

Oct. 9, 1934.

W. G. VERNON ET AL

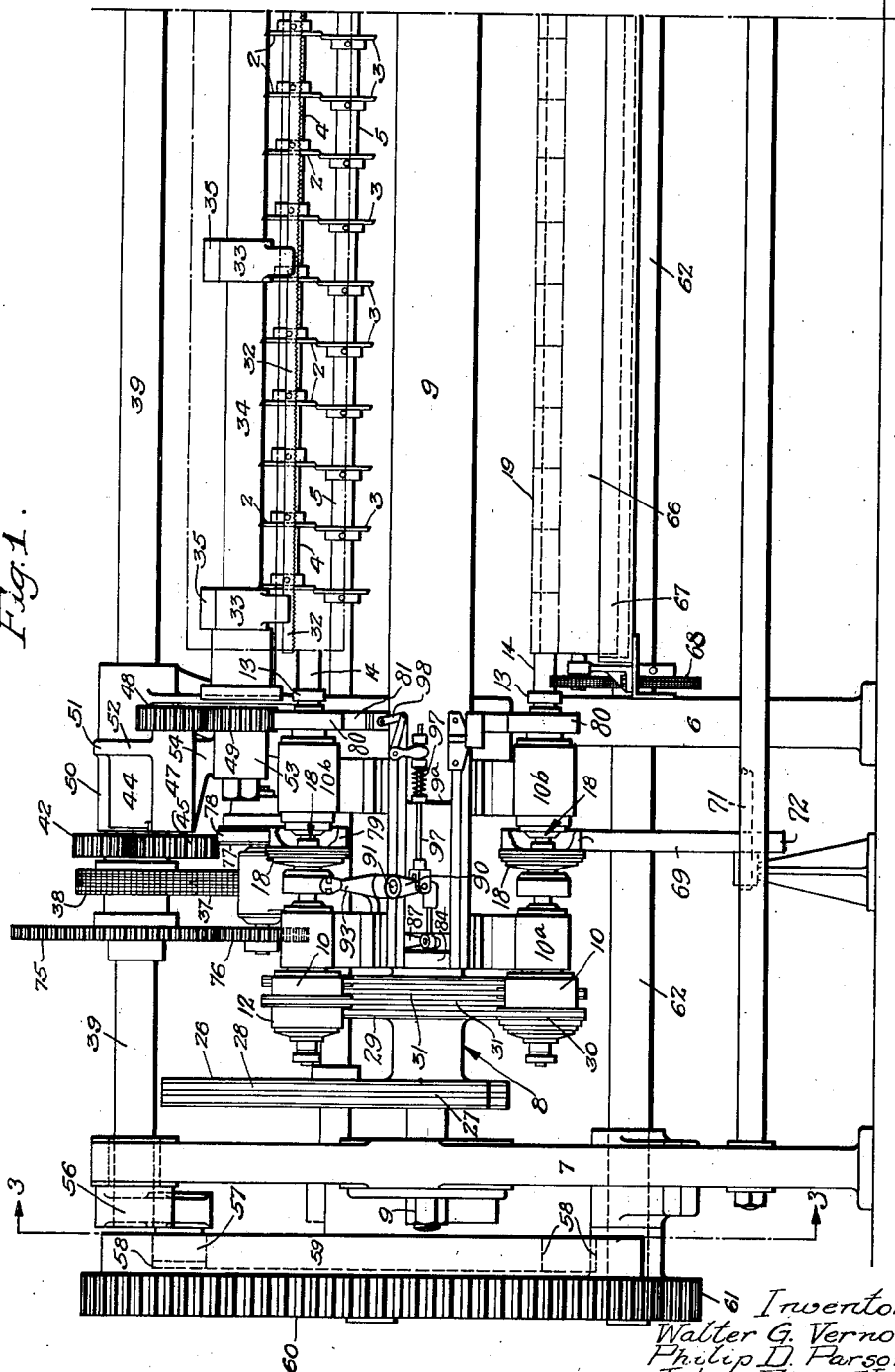
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PAPER WINDING MACHINE

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5 Sheets-Sheet 1

Fig. 1.



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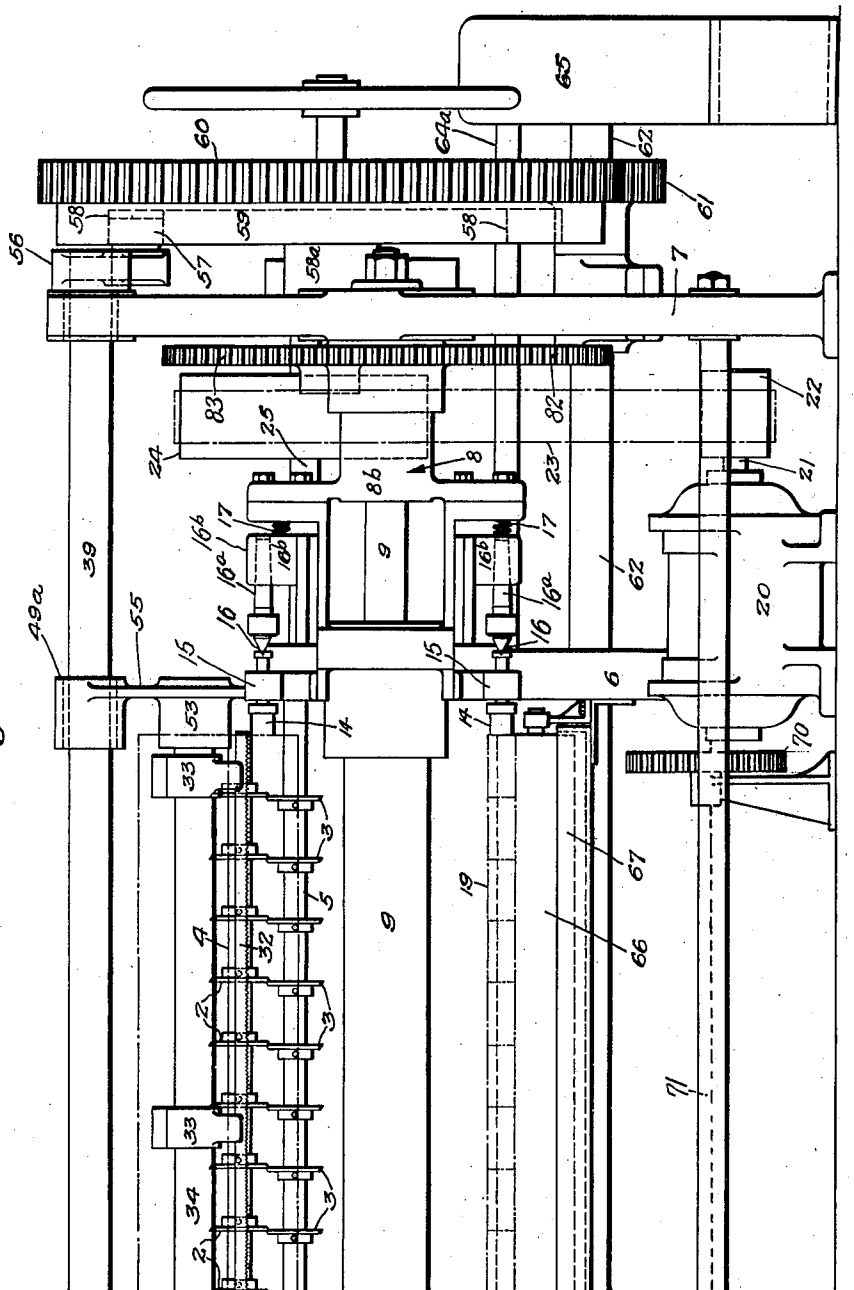
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5 Sheets-Sheet 2

