J. C. FOGARTY.
MACHINE FOR SLITTING, PERFORATING, AND Rewinding Paper.
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3 SHEETS—SHEET 1.

[Diagram of the machine for slitting, perforating, and rewinding paper]

Witnesses:

By Barton & Folk

Inventor.
John C. Fogarty

[Signatures]
To all whom it may concern:

Be it known that I, JOHN C. FOGARTY, citizen of the United States, residing at Green Bay, in the county of Brown and State of Wisconsin, have invented a certain new and useful Improvement in Machines for Slitting, Perforating, and Rewinding Paper, of which the following is a full, clear, concise, and exact description.

My invention relates to improvements in machines for unwinding paper from a large, wide roll and slitting, perforating and rewinding the same on a plurality of smaller narrower rolls.

The object of my invention is to provide improved mechanism whereby these operations, which have hitherto been somewhat intermittent and have required hand labor to a greater or less extent, may be carried on continuously and substantially automatically.

As contributory toward carrying out this general object, I have, as further objects of my invention: To provide a machine having a rotary frame on which the cores for the smaller rolls may be carried in different groups in such manner that while one group of rolls is winding, a completely wound group may be removed by an attendant and a third group of cores may be pasted as a preliminary to the winding operation. To provide a machine having means for moving the groups of cores into and out of operative relation to the rest of the machine without stopping the latter. To provide a machine having improved perforating means; and to provide a machine of increased simplicity and greater efficiency and reliability.

In the accompanying drawings I have illustrated a machine which embodies my invention, which latter, however, may be embodied in other forms.

Figure 1 is a side elevation of a machine constituting the preferred embodiment of the invention; Fig. 2 is a front elevation thereof; Fig. 3 is a sectional elevation on the line 3—3 of Fig. 2; Fig. 4 is an enlarged elevation of one of the rollers; Fig. 5 is a transverse section thereof showing the relation of the perforating and slitting knives thereto. Fig. 6 is an enlarged, sectional elevation of the pasting trough and paste-applying rolls; Fig. 7 is an enlarged side elevation of the knives for severing the paper and associated mechanism; Fig. 8 is an enlarged side elevation of the rotatable frame which carries the cores; and Fig. 9 is a central sectional elevation of a frictionally driven socket member.

The machine is provided with a suitable frame 1 which carries the various parts of the mechanism. A large roll of paper 2 is mounted preferably at the rear end thereof, said roll being supported on a shaft 3 mounted in suitable bearings in the frame 65 and having an enlargement or collar 4 at one end thereof. A band brake 5 surrounds the said collar, the ends thereof being suitably adjusted by a screw-threaded rod 6 extending to the forward part of the machine, whereby the operator may vary the friction developed while the roll is unwinding to maintain nearly uniform tension on the web or sheet of paper. The paper is unwound in a thin, wide sheet 7 which is fed past rollers 8, 9 and 10, passing under rollers 8 and 10 and over roller 9 as shown in Fig. 1, during which passage it is slitted into a plurality of narrow parallel bands and then rewound in a plurality of small rolls 11 about suitable cardboard cores 12. As soon as the small rolls have attained the desired diameter the narrow bands of paper are cut by a suitable mechanism, hereinafter described, the ends of said bands being pasted to a new set of cores and the winding continued without interruption, while the completed rolls are being removed.

The machine derives its power preferably from a belt 13 which rotates a pulley 14, the latter being adapted, by means of a suitable clutch 15, to rotate a shaft 16, the latter being the shaft on which the roller 9 is mounted. A pulley 17 is mounted on the other end of said shaft and carries a belt 18 which drives another pulley 19 mounted on a shaft 20 arranged transversely at the forward part of the machine. A pulley 21, mounted on one end of said shaft, drives a belt 22 and hence a second pulley 23, which latter rotates a shaft 24 on which the pasting rollers 25 are mounted. The shaft 20 also carries an additional pulley 26 which drives a belt 27, the latter passing over a plurality of pulleys and serving to rotate the re-winding rolls as hereinafter described. The cores of said rolls are mounted on suitable shafts 28, 29, 30, all of which are alike and are movably supported at opposite ends, in suitable sockets carried at the outer ends of ra-
dial arms 31. The cores are round, whereas the shafts are perfectly square, said cores being sprung slightly to maintain a frictional hold on the shafts which rotate them. There are a plurality of arms at each side of the machine, preferably three, formed integrally to provide a rotating frame as shown in Fig. 8. Said frame may be rotated by hand to move a series or line of small rolls out of operative relation with the rest of the machine when the rolls have attained the desired diameter, thereby automatically bringing the next set of cores into line for the winding operation.

