouble heretofore experienced due to the working loose of the ferrule. Furthermore, the means for applying the ferrule are so arranged that the insertion of the ferrule to an exactly predetermined point is always effected.

Generally speaking the invention embraces the combination of a ferrule-supporting means in association with a co-axial roller compressing die, and means for forcing together the contracted end of the roller into a ferrule of corresponding diameter. To facilitate the removal of the ferrule-capped roller, the roller-compressing dies are mounted in separable jaws by providing means for causing these jaws to open automatically. When the compressed end of the

roller has penetrated a predetermined distance into the ferrule, I not only increase the efficiency of the machine but also provide means which serve as an automatic signal to notify the operator that the roller has been inserted to the predetermined depth into the ferrule.

These and other features of the invention will be particularly described in this specification and will be defined in the claims here-to annexed.

In the accompanying drawings I have illustrated one form of construction and arrangement embodying the principles of this invention as applied to a double acting machine, that is, a machine for applying both ferrules simultaneously to the roller.

In the drawings:

Figure 1 is a plan view of the complete machine.

Figure 2 is a side elevation thereof showing the roller in position for treatment.

Figure 3 is a similar side elevation showing the roller being telescoped into the ends of opposite ferrules.

Figures 4 and 5 are detail end elevations showing the dies and their holding jaws in closed and in open position, respectively.

Figure 6 is an enlarged detail view in vertical central section showing the position of the roller and of the ferrule as these parts are about to be telescoped together by the action of the compressing die.

Figure 7 is a rear elevation of the left hand end of the machine, according to Figure 1.

Figure 8 is an end elevation of a portion of the jaw-opening mechanism.

Figure 9 is a horizontal section of the head shown in Figure 7 on the axial center of the machine.

Figure 10 is a detail view showing the spool-head and the spool barrel with affixed ferrule in juxtaposition ready for assembly.

In the practice of this invention, according to the form illustrated, I provide a horizontal bed-plate 1, having projecting side ribs or flanges 1^a, forming slide-ways for the movable carriages of the machine. Near the left hand end of the machine is mounted a fixed head 2 which may be located at any convenient distance from the end of the ma-

chine and connected with said fixed head 2, by means of return springs 3^a, is a slidable carriage 3. This carriage is provided with parallel spaced uprights or bearing brackets 4, carrying a horizontal fulcral pin 5 on which are pivotally mounted or fulcrumed, by overlapping hinged joints, an upper die-carrying jaw 6 and a lower die-carrying jaw 7 which, when placed together, are transversely bored to receive an annular compressing die 8, one half of which is secured in the opening of the upper jaw, the other half being secured in the opening of the lower jaw so that, when the two jaws are brought close together into operative position, the die forms a complete circle having an interior convergent wall whose larger end is of a diameter somewhat larger than the interior of the ferrule shown at *x* in Figure 6, and whose smaller end corresponds to the internal diameter of the ferrule, the function of this die being to compress the wood or other compressible material of which the roller *y* may be made, so that it can telescope into the interior of the ferrule *x* as the end of the roller is forced endwise through the die and into the ferrule. The upper jaw 6 is provided with a locking latch 9 whose upper end forms a handle for convenient manipulation, and whose lower end is cut away to form a hook or shoulder at 9^a to interlock with a co-acting undercut shoulder formed in the front end of the jaw 7 so that, when the two jaws are moved together, the latch will hold them in closed position until it is released either by hand or by automatic means, presently to be described.

The jaws are automatically thrown open by means of a spring-pressed plunger 21, mounted in the upper jaw 6 and thrusting against the top face of the lower jaw 7.

At the left-hand end of the bed 1 is mounted an upright or standard 10 which is bored in coaxial alignment with the opening through the die-carrying jaws when the latter are in operative position. In this coaxial bore is mounted a cylindrical bushing 11, secured against endwise movement by any suitable means, such as a key 11^a, and centrally bored to receive a slide-pin 12, which forms part of the jaw-releasing mechanism. The outer diameter of the bushing 11 is appropriate to penetrate the interior of the ferrules that are to be applied to the rollers. Surrounding the inwardly projecting end portion of this bushing 11 is a collar or washer 13 which, as will be hereinafter explained, receives the end thrust of the ferrule and whose width determines the distance which the ferrule is to project beyond the end of the roller, as shown in Figure 10, when the ferrule is affixed, such distance being varied by the substitution of thrust-collars 13 of different widths. The wider the thrust collar the more nearly its

ferrule-engaging thrust face approaches to the end of the bushing 11 and, consequently, the less, in such case, will be the projection of the affixed ferrule beyond the end of the wooden roller. When using the same washer this distance will always be uniform for all ferrules applied thereby.