Fig. 2.



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5 Sheets-Sheet 3

Fig. 3.

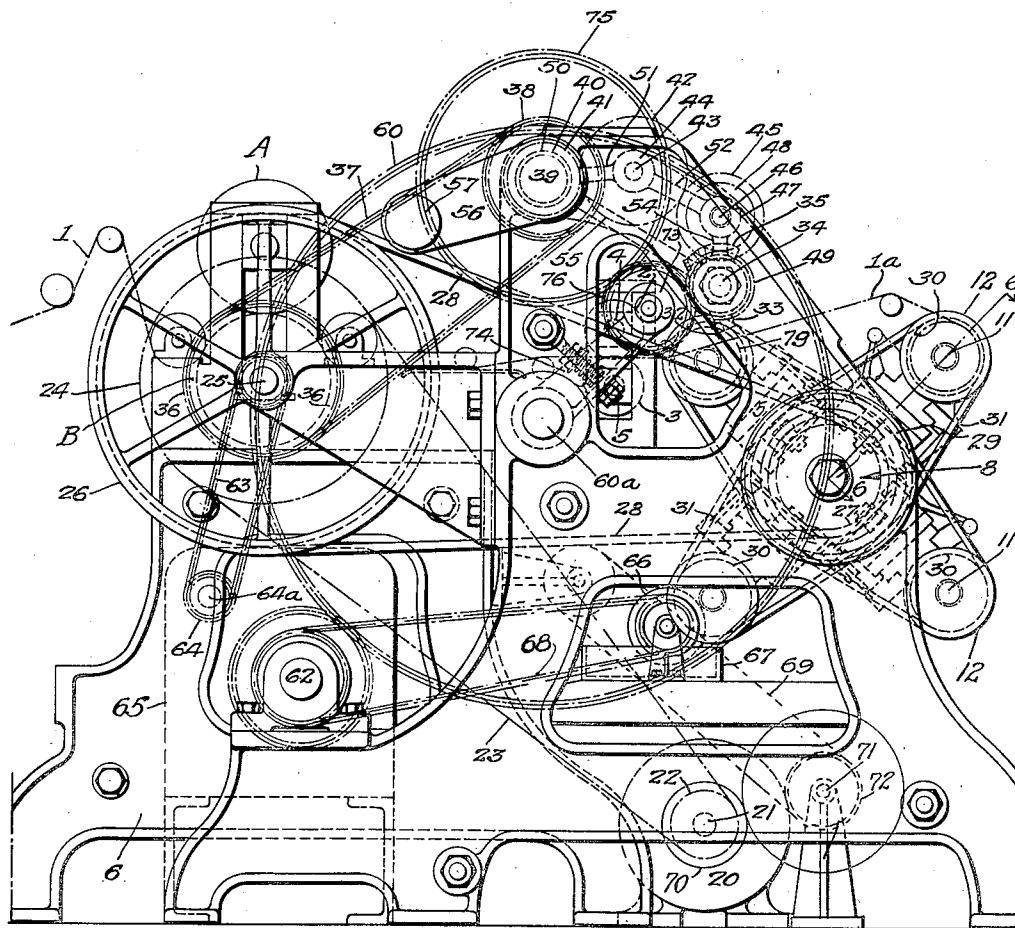


Fig. 4.

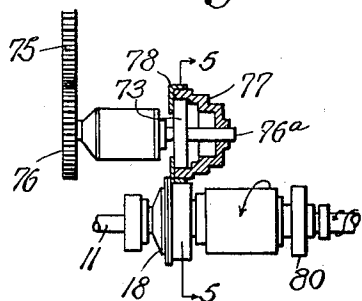
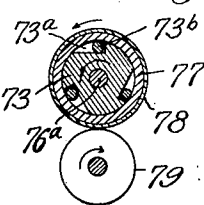


Fig. 5.



