W. F. MARRESFORD
paper rolling machine
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PAPER ROLLING MACHINE
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Aug. 14, 1928.

PAPER ROLLING MACHINE

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paper rolling machiner


# UNITED STATES PATENT OFFICE. 

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## PAPER-ROLIING MACHINE.

Application filed November 19, 1924. Serial No. 750,750.

My invention relates to machines for winding or rolling a strip or web of paper or similar material such as wall paper into a roll and relates particularly to the type of
5 such machines in which the winding is effected by a plurality of winding rollers arranged about a central space in which the roll is formed by the action of the peripheries of the winding rolls, one or more of the winding the centre as the roll increases in diameter.

My invention has for its objest to provide a machine by which the paper strip or web may be quickly wound into successive rolls, paper strip or web after they are formed and carried away automatically and continuously until the entire strip or web is used. A further object of my invention is to provide of the strip or web without a mandrel and for forming this core by forming a fold neas: the end of the strip or web and rolling this fold to form a core of two thicknesses of mato form a ous strip or web instead of from previously cut lengths. first forming the roll and then severing it from the strip or web. A further
omitted, a suitable form of machine embodying an application of my invention.

Figure 2 is a similar view showing other parts not disclosed in Figure 1, and may be 60 read therewith.

Figure 3 is an enlarged detail in perspective, parts being broken away, illustrating the paper cutting off mechanism.

Figure 4 is an enlarged detail perspective, 65 parts being broken away illustrating part of the autcmatic control of the rolling up mechanism.
Figure 5 is an enlarged detail in perspective, parts being broken away, illustrating 70 mechanism for truing up the rolled paper.

Figure 6 is an enlarged detail of the knife for cutting the paper.

Figure 7 is a diagrammatic illustration of the rolling of the paper.
Figure 8 is a detail diagrammatic view showing the manner of mounting the feed roll 2 and its movement by the foot lever.

Figures 9 and 10 are similar views showing how the roll forming rollers 35 are car- 80 ried and driven.

Figures 11, 12, 13, 14, and 15 are diagrammatic views showing successive steps in the formation of the core, and Figure 16 is a detail diagrammatic view showing the driving means for the main feed roller 23 .

In the drawings 1 and 2 indicate the side ubrights of the frame of my machine suitably spaced apart and carrying between them operating elements of the machine. 7 (see Figure 2) indicates a motor for operating the machine, its shaft 8 carries pulley 9 which through belt 10 drives pulley 11 on shaft 12. On shaft 12 is a pinion 13 which is in mesh with large gear 14 on stub shaft 8 15 which carries also gear 16 which is in mesh with large gear 17 on cam shaft 18 .

The wall paper or other material 19 , which is to be wound or rolled to form rolls of definite length, is supplied in a continuous strip to the winding or roll forming rollers $23,121,48,49$ and 35 , which are so arranged about a centre as to leave a central space throngh which the end of the paper strip passes at the beginning of the operation. In this central space a loop or fold is formed in the paper strip to serve as a core for the roll, and in it the paper strip is wound on the core thus formed into the roll desired. Of these winding or roll forming rollers 23 and 121 are carried on fixed axes and are positively driven while rollers 35,48 and 49
also positively driven, are so mounted as to le movable outward a way from the central space in which the roll is formed as the roll increases in diameter.
Directly above the roller 23 and so spaced from it as to permit the strip of paper to pass between its curved under surface and the periphery of roller 23 is guide 120 carried on arms 33 mounted to swing on shaft 20 An he rear of the 22 mounted on shaft $29^{\prime}$ journalled in arms 30, and so arranged with reference to rolles 23, as to hold the paper strip between its periphery and the periphery of roller 23 so
$\therefore$ that the strip will be positively fed forward lif the rotation of roller 23 into and through the central roll forming space about which rollers $23,121,48,29$, and 35 are grouped.
The paper strip 19 is guided to the feed
$\because$ rollers 22 and 23 by any convenient means, the means shown comprising roller 21, carried by fixed shaft $21^{\prime}$ and idler roller 20 carried on a shaft mounted in arms 41 which are piroted at 42 in the frame of the masuitable tension on the paper strip 19 as it cones from the source of supply. Roller 21 mounted on shaft $21^{\prime}$ on which is secured gear 136 with which gear 134 mounted to
3 rotate on stub shaft 135 is in mesh, gear 184 being also in mesh with gear 128.
As the end of the paper strip is fed formard by rollers 23 and 22 , it will be curved downward by the guide 120 and as it is fed forward a stop 26. At the instant the end of the strip strikes stop 26 the portion near the end lies in a curved path following, between the forward end of guide 120 and the upper end of guides