To facilitate the removal of the roller with its affixed ferrule, the die-carrying jaws, as well as the two halves of the die, are made separable to allow them to open apart. By providing automatic means that will open the die when the compressed end of the roller has telescoped into the ferrule for the predetermined distance, I both expedite the action of the machine, relieving the operator from this work, and also inform the operator when the requisite degree of telescoping has been effected.

Since the inner end of the head or bushing 11 telescopes into the ferrule being applied to the roller, and the end of the ferrule thrusts against the collar 13, it will be obvious that when the wooden roller is forced inside the ferrule, until its outer end engages the projecting end of the pin 12, the pin 12 will recede, under the pressure of the wooden barrel, until it lies flush with the end of the bushing 11, when no further movement of the roller can take place. This slidable pin 12 exerts its outward thrust against one arm of the angle-lever 14, mounted to rock upon a vertical axis 15, and preferably having adjustable engagement with a rock-arm 16 through the medium of an adjustable thrust-screw 14^a, arranged to engage the lower face of said rock-arm 16, so that, as the slide-pin 12 is moved outwardly endwise it rocks the rear arm of the angle lever 14 forwardly, which movement is transmitted through the adjustable thrust-screw 14^a to the arm 16. The arm 16 has its free end abutting against a releasing pin 20 which passes from front to rear through a bored passage in the lower jaw 7, so that the forward end of this pin member engages the lower end of the hook-latch 9 and, by its forward movement, pushes said hook outwardly until it is released from the overhanging shoulder with which it is interlocked. As soon as such release of the hook-latch takes place, the jaws spring apart or open by reason of the thrust of the jaw-opening pin 21.

It will, therefore, be seen that the roller *y* can be forced through the compressing die 8 into the associated or juxtaposed ferrule *x* until the wooden roller abuts against the bushing 11, which forms a positive stop against its further movement, and that this will leave the ferrule projecting beyond this end of the roller a distance equal to the longitudinal distance from the end of the bushing 11 to the adjacent face of the washer, while at the same time the parts are so pro-

portioned that when the roller abuts against the end face of the thrust-bushing 11, the slide-pin 12 is forced into the point where the latch is released through the intermediate connections just described.

On the carriage 3 is mounted a roller-rest or bracket 3^b, notched or recessed at its upper end to support the roller in substantial alignment with the compressing die when the die is closed.

It will be observed that both die-carrying jaws are pivoted, the reason for this being to allow a certain floating movement to the die when in operative position to permit the die to accommodate itself concentrically to the circumference of the roller that is being forced into it so as to give equal compression all around the end of the roller. As soon as the die is opened in the manner described, or in any other suitable manner, the end thrust of the roller against the die ceases and the carriage 3 is allowed to return to its initial position under the influence of the retractile springs 3^a. When moving to return position the lower jaw of the die rides against the inclined face or cam face of a cam member 2^a that is secured to the fixed head 2, so that both jaws, the top one by gravity and the other by the cam action exerted on its return, are brought to closed position in central or coaxial alignment with the ferrule-supporting members 12 and 22. It will be understood that the ferrule *x*, as shown in Figure 6, is inserted in the outer end of the bore formed by the two jaws 6 and 7, beyond the recess in which the die sections 8 are mounted, so that as the carriage 3 is moved outwardly the ferrule encircles the bushing 11 and comes to rest against its thrust collar or member 13. It will also be understood that the movement of this carriage is initially by the end thrust of the wooden roller 9 against the contracted interior wall of the die until the ferrule abuts against the thrust-receiving abutment member 13 which arrests the movement of the carriage but allows the continued movement of the roller until its end face abuts against the end face of the bushing 11.