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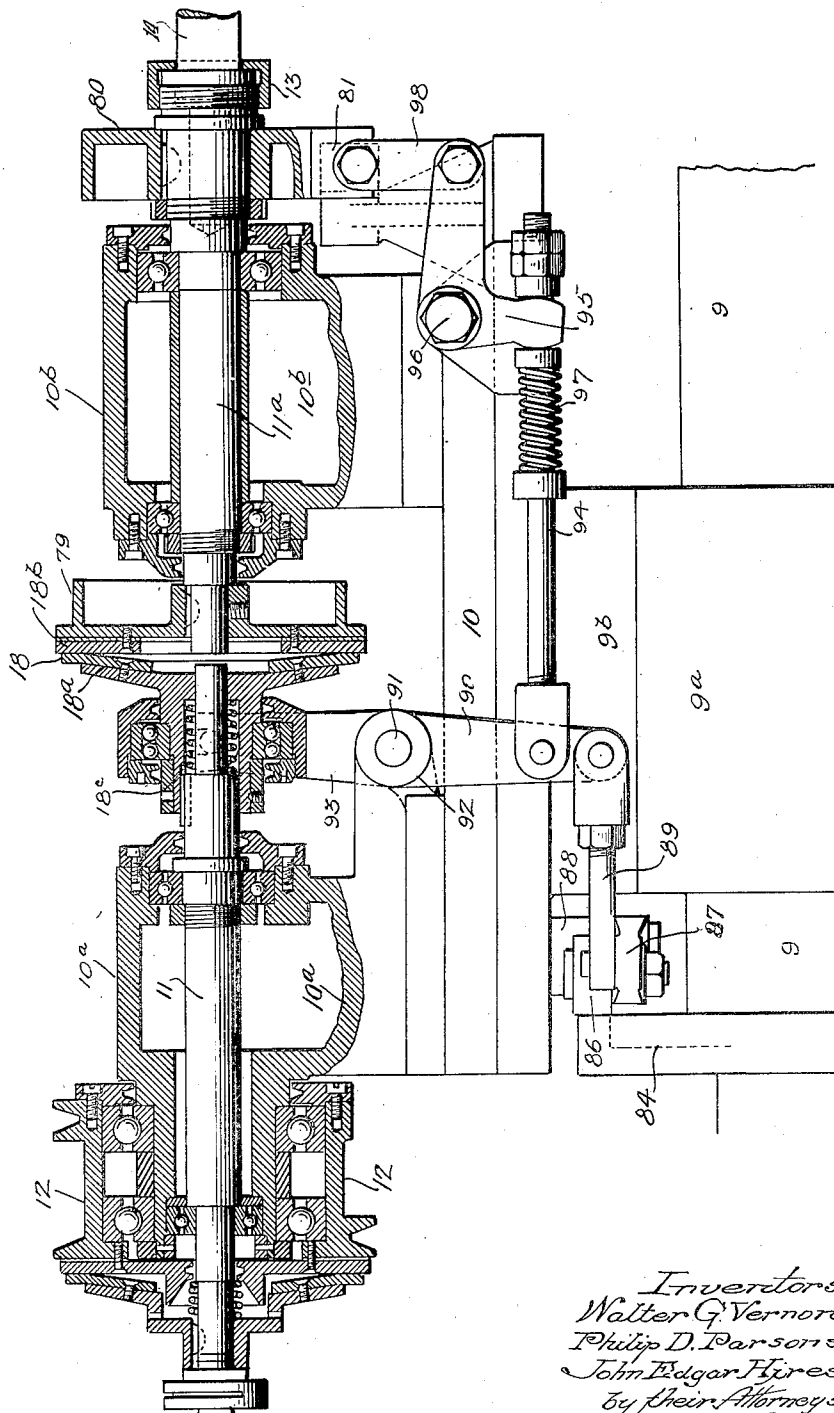
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PAPER WINDING MACHINE

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5 Sheets-Sheet 4



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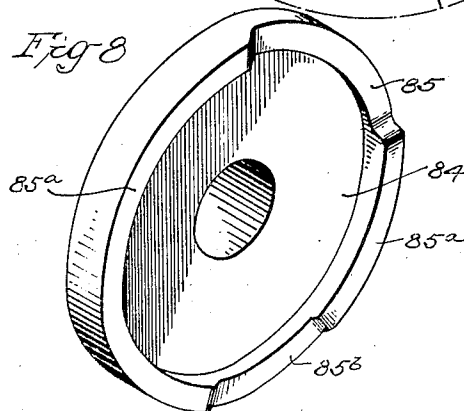
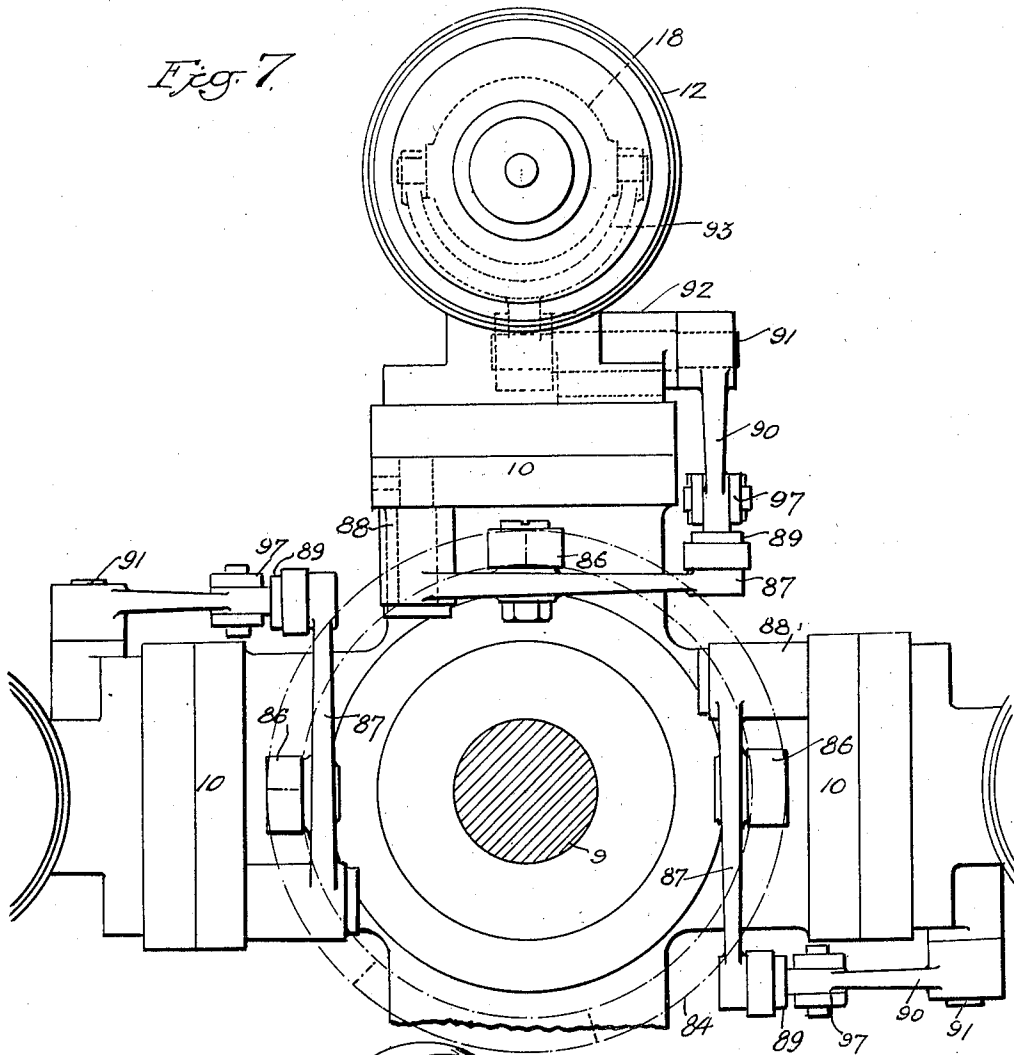
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PAPER WINDING MACHINE

Filed June 17, 1933

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

1,976,641

PAPER WINDING MACHINE

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Application June 17, 1933, Serial No. 676,312

33 Claims. (Cl. 242—56)

This invention relates to new and useful improvements in paper winding machines and contemplates more particularly a continuous winding machine for toilet papers wherein a plurality of narrow strips of paper are wound upon a plurality of aligned cores and is a continuation in part of United States patent application, Serial No. 627,374, filed August 3, 1932.