The preferred construction for the sockets and associated parts on the rotating frames is shown in Fig. 9. A shaft socket 32 is received within an opening in each arm, which socket is adapted to receive non-rotatably the end of any one of the shafts 28, 29 or 30. This shaft socket extends through a sleeve 33, which latter carries a grooved pulley 34. A ring or washer 35 of friction material, such as leather for example, is interposed between said pulley and a washer 36, the latter having a hollow hub 37 containing a spring 38. A pin 39 passes through elongated slots in said hub 37 and serves to maintain the parts in frictional engagement. The spring is held in place by a suitable screw-threaded cap 40. When the pulley is rotating, it drives the socket shaft through the friction of the cooperating parts, which friction may be varied by a sliding ring 41 which exerts pressure against the hub of the grooved pulley, the pressure being varied by a threaded nut 42. This adjustment determines the degree of tightness with which the paper is wound.

The rotating frames 31 are supported on a suitable shaft 43 journaled in the forward part of the frame. Said shaft supports also an arm or lever 44 which carries a grooved pulley 45, the position of the latter being adjustable through a small arc by means of the lever 44, which latter may be locked in any one of a number of angular positions by means of the latch mechanism 46, 47 and notched section 48. The belt 27 previously described is driven by the pulley 26 and passes over the pulley 45 and also over one of the pulleys 34. It passes also over a spring actuated belt-tightening pulley 49. When the parts are in the position shown in Fig. 8, it will be seen that only the upper left hand pulley 34 is rotated by the belt 27, the other two pulleys being idle. Accordingly the paper is rewound on the cores carried on the uppermost shaft farthest to the rear. When the small rolls have attained the desired diameter the shaft 39 is given a third of a turn by an attendant who operates the hand-wheel 50 shown in Fig. 2, the pulley 45, during this turning movement, remaining in the position shown in Fig. 8. The rotation of the shaft 43 moves the shaft 28 forwardly, during which movement the narrow bands of paper are severed as hereinafter described, the lowermost shaft 29 being simultaneously swung up to the winding position. The cores on said shaft have had the necessary paste applied thereto by the pasting rolls 25, which rotate in the paste contained in the trough 31, and accordingly the advancing bands of paper tend to adhere to the cores and do adhere and begin to wind thereon as soon as the paper is severed. As a result the winding proceeds continuously, the operator smoothing down the free ends of the paper on the fully wound rolls, which ends have picked up a small amount of paste prior to being severed, whereby said ends adhere immediately to the rolls and no loose ends are left.

To aid in this smoothing down operation, the operator may move the handle 44 downwardly about as shown in dotted lines in Fig. 8, whereby the belt 27 may be brought in contact with the right hand grooved pulley 34, thereby frictionally driving the latter and continuing the rotation of the full rolls for a short interval. Although the operation of the machine is not interrupted during the above described operations, it is desirable to slacken the speed thereof if running at high speed, either by manual operation or automatically. As soon as the finished rolls have been smoothed down, the operator removes the shaft on which they are supported from the rotating frame, and after removing said rolls from said shaft, slips a new series of cardboard cores thereon.

The saw-tooth cutting knives 52 are carried on arms 53 pivotally supported on brackets 54, the latter being rotatably mounted on a shaft 55. A weight 56 (or its equivalent, a spring) is used in cooperation with a drum 57 to counterbalance the weight of the knives and supporting arms therefor, whereby said knives may be moved up and down readily to cut the paper, which operation may be either manual or automatic. The arm 53 carries a roller 58 which serves to hold down the free ends of the narrow bands of paper against the pasted core to insure the beginning of the winding operation. This action is also aided by the springs 59 which press the paper against said cores. The arm 53 is normally held in the position shown, against a suitable stop, by means of a spring 60, the pivotal connection between the arms 53 and 54, however, permitting the knives to move forwardly at the time they cut the traveling bands of paper, thereby avoiding tearing the paper. Said knives are also permitted, by this arrangement, to press against the cores. The perforating knives 61 are of the customary form, and are rotated in timed relation to
the roll 9, whereby they are made to drop into suitable recesses 62 in the roll 9. As the paper advances, it is slitted by suitable slitting knives 63 which are preferably spaced apart equal distances along a shaft 64, the latter being journaled in a frame or cap 65 which is pivoted at 66, whereby said knives and other parts herebefore described may be lifted when it is desired to thread the paper through as in starting up the machine or inserting a new roll of paper to be unwound. Movement is imparted to the frame 65 by a suitable cam-lever 67, the operation of which is indicated by dotted lines in Fig. 3. The slitting knives rotate in grooves 68 in the roller 9, as shown in Fig. 4 to insure their passing through the paper while at the same time providing a suitable clearance.