At the opposite end of the bed I provide another movable carriage 23 on which are mounted upper and lower jaws 6 and 7, carrying die sections 8, exactly similar to that already described and shown in Figure 6, except, of course, that the position of the die is reversed to bring its larger end facing opposite the head so as to engage the edge of the interposed roller 9. The mechanism for releasing these jaws is a duplicate of the mechanism already described and comprises an angle arm 14, adjustable thrust or transmitting screw 14^a, and an intermediate rock-arm 16 engaging the latch-releasing pin 21, but it will be understood that these parts are mounted on the carriage 23 and

travel with it. Like carriage 3, the carriage 23 carries a roller-supporting standard 23^b. The carriage 23 carries an upright standard 25 which is bored transversely in axial alignment with the bore in the standard 10. In this bore is mounted a slide-rod 26, which extends a considerable distance beyond the outer end of the carriage and passes through a fixed head 30, which is also bored to form a bearing for the outer end of the slide-rod 26. Below this transverse bore in the head 30 is mounted a shaft 31, carrying actuating arms or handles 32, said arms being provided with a pinion 33 intermeshing with rack 26^a, formed on the lower side of the slide-rod 26.

This slide-bar is also slotted or cut through transversely, as shown at 26^b, to receive the forwardly projecting arm of the angle lever 14 and the slide-rod also carries, in its inner end, a slide-pin 22, having loose pivotal connection with the forward arm of the angle lever 14, precisely as does the slide-pin 12, as above described.

Rotation of the pinion shaft 31 in a counter-clockwise direction causes the slide-bar 26 to travel inwardly toward the opposite head. At its inner end this slide-bar has a projecting portion 27 adapted to fit into the adjacent ferrule, and around this telescoping thrust member 27 is a collar 28 which supports the end thrust of the ferrule.

A cam-block 29, corresponding to the cam-block 2^a, acts to restore the lower jaw 7 to normal position when the carriage 23 is retracted to idle position to allow the insertion of another roller to which ferrules are to be applied.

It will, therefore, be seen that the two ends of the machine differ only in that the first carriage is actuated by means of thrusts transmitted through the roller *y* from the second carriage, which is actuated by means of the rack and pinion to exert an end thrust on its supported ferrule which is transmitted to the opposite ferrule, so that both ferrules are forced on the opposite ends of the wooden roller simultaneously. Even should one ferrule reach its predetermined limit of movement on the roller before the other ferrule does, the successful operation of the machine is not affected since the movement of the actuating carriage is continued until both ferrules are forced home and both compressing dies are opened to permit the removal of the roller to which the ferrules have been thus attached.

What I claim is:

1. In a machine for applying ferrules to wooden rollers, the combination with a supporting bed-plate, separable die-carrying jaws mounted in axial alignment, ferrule-supporting abutments mounted in coaxial alignment with said die-carrying jaws, and means for forcing one abutment and its as-

sociated jaws toward the other and thereby force the ferrules over the opposite ends of an interposed roller.

2. In a machine for applying a ferrule to the end of a wooden roller, the combination with ferrule-supporting means, a roller-compressing die arranged in juxtaposition to said supporting means and means for telescoping the end of the roller into the compressing die and thereafter forcing said compressed end of the roller into the adjacent ferrule.

3. In a machine for applying ferrules to the ends of wooden rollers, the combination with ferrule-supporting means, a hollow convergent die arranged adjacent to said ferrule-supporting means, one end of said die being of a diameter to receive the end of a roller, the other end being of smaller diameter than the end of the roller to be treated and corresponding to the interior diameter of the ferrule, and means for forcing the roller through said die and into the adjacent ferrule after the end of the roller has been compressed by the die to a diameter permitting it to enter the ferrule.

4. In a machine for applying ferrules to the ends of wooden rollers, the combination of a ferrule-supporting abutment, a coaxial roller-compressing die arranged adjacent thereto, said die having a convergent interior wall whose smaller end corresponds to the interior diameter of the ferrule and whose larger end is sufficiently large to receive the end of a roller of compressible material that is of substantially larger diameter than the interior diameter of the ferrule, and means for forcing the end of the roller into the ferrule a predetermined distance.