One principal object of the invention is to provide a machine of the above character having a novel, continuously rotating turret comprising a plurality of sets of turret heads, each of which rotatably supports a mandrel adapted to carry a plurality of cores, reels or other means on which the strips of paper are wound, the continuous rotation of the turret moving each mandrel and the cores successively into position for winding when a predetermined amount of paper has been wound upon the preceding set of cores.

Another principal object of the invention is to provide means operatively associated with the aforesaid apparatus for driving each of said mandrels at a predetermined speed of rotation, together with means operatively associated with each of said turret heads for breaking the driving connection to the mandrels for a predetermined portion of the operating cycle of the machine, said means also being operable to apply a brake simultaneously with the breaking of the driving connection, whereby further rotation of the mandrel is prevented.

Another principal object of the invention is to provide means in conjunction with the aforesaid apparatus for perforating the narrow strips of paper at equally spaced intervals transversely thereof, together with means automatically actuated in timed relation with said perforating means and the travel of the narrow strips of paper whereby said strips may be severed or broken when an exact, predetermined number of sheets or feet of paper have been wound.

Another object of the invention is to provide novel means operative in timed relation with respect to the strip severing means whereby the loose ends of said strips are forced onto the next succeeding mandrel which, at that time, moves into position for winding.

Another object of the invention is to provide a paper winding machine of the stated character having a continuously rotating turret wherein the mandrels carried thereby may be removed from said turret to discharge the wound rolls therefrom and to permit additional cores or other means to be placed thereon and the man-

drel replaced in the turret ready for winding again.

Another object of the invention is to provide means operating in timed relation with the machine for applying paste or other adhesive substance to the cores or other paper receiving means on the mandrels for the purpose of securing the free ends of the severed strips of paper thereto when they are forced downwardly onto said cores.

A further object of the invention is to provide a paper winding machine of the character set forth having novel means arranged to contact the driven mandrels at the start of the winding operation and synchronize the speed of said mandrels and the paper strips and also permit the speed of the mandrels to slow down as the first few turns of paper are wound thereon.

The invention consists in certain constructions and in certain parts, improvements and combinations such as are hereinafter described and shown in the accompanying drawings in which:

Figure 1 is a fragmentary view in front elevation of one end of the machine forming the subject of this invention;

Fig. 2 is a view similar to that shown in Fig. 1, showing the opposite end or half of the continuous paper winding machine;

Fig. 3 is a view in section on line 3—3, Fig. 1;

Fig. 4 is a fragmentary elevation view partly in section showing the detail construction of the free wheeling mechanism;

Fig. 5 is a view in section on line 5—5, Fig. 4;

Fig. 6 is an enlarged view in section on line 6—6, Fig. 3;

Fig. 7 is an end view of the mechanism disclosed in Fig. 6; and

Fig. 8 is a view in perspective of the cam member to be mounted on the turret shaft and arranged to operate the clutch release and brake applying mechanism disclosed in Figs. 6 and 7 respectively.

Referring now more particularly to the drawings, the present invention is shown as applied to the general form of machine used in winding narrow widths or strips of fine tissue papers of the toilet roll variety and wherein a relatively wide web of paper 1 is fed from a calendar roll (not shown), through the perforating rolls A and B of the machine where it is transversely perforated in the customary manner at equally spaced intervals and is subsequently cut into a plurality of substantially narrow widths of paper 1a by means of rotary cutting tools 2 and 3 respectively which are mounted on and driven by

the shafts 4 and 5. Ordinarily these narrow strips of paper are subsequently wound on a plurality of cores mounted on a mandrel which rotates in a fixed position with respect to the end frames 6—6 of the machine.

The continuous automatic winding apparatus constituting the present invention and applicable to machines of the above character, comprises end frames 7—7, in which a turret designated generally as 8 is supported and mounted for rotation about a shaft 9 on a hub 9a having a number of radial arms 9b. In the present case a turret head 10 is located at the radial extremity of each arm 9b and includes bearing boxes 10a and 10b, respectively, in each of which, and in alignment, is journaled a stud shaft 11 and 11a. A drive pulley 12 is mounted on the outer end of the stud shaft 11 and a socket 13, to receive and releasably support one end of a mandrel 14, is mounted at the inner end of the other stud shaft 11a. Connection between the shafts 11 and 11a is effected by means of a slip clutch 18, the movable member 18a of which is mounted on the inner end of the shaft 11 and normally maintained in engagement with the fixed member 18b by means of a spring 18c. The driven member 18b of the clutch 18 is provided with a flange 79 constituting a pulley, the purpose for which will be described in detail hereinafter. A brake drum 80 is fixed on the stud 11a between the bearing box 10b and the mandrel socket 13, and a brake shoe 81 is operatively associated therewith. As will be noticed hereinafter it is desirable to disengage the clutch 18, and apply the brake to stop further rotation of the mandrels for certain portions of the operating cycle of the machine, and the mechanism operable to accomplish this and its operation will be set forth hereinafter.

As previously set forth one end of each of the mandrels 14 is supported in the sockets 13 and the other ends are releasably supported in brackets 15 and rotate against bearing points 16 on studs 16a carried in movable blocks 16b on the turret spider 8b and spaced from the adjacent end thereof by means of springs 17 which function to permit movement of the blocks 16b and hence the mandrels 14 longitudinally of the turret 8 to enable withdrawal of the opposite ends thereof from the sockets 13 and from said turret. The customary cores or reels 19 on which the narrow strips of paper 1a are wound are placed on the mandrels 14, the said mandrels being readily and easily removed from the turret 8 during the slow continuous rotation thereof to permit the fully wound rolls of paper to be taken from said mandrels and replaced by another set of cores 19 on which other rolls of paper may be wound, when in due course of rotation of the turret 8, the cores 19 are placed in position to receive the paper.

In the present instance, all operations of the machine, including the continuous winding attachment, are driven from a motor 20 having a shaft 21 on which is mounted a belt pulley 22. A drive belt 23 passes about the pulley 22 and a second belt pulley 24 which is mounted on and drives the main shaft 25 of the machine. A sprocket wheel 26 is mounted upon and driven by the main shaft 25 and this sprocket wheel 26 drives a sprocket 27 mounted on the turret 8 by means of a chain 28. The turret heads 10 and the core mandrels 14 are driven from the left-hand turret 8 by means of a chain or belt drive comprising pulleys 29 and 12 respectively mount-

ed on the turret 8 and the radial turret heads 10, the said pulleys being connected by a chain or belt 31. The right-hand turret 8 is rotated about the shaft 9 at a predetermined speed of rotation by means of a gear 82 which is meshed with a pinion 83 fixed on the shaft 60a. The speed of rotation of the turret 8 with respect to the shaft 60a depends upon the ratio of the respective diameters of the gear 82 and pinion 83 and as will be seen later the rotation of the turret 8 should be as many times faster than the rotation of the shaft 60a as there are turret heads 10 on said turret.