In prior machines with which I am familiar, it has been necessary to stop the machine when the small rolls were completed, remove the supporting shaft and substitute a new one with cores in place. The end of the paper was then pasted down by the use of a brush, smoothed down by hand on the core and the machine again started. During the time of making this change, the machines are idle and a great deal of the attendant's time is wasted. By the employment of the mechanism described herein, practically all of the operations are automatic and continuous as a result of which the output can be more than double as compared with results formerly obtained.

While I have described the preferred embodiment of my invention, I do not desire to limit myself to the details thereof, as various other forms may be devised which fall within the scope of the appended claims.

What I claim is:

1. In a machine of the class described, means for supporting a roll of paper to be rewound in smaller rolls, means for supporting and rotating a rewinding core, whereby the paper is fed continuously from the unwinding to the rewinding roll, means for interposing a second rewinding core against the traveling sheet of paper between said rolls, and means for severing said sheet between said rewinding cores.

2. In a machine of the class described, means for supporting a roll of paper to be rewound in smaller rolls, means for supporting and rotating a rewinding core, whereby the paper is fed continuously from the unwinding to the rewinding roll, means for moving a rotating pasted core against the traveling sheet of paper, whereby the latter tends to adhere to said pasted core, and means for severing said sheet between said rewinding cores, whereby the winding of one roll is completed and the winding of the other roll is begun, simultaneously.

3. A machine of the class described, comprising a support for a roll of paper, a support for a plurality of rewinding cores, arranged preferably in alignment and having a total length equal to the width of the roll to be unwound, a plurality of slitting knives arranged to sever the traveling band of paper into a number of narrow bands corresponding to the number of rewinding cores, means for moving a second aligned series of cores against said bands of paper, means for applying paste to said second series of cores, whereby said traveling bands tend to adhere thereto, and means for simultaneously severing all of said bands immediately after said cores have been brought into contact therewith, whereby the rewinding on the first set of cores is completed and is simultaneously begun on the second set of cores.

4. In a machine of the class described, a rotating frame having means for carrying a plurality of aligned series of rewinding cores arranged substantially parallel to each other around the circumference of a circle, whereby said series of cores may be brought to the winding position in succession by rotating said frame, and means for continuously rotating whatever series of cores are arranged in rewinding position, including means for causing the next successive series of cores to begin rotating before the last series stops rotating.

5. In a machine of the class described, a rotating frame having means for carrying a plurality of aligned series of rewinding cores arranged substantially parallel to each other around the circumference of a circle, whereby said series of cores may be brought to the winding position in succession by rotating said frame, means for continuously rotating whatever series of cores are arranged in rewinding position, including means for causing the next successive series of cores to begin rotating before the last series stops rotating, means for supporting a roll of paper in position to be fed to said rewinding cores, and means for slitting said paper during its travel from said roll to one of said rewinding cores.

6. In a machine of the class described, a pair of rotatable frames, each comprising a plurality of radial arms, one of said frames having a socket member rotatably mounted near the outer end of each of said arms, a pulley mounted on each of said arms and having frictional engagement with said socket member to drive the same, and an endless belt arranged to engage whichever pulley is moved by said rotatable frame to the driving position.

7. In a machine of the class described, a pair of rotatable frames, each comprising a plurality of radial arms, one of said frames having a socket member rotatably mounted near the outer end of each of said arms, a pulley mounted on each of said arms and
having frictional engagement with said socket member to drive the same, a shaft on which said frames are rotatably mounted, a lever rotatably mounted on said shaft, an idle pulley carried thereby and an endless belt passing over said idle pulley, and arranged to engage whichever of said first named pulleys are in driving position, whereby the rotation of said frame permits said pulleys to be rotated in succession.

8. In a machine of the class described, a rewinding core for the paper, a paper severing knife having its cutting edge extending transversely of the web of paper, a pivotally mounted supporting arm for said knife, and a counterbalanced bracket by which said arm is carried.

9. In a machine of the class described, a support for a roll of paper, a plurality of rewinding cores, means for interposing an empty core between the roll-support and a core upon which the paper is rewound, a paper severing knife having its cutting edge extending transversely of the web of paper, a pivotally mounted supporting arm for said knife, and means carried by said arm for pressing the web of paper against said empty core.

10. In a machine of the class described, a severing knife, a pair of links pivotally connected to each other, to one of which said knife is secured, and a spring tending to move said links toward each other, whereby the angle between them may be increased against the action of said spring when the knife cuts the traveling band of paper, thereby preventing tearing of the latter.

11. In a machine of the class described, a roller over which the web of paper travels, a pivoted frame, perforating knives carried by said frame, slitting knives also carried by said frame, and a cam member carried by said frame for moving the latter away from said roller to provide a clearance necessary for the insertion of the web.

In witness whereof, I hereunto subscribe my name this 5th day of February A. D., 1914.

JOHN C. FOGARTY.

Witnesses:

McCLELLAN YOUNG,

Geo. B. Jones.