5. In a machine for applying ferrules to the ends of wooden rollers, the combination with ferrule-supporting means, of coaxially arranged roller-compressing die sections located in juxtaposition to said ferrule-supporting means, means for forcing the end of a roller through the compressing die sections with the ferrule, and means acting when the roller has telescoped a predetermined distance into the ferrule to open the die sections apart to permit the removal of the roller and its attached ferrule.

6. In a machine for applying ferrules to the ends of wooden rollers, the combination of ferrule-supporting means and a sectional roller-compressing die arranged coaxially in juxtaposition, means for forcing the end of a roller through said die into an aligned ferrule, and means actuated by the thrust of the advancing roller, at a predetermined point, to open the sectional die to permit removal of the roller and its affixed ferrule.

7. In a machine for applying ferrules to the ends of wooden rollers, the combination with ferrule-supporting means, of a roller-compressing sectional die coaxially aligned

with said supporting means, said die being mounted to travel axially a predetermined distance toward a thrust-supporting abutment, means for forcing the end of a roller through the die into the aligned ferrule until the roller reaches said abutment, and means actuated through the agency of the advancing roller to open the die when the roller reaches said abutment.

8. In a machine for applying ferrules to the ends of wooden rollers, the combination of an axially arranged roller-compressing sectional die, a thrust member arranged coaxially with the die to support the end thrust both of a ferrule and of a roller forced into the ferrule, and means for forcing the end of a coaxially disposed roller through the die and into the ferrule for a predetermined distance dependent upon the position of the end of said thrust member with relation to the ferrule.

9. In a machine for applying ferrules to the ends of wooden rollers, the combination with a movable carriage, of roller-positioning means, a sectional roller-compressing die pivotally mounted on the carriage to accommodate itself to coaxial alignment with a roller supported on the positioning means, a thrust member located on the opposite side of the die from the roller, and means for forcing the end of a roller through said compressing die into a ferrule that is engaged by said thrust member and sustained against end thrust thereby.

10. In a machine for applying ferrules to the ends of wooden rollers, the combination of two movable die-supporting carriages, of coaxially arranged roller-compressing dies mounted on the respective carriages, ferrule-receiving thrust members mounted in coaxial alignment with said dies, and means for advancing one carriage toward the other to simultaneously force two properly positioned ferrules over the opposite ends of a coaxial interposed roller for predetermined distances.

11. In a machine for applying ferrules to the ends of wooden rollers, the combination of two axially aligned roller-compressing dies, one movable axially toward the other, a pair of coaxially disposed ferrule-receiving and thrust-sustaining members located in proximity to the respective dies, one thrust member being movable toward the other, and means for forcing one die and its adjacent thrust member toward the other to compress the ends of an interposed axial roller of normally larger diameter than the inside of the ferrules, and to force the rollers ends so compressed into their respective ferrules.

12. In a machine for applying ferrules to the ends of wooden rollers, the combination of roller-supporting means, of roller-compressing sectional dies movably mounted in

coaxial alignment with an interposed roller, ferrule-receiving end thrust members, and means for automatically opening each sectional die when the roller end compressed thereby has telescoped into its adjacent ferrule a predetermined distance.

13. In a machine for applying ferrules to the ends of wooden rollers, the combination of two relatively movable die-supporting carriages, roller-compressing dies mounted on the respective carriages in axial alignment with each other and with an interposed roller, means for positively advancing one carriage toward the other to force the dies over the opposite ends of an interposed roller, ferrule-engaging end-thrust members arranged in axial alignment with said dies to cause the ferrules to telescope over the compressed ends of the roller, the second carriage opposing a yielding resistance to

the positively advancing carriage, and means for returning the second carriage to initial position after the ferrules have been applied.

14. In a machine for applying ferrules to the ends of wooden rollers, the combination with a sectional roller-compressing die, of an axially disposed ferrule-engaging thrust member, means for forcing the end of an axially disposed roller through said die into a ferrule engaged by said thrust member, die-opening mechanism arranged to be set in action by the end of the roller advancing inside said ferrule, and means for adjusting the die-opening mechanism to correlate its die-opening action to a predetermined penetration of the roller into the ferrule.

In witness whereof, I have subscribed the above specification.

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