The continuously fed narrow perforated strips of paper 1a formed by the rotating cutters 2 and 3 from the wide web 1, form what is in effect a continuous succession of joined sheets of paper having a rectangular surface area. In the present instance, a toothed cutter 32 is supported in brackets 33 which are mounted on a shaft 34 and arranged to rotate therewith, the said brackets 33 being provided with a weight 35 at the upper side thereof which functions as a counterbalance to aid in the downward thrust of the cutter 32 when it is actuated to completely sever or break the narrow strips 1a in the manner set forth and described in detail hereinafter.

The shaft 34 is driven by the main shaft 25 through a sprocket and chain system and a gear train. A pair of sprockets 36 and 38 are mounted on the drive shaft 25 and a sleeve 40 respectively, the sleeve 40 being loosely mounted on the shaft 39 to permit relative rotation of either the shaft 39 or the sleeve 40 with respect to each other. A gear 41 is mounted on the sleeve 40 driven by the sprocket 38 and chain 37 and meshes with a gear 42 mounted on the spindle 43 rotatably mounted in the sleeve 44, the gear 42 in turn meshing with a gear 45 similarly mounted on a spindle 46 mounted on a sleeve 47. A gear 48 mounted at the other end of the spindle 46 meshes with a gear 49 mounted on the shaft 34 to rotate the shaft at a definite speed ratio with respect to the speed of rotation of the drive shaft 25.

In the present instance a sleeve 50 is rigidly mounted upon the shaft 39 and rotatable therewith, the said sleeve being connected by a rigid bar 51 to the sleeve 44 which is connected to the sleeve 47 by another bar 52. The sleeve 47 is also connected to the bearing 53, in which the shaft 34 is mounted, by a rigid arm 54. The construction just described, constitutes a simple lever which moves the cutter 32 downwardly to sever or break the narrow strips of paper 1a without interrupting the continuous rotation of the shaft 34 being driven in the manner described above. In order to balance the downward thrust on the shaft 34, a similar lever system is provided at the other end of said shaft 34 and comprises a sleeve 49a mounted for rotation with the shaft 39 and connected to the bearing 53, in which the shaft 34 is mounted, by a straight bar 55.

The shaft 39 is rotated, to move the cutter 32 downwardly, by means of arms 56 rigidly mounted on said shaft 39 and which are actuated to rotate the shaft 39 by cam rollers 57 mounted thereon and arranged to ride on cam surfaces 58. These cam surfaces 58 are formed on the inner circumference of each of the cam rings 59 carried by the gear wheels 60 which are mounted on the shaft 60a and driven by smaller gears 61 mounted adjacent the extremities of a shaft 62. The shaft 62 is driven by the main shaft 25 of the machine through a chain 63 and sprocket 64 and the shaft 64a of an ordinary reduction gear box 65.

It is pointed out that the interval of time occurring between each downward movement of the toothed cutter 32 actuated by the cams 57, determines the number of feet or sheets of paper wound upon each of the cores 19 for one particular roll of paper and it is obvious that the frequency of rotation of the shaft 39 depends upon the speed of rotation of the gear wheels 60 and the cam surfaces 58. In this particular instance the gear wheels 60 are driven in a certain predetermined timed relation with respect to the drive shaft 25 of the machine by means of the aforementioned reducing gears 65, and it should be particularly borne in mind that the severance of the narrow strips of paper by the downward movement of the cutter 32, which is actuated in the manner set forth, is so timed with respect to the speed of travel of the strips of paper through the machine, as to insure the severing of the strips only at fixed equal intervals determined by the number of sheets of paper passing in a strip. In this manner each roll of paper will be wound with a predetermined fixed number of sheets of paper, thus affording uniformity to each roll with respect to another, and precluding the necessity of using questionable counting devices to standardize the product as to quantity.

As has been previously stated it is desirable to disengage the clutch 18 to break the driving connection to the mandrels 14 and contact the brake shoe 81 with the drum 80 to prevent further rotation of the mandrels just after the completion of each winding operation so that said mandrels carrying the wound rolls may be removed from the turret 8, the rolls removed therefrom and reloaded with a new set of cores 19. In addition it is desirable to keep the clutch 18 disengaged until that particular head and its mandrel approaches winding position again. A cam 84 is fixed on the shaft 9 and is stationary with respect to the rotation of the turret 8. An annular cam surface 85 is formed on the inner face of said cam 84 and its contour is provided with a high portion 85a and a mean portion 85b of a height not as great as said high portion. A cam roller 86 is rotatably mounted adjacent the center of an arm 87 pivotally connected at one end to the underside of the turret head 10 as at 88, and the other end of said arm 87 is pivotally connected by means of an adjustable rod 89 to the lower end of a lever 90 which is fixed on a spindle 91 journaled in a bearing 92 and connected at its other end to the movable member 18a of the clutch 18 by an arm 93. A brake rod 94 is connected to the lever 90 and extends inwardly of the machine. An L shaped arm 95 pivoted at its vertex to the head 10 as at 96 slidably connects with the rod 94 and a spring 97 on said rod tends to turn the arm 95 in a counter-clockwise direction with respect to Fig. 6 of the drawings. The other end of the arm 95 is pivotally connected to the brake shoe 81 by means of a link 98.

It will be noticed by referring to the drawings and especially Figs. 6, 7 and 8, thereof that when the cam roller 86 moves onto the high portion 85a of the cam surface the rod 89 will be shifted to the right pivoting the lever 90 in a counter-clockwise direction to move the member 18a of the clutch 18 to the left against the spring 18c and out of engagement with the member 18b.

The counter-clockwise movement of the lever 90 shifts the rod 94 to the right, turning the arm 95 in a counter-clockwise direction by means of the spring 97, which acts through the link 98 to move the brake shoe 81 into engagement with

the drum 80. It will be obvious that the relative positions of the above mechanism will be maintained during travel of the cam roller 86 on the high surface 85a of the cam 84 and the driving connection to the mandrels 14 will be broken and rotation of the latter stopped by application of the brake 80.

As the roller 86 passes from the high portion to the low portion of the cam surface the clutch disengaging and brake applying mechanism all moves to the left with respect to Fig. 6 to release the brake and establish the driving connection to the mandrel by engaging the clutch. Obviously therefore the cam must be positioned on the shaft 9 so that its low surface is disposed to permit engagement of the clutch and release of the brake just as each mandrel moves into winding position and permit the driving connection to be maintained throughout winding until just subsequent to the time when the cutter 32 moves downward to sever the strips of paper 1a being wound on that particular mandrel.

The invention further contemplates the provision of a roller 66 for applying an adhesive material such as paste to the cores or reels 19 carried by the mandrels 14, said roller 66 being partially immersed in a paste box 67. The roller 66 is driven by a chain 68 from the shaft 62. As each mandrel 14 carrying cores 19 moves into position to receive adhesive, the mandrels is stationary since the cam roller 86 is on the high portion 85a of the cam surface and the driving connection is broken and the brake applied, and in order to properly coat the cores 19 with said adhesive the drum 79 on the clutch member 18b is contacted with a belt 69 driven from the motor 20 through gearing 70, shaft 71 (see Fig. 3) and pulley 72. The cam surface is provided with a mean high surface 85b which interrupts the high portion and while sufficiently high to maintain the clutch disengaged permits release of the shoe 81 enough to permit the mandrel 14 to be rotated by the belt 69 in contact with the clutch drum 79. The circumferential length of the mean high portion 85b is just enough to permit the cores 19 to rotate approximately one revolution after which the high surface portion of the cam 84 continues.

A novel feature of the invention resides in the mechanism employed for the purpose of maintaining the speed of rotation of the mandrels 14 at the exact speed of travel of the paper web 1a. Actually, the normal speed of rotation of the mandrels is from two to three times faster than the speed of travel of the paper and in order to prevent breaking of the web as the winding operation is initiated the speed of the mandrel is retarded by providing a free wheeling mechanism.

The free wheeling device is mounted on an arm 74 supported by the shaft 60a and remains in a fixed position with respect to said shaft, irrespective of rotation thereof. The free wheeling mechanism is driven by means of gear 75 which is mounted on and rotates with the sleeve 50, driven by the chain 37. The gear 75 is meshed with a gear 76 mounted at one end of a shaft 76a and drives a free wheeling clutch 73 at the peripheral speed of rotation of the cores 19 on the mandrels 14, and this clutch 73 is recessed as at 73a to receive rollers 73b which ride on the inner circumferential surface of a free wheeling clutch pulley 77, the outer periphery of which is embraced by a friction belt 78 arranged for contact with pulleys 79 comprised in the clutches 18 connected intermediate the mandrel drive means 10 and each of the mandrels 14, said pulleys being

arranged to contact with the free wheeling clutch pulley 77 as the mandrels move successively into position to receive the strips of paper 1a.

At the instant the winding operation is initiated and the strips 1a come into contact with the cores 19 on a mandrel 14, it is desirable that the speed of said mandrel is synchronized with the speed of travel of the web. This is accomplished in the present instance by contacting the pulley 79 of the clutch 18 with the free wheeling pulley 77 which is driven by the machine at a definite predetermined speed of rotation and when contacting with said winding clutch pulley 79, reduces the speed of the particular mandrel 14 and synchronizes it with the speed of travel of the paper strips. The provision of the rollers 73b in the recesses 73a in free wheeling clutch 73 permits the particular mandrel to slow down as the diameter of the roll being wound increases in size while the winding clutch pulley 79 and the free wheeling clutch pulley 77 remain in contact with each other.

The above arrangement of the free wheeling device 73 and the clutches 18 operate to decrease the speed of rotation of the mandrels 14 maintaining the speed thereof, the same as the speed of travel of the paper, but at no time permitting rotation of said mandrels at a speed greater than the travel of the paper.

In the operation of the machine the wide web of tissue paper 1 is fed from a calendar roll and passes intermediate the usual perforating rolls A and B, after which it is cut into relatively narrow strips by the rotating cutters 2 and 3, respectively as described. Prior to putting the machine in operation a mandrel 14 supplied with a plurality of cores or reels 19 is mounted intermediate each set of turret heads 10. The machine is then started and the free ends of the narrow strips of the paper 1a are attached to the cores 19 on the mandrel 14, which at that time is in the wind quadrant of rotation of the turret 8. The cam roller 86 of this particular turret head is on the low surface portion of the cam and the clutch 18 is in engagement and the brake shoe 81 released from contact with the drum 80 to permit the mandrel 14 to be driven by the belts 31 as previously described. The speed of rotation of the turret 8 with respect to the feed of the paper through the machine is so timed that when a desired predetermined number of sheets or feet of paper have been wound on one set of cores 19, the next succeeding turret head 10 carrying a similar mandrel 14 supplied with cores 19 is moved substantially into position for winding. Simultaneous with the above the continuously passing narrow strips of paper 1a are broken by the downward movement of the cutter 32 actuated through its lever system by the cam arm 54. This same downward movement of the cutter 32 forces the free ends of the paper strips 1a onto the cores 19 on the next succeeding mandrel 14 and to which they adhere due to the presence on the cores 19 of adhesive material such as paste or the like. Just previous to the placing of the free ends of the paper strips 1a onto the cores 19 by the cutter 32, the cam roller 88 of that particular turret head passes from the high to the low portion of the cam 84 to establish driving connection to the mandrel and by engaging the clutch 18 and releasing the shoe 81 from the brake drum 80. At the same time the cam roller 86 of the turret head 10 supporting the mandrel 14 on which a wind has just been completed and

the paper strips 1a severed, passes from the low to the high surface portion of the cam 84 to disengage the clutch 18 and apply the brake shoe 81 to the drum 80, whereby further rotation of the mandrels 14 is prevented to permit removal thereof from the machine so that the wound rolls may be taken off and additional cores 19 placed thereon and the mandrel replaced in the turret for rewinding in due course of rotation thereof. In the course of rotation of the mandrel carrying the new cores 19 to winding position, the cam roller 86 of the turret head supporting this mandrel traverses the mean high portion of the cam surface which allows release of the brake drum 80 sufficient to permit the mandrel and cores 19 to be rotated in contact with the paste roller 66 by means of the belt 69.

While certain specific details of construction of the invention have been set forth for the purpose of description, it is not intended that the same be precisely limited thereto except as set forth in the appended claims.

What is claimed is:

1. In a paper winder, the combination with a paper feeding mechanism of a turret comprising a plurality of sets of turret heads, a mandrel mounted between each of said sets of turret heads, means driving said turret in predetermined timed relation with feed of the paper, means for driving said mandrels independently of said turret drive means, said means including a clutch and a brake operatively associated therewith; and means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels during a portion of each revolution of the turret.

2. In a paper winder, the combination with a paper feeding mechanism of a turret comprising a plurality of sets of turret heads, a mandrel mounted between each of said sets of turret heads, means driving said turret in predetermined timed relation with feed of the paper, means for driving said mandrels, said means including a clutch and a brake operatively associated therewith; and means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels during a portion of each revolution of the turret.

3. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel mounted between each of said sets of turret heads, a plurality of cores on each mandrel, means driving said turret continuously in one direction, an adhesive roll positioned to contact the cores on said mandrels, means for driving said mandrels, said means including a clutch and a brake operatively associated therewith, and means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels during a portion of each revolution of the turret, said means being further operable to release the brake during contact of the cores on the mandrels with said adhesive roll to permit the former to rotate in contact with the latter.

4. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction, means for driving said mandrels, said means including a clutch and a brake operatively associated therewith, and cam-actuated means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels during a portion of each revolution of the turret.

5. In a paper winder, a turret comprising a

plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, a plurality of cores on each of said mandrels, means for driving said turret continuously in one direction, an adhesive roller positioned to contact the cores on said mandrels, means for driving said mandrels, said means including a clutch and a brake operatively associated therewith, and cam-actuated means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels during a portion of each revolution of the turret, said means being further operable to release the brake during contact of the cores on the mandrels with the adhesive roller to permit the former to be rotated when in contact with the latter.

6. In a paper winder, the combination with a paper feeding mechanism, of means for perforating the paper normal to the direction of travel thereof at equally spaced intervals, a rotatable cutting tool, means for continuously driving said tool at a predetermined speed with respect to the speed of travel of the paper, said rotating means constituting a bell crank operating in conjunction with a lever adjacent the other end of the cutter to move the cutter to engage and break the paper, means for pivoting the lever systems, and cam means controlling the lever actuating means, said cam means operating in predetermined timed relation with the travel of the paper, permitting a fixed number of perforations indicating small sheets of paper to pass beneath the cutter during the interval between each succeeding downward movement thereof to break the paper.

7. In a paper winder, the combination with a paper feeding mechanism, of a turret comprising a plurality of radially disposed turret heads adjacent one end thereof, spindles mounted adjacent the other end of the turret, a mandrel mounted intermediate each of the turret heads and a corresponding spindle, clutch means intermediate the turret heads and the adjacent ends of the mandrels, means preventing rotation of the mandrel at a speed greater than the speed of travel of the paper, means for rotating the turret in timed relation with the feed of the paper to advance said mandrels successively into position for winding paper thereon, a continuously rotating cutter, a bell crank operating in conjunction with a lever adjacent one end of the cutter to move the cutter to engage and break the paper, means for pivoting the lever systems, and cam means controlling the lever actuating means to move the cutter at equally spaced intervals having a fixed relation with respect to the speed of travel of the paper through the machine.

8. In a paper winder, the combination with a paper feeding mechanism, of a continuously rotating member adjacent the paper, a toothed cutter carried thereby out of the path of said paper, and means operable at predetermined intervals in timed relation with the paper feed mechanism to move the rotating member toward the paper to engage said paper by the cutter and sever the same.

9. In a paper winder, the combination with a paper feed mechanism, of a turret comprising a plurality of sets of turret heads, a mandrel rotatably supported in each set of said turret heads, means for rotating said mandrels, means for continuously rotating the turret in timed relation with the feed of the paper to advance said mandrels successively into position for winding

paper thereon, and continuously rotating means operable to sever the paper after a predetermined amount has been wound on a mandrel, said means also being operable to place the free end of said paper on the next succeeding mandrel as it is moved into winding position.

10. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a slip clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper to control the speed of rotation of said mandrel at the start of a winding operation, said means including a driven clutch member, a pulley mounted on the latter, said pulley being arranged to contact the slip clutch at start of said wind to synchronize the speed of rotation of the mandrel with the speed of travel of the paper.

11. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a slip clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper to control the speed of rotation of said mandrel at the start of a winding operation, said means including a driven clutch member, a pulley mounted on the latter, said pulley being arranged to contact the slip clutch at start of said wind to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, a cutting member, and means operable at predetermined intervals in timed relation with said paper feed mechanism to move said cutter into engagement with the paper and sever the same at the completion of a wind.

12. In a paper winder, the combination with a paper feeding mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper operable to control the speed of rotation of said mandrel at the start of a winding operation, said means including a positively driven clutch member, a pulley overlying the latter and arranged to contact the mandrel clutch at the start of said winding operation to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, and means carried by the driven clutch member permitting relative movement of said pulley with respect thereto to allow the speed of rotation of the mandrel to slow down as the diameter of the roll being wound thereon increases during the period of contact of the pulley with said clutch.

13. In a paper winder, the combination with a paper feeding mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper operable to control the speed of rotation of said mandrel at the start of a winding operation, said means including a positively driven clutch member, a pulley overlying the latter and arranged to contact the clutch at the start of said winding operation to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, and means carried by the driven clutch member permitting relative rotation of said pulley with respect thereto to allow the speed of the mandrel to slow down as the diameter of

the roll being wound thereon increases during the period of contact of the pulley with said clutch, a continuously rotating member adjacent the paper, a cutter carried thereby, and means operable at predetermined intervals in timed relation with the paper feed mechanism to actuate said rotating member to engage the paper by the cutter to sever the same.

14. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a slip clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper operable to control the speed of rotation of said mandrel at the start of a winding operation, said means including a driven clutch member, a pulley mounted on the latter, said pulley being arranged to contact the slip clutch at start of said wind to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, a cutter, a bell-crank operating in conjunction with a lever adjacent the other end of the cutter to move the same vertically downward to break the paper, and means for pivoting the lever systems and cams controlling the lever actuating means to move the cutter downward at predetermined intervals with respect to the speed of travel of the paper through the machine.

15. In a paper winder, the combination with a paper feeding mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper operable to control the speed of rotation of said mandrel at the start of a winding operation, said means including a positively driven clutch member, a pulley overlying the latter and arranged to contact the mandrel clutch at the start of said winding operation to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, means carried by the driven clutch member to permit relative rotation of said pulley with respect thereto to allow the speed of the mandrel to slow down as the diameter of the roll being wound thereon increases during the period of contact of the pulley with said clutch, a cutter, a bell-crank operating in conjunction with a lever adjacent the other end of the cutter to move the same vertically downward to break the paper, and means for pivoting the lever systems and cams controlling the lever actuating means to move the cutter downward at predetermined intervals with respect to the speed of travel of the paper through the machine.

16. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a slip clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper to control the speed of rotation of said mandrel at the start of a winding operation, said means including a driven clutch member, a pulley mounted on the latter, said pulley being arranged to contact the slip clutch at the start of said wind to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, a cutting member, means operable at predetermined intervals, in timed relation with said paper feed mechanism to move said cutter into engagement with the paper and sever the same at the completion of a wind, and means operable to disengage the mandrel clutch and break the driving connection

to said mandrel at the completion of a winding operation thereon just subsequent to the severance of the paper by said cutter.

17. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a slip clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper, to control the speed of rotation of said mandrel at the start of a winding operation, said means including a driven clutch member, a pulley mounted on the latter, said pulley being arranged to contact the slip clutch at start of said wind to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, a cutting member and means operable at predetermined intervals in timed relation with said paper feed mechanism to move said cutter into engagement with the paper and sever the same at the completion of a wind, and means operable to disengage the mandrel clutch and break the driving connection to said mandrel at the completion of a winding operation thereon just subsequent to the severance of the paper by said cutter, said means being further operable to reengage the clutch as the mandrel moves into winding position and contact with the free wheeling pulley.

18. In a paper winder, the combination with a paper feeding mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper, for controlling speed of rotation of said mandrel at the start of a winding operation, said means including a positively driven clutch member, a pulley overlying the latter and arranged to contact the mandrel clutch at the start of said winding operation to synchronize the speed of rotation of the mandrel with the speed of travel of the paper, and means carried by the driven clutch member permitting relative rotation of said pulley with respect thereto to allow the speed of the mandrel to slow down as the diameter of the roll being wound thereon increases during the period of contact of the pulley with said clutch, and means operable to disengage the mandrel clutch to break the driving connection to said mandrel at the completion of a winding operation.

19. In a paper winder, the combination with a paper feeding mechanism, of a mandrel on which the paper is wound, means for driving said mandrel, a clutch connected between the mandrel and its drive means, means driven independently of the mandrel at the speed of feed of the paper, for controlling speed of rotation of said mandrel at the start of a winding operation, said means including a positively driven clutch member, a pulley overlying the latter and arranged to contact the mandrel clutch at the start of said winding operation to synchronize the speed of rotation of the mandrel with the speed of travel of the paper and means carried by the driven clutch member permitting relative rotation of said pulley with respect thereto to allow the speed of the mandrel to slow down as the diameter of the roll being wound thereon increases during the period of contact of the pulley with said clutch, and means operable to disengage the mandrel clutch to break the driving connection to said mandrel at the completion of a winding operation, said means being further operable to reengage the clutch as the mandrel moves into

winding position and contact with the free wheeling pulley.

20. In a paper winder the combination with paper feeding mechanism, a continuously rotating member normally disposed above the paper, a toothed cutter carried thereby out of the path of said paper and means operable at predetermined intervals in timed relation with the paper feed mechanism to actuate said rotating member downwardly to engage the paper by the cutter and sever the same.

21. In a paper winder, the combination with a paper feed mechanism of a mandrel on which the paper is wound, means for driving said mandrel, and means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation.

22. In a paper winder, the combination with a paper feed mechanism of a mandrel on which the paper is wound, means for driving said mandrel, means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation, and means operable at predetermined intervals to break the driving connection to said mandrel.

23. In a paper winder, the combination with a paper feed mechanism of a mandrel on which the paper is wound, means for driving said mandrel, means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation, and means operable at predetermined intervals to break the driving connection to said mandrel, said means being further operable at predetermined intervals to reestablish the driving connection to the mandrel.

24. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction, means for driving said mandrels, and means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation.

25. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction, means for driving said mandrels, means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation, and means operable to break the driving connection to said mandrel at the completion of a predetermined wind.

26. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction to successively present said mandrels into winding position, means for driving said mandrels, and means driven independently of the mandrels at the speed of feed of the paper to synchronize the speed of rotation of the former with the speed of travel of

the latter at the start of a winding operation.

27. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction to successively present said mandrels into winding position, means for driving said mandrels, means driven independently of the mandrels at the speed of feed of the paper to synchronize the speed of rotation of the former with the speed of travel of the latter at the start of a winding operation, and means operable to break the driving connection to said mandrels at the completion of a wind.

28. In a paper winder, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, means for driving said turret continuously in one direction to successively present said mandrels into winding position, means for driving said mandrels, means driven independently of the mandrels at the speed of feed of the paper to synchronize the speed of rotation of the former with the speed of travel of the latter at the start of a winding operation, and means operable to break the driving connection to said mandrels at the completion of a wind, said last-mentioned means being further operative to reestablish driving connection to said mandrels as the latter successively move into winding position.

29. In a paper winder, the combination with a paper feed mechanism, of a mandrel on which the paper is wound, a plurality of cores on each of said mandrels, means for driving said mandrel, means driven independently of the mandrel at the speed of feed of the paper operable to synchronize the speed of rotation of said mandrel with the speed of travel of the paper at the start of a winding operation, means operable at predetermined intervals to break the driving connection to said mandrel, and an adhesive roller positioned to contact with the cores on said mandrels during the interval that the driving connection to said mandrels is broken.

30. In a paper winder, a paper feed mechanism, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, a plurality of cores on each of said mandrels, means for driving said turret continuously in one direction, means for driving said mandrel, said means including a clutch and a brake operatively associated therewith, an adhesive roll, means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels after the completion of said winding operation, said means being further operable to release the brake during contact of the cores with the adhesive roller to permit the former to be rotated when in contact with the latter and thereafter effect re-engagement of the clutch to establish driving connection to the mandrels, and means driven at the speed of feed of the paper to synchronize the speed of rotation of the mandrel with the speed of the paper at the start of a winding operation.

31. In a paper winder, a paper feed mechanism, a turret comprising a plurality of sets of turret heads, a mandrel rotatably mounted between each of said sets of turret heads, a plurality of cores on each of said mandrel, means for driving said turret, means for driving said mandrel, said

means including a clutch and a brake operative- ly associated therewith, an adhesive roll, means operable to disengage the clutch and apply the brake to prevent rotation of the mandrels after 5 the completion of said winding operation, said means being further operable to release the brake during contact of the cores with the adhesive roller to permit the former to be rotated when in contact with the latter and thereafter effect 10 re-engagement of the clutch to establish driving connection to the mandrels.	heads and corresponding brackets and rotatable against a bearing point on each stud.	
32. In a paper winder, the combination with a paper feed mechanism, of a turret comprising a plurality of turret heads adjacent one end 15 thereof, brackets mounted adjacent the other end of the turret in alignment with said heads, blocks movably mounted on said turret, studs mounted in said blocks and aligned with said brackets, and a mandrel mounted in each of the turret	33. In a paper winder, the combination with a paper feed mechanism of a turret comprising a plurality of turret heads adjacent one end there- of, brackets mounted adjacent the other end of the turret and aligned with said heads, blocks mounted on said turret, studs mounted in said blocks and aligned with said brackets, a mandrel mounted in each of the turret heads and cor- responding brackets and rotatable against a bear- ing point on each stud, and spring means inter- mediate said block and the adjacent end of the turret to permit movement of the former longi- tudinally of said turret and enable withdrawal of the ends of the mandrels from the turret.	80 85 90
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