## 40

 the periphery of roller 23 (see Figure 8). Any tendency of the portion of the paper immediately above the stop 26 to be curved to the right, (see Figures 1 and 8 to 12) by roller the paper caunot be curved except to the left and above roller 49. In this manner an initial downward curve or bight is formed in the end portion of the paper strip at a substintial of the feed rollers 22 and 23 continues the initial bend or bight is made sharper forming a loop, and is forced into contact with the periphery of rollers 121, and 48 (sec Figure-5 12). These rollers act upon the curvel portion or bight as the feeding forward by rollers 23 and 22 continues to change the initial. curve into a fold, indicated at 45, Figure 1 , and to force this fold over and downward against the upper surface of the paper strip (see Figure 13) and to draw upward the portion of the strip betreen the fold and the end which was in contact with stop 26 (see Figwre 14) and to roll this end portion onto the
(is loop thus forming a core (see Figure 15) of
double thickness on which the paper strip is rolled up by the action of the rollers 23,121 , 48,49 , and 35.
Roller 23 is carried by a stationary shaft $23^{\prime}$ and is driven by a sprocket chain $23^{2}$ and it a sprocket on shaft 12. (See Figure 16). This roller 23 serves a double purpose in that it acts with roller 22 to feed the paper strip and also acts as one of the group of roll forming rollers.
Roller 22 is carried by shaft $22^{\prime}$ journalled in arms 33, mounted to swing on rock shaft 29. Fast on rock shaft 29 are arms $33^{\prime}$ extending downward and to the right (see Figure 2) and in these arms $33^{\prime}$ are journalled rollers 35 which cooperate with rollers 23,121, 48 , and 49 to form the paper roll These rollers 35 are in contact with and are driven ly rubber roller 36 carried by arms $36^{\prime}$ mounted to swing on shaft 29 , and in driven contact with rollers 121 on shaft 12 which is driven by belt 10. By rotating rollers 35 through roliers 36 the direction of rotation of roller 35 is the same as the direction of rotation of roller 121. Also fast on rock shaft 29 is a depending arm 28 having at its lower end a roller 30 which bears against the fluted cam 31 on cam shaft 18 against which it is yieldingly held by the counter weight 32 secured to rock shaft 29 .
The cam 31 acts through rock shaft 29 and arms 83 ' to press rollers 35 inward towards the centre of the central space between the roll forming rollers at the beginning of the roll forming operation so as to aid in keeping the roll cylindrical until any tendency of its becoming oval is overcome. When the rolling has proceeded to the point when this tendency has been overcome the cam permits the rock shaft to be rocked by the weight 32 so as to swing arms $33^{\prime}$ upward and to carry rollers 35 out of contact with the roll.
Rollers 48 and 49 are mounted on shafts $48^{\prime}$ and $49^{\prime}$ respectively journalled in arms 46 carried by rock shaft 47 on which is secured, outside side frame 1 , an arm 50 by which, through mechanism hereinafter deseribed, the arms 46 may be swung from the position indicated in full lines in Figure 7 to the position indicated in dotted lines to permit the roll formed by the forming rollers $23,121,48$, 29 and 35 to drop out of this space and into the space between rolles 77,78 , and 79 , by which the forming of the roll is completed. Roller 48 is rotated by means of gear 128 on driven shaft 12 which is in mesh with gear 129 looscly mounted on rock shaft 47 and having secured to it gear 130 which is in mesh with gear 131 fast on shaft $48^{\prime}$. Roller 49 is rotated through the action of gear 131 on gear 132 loosely mounted on stub shaft $132^{\prime}$ on 1 arm 46, gear 132 being in mesh with gear 133 fast on shaft 49'. By this arrangement rollres 48 and 49 are rotated continuously whether arm 46 is swing forward or rearward and are rotated in the same direction in which
roller 121 is driven. Arm 46 carries at its end bar 59 ' and stops 26 and above these stops the arm is preferably provided with guide 25 between which and fixed guide 24 the end of

The swing of arm 46 to the position shown in dotted lines in Figure 7 to permit the roll to drop is effected through the action of a toppet arm 57 carried by cam shaft 18 . As cam shaft 18 rotates this tappet arm strikes
35 an offset 59 on a crank arm 55 mounted to swing on stud 56 and carrying upwardly extending arm 54 to the upper end of which is pivotally connected one end of link 53 the other end of which carried a pin 52 which in extends into slot 51 in arm 50 . As the tappet 57 strikes offset 59 it forces crank arm 55 and lever 54 to the left and through link 53 and arm 50 causes rock shaft 47 to rock to swing arm 46 downward and to the left.
4.) A stop 144 on side frame 1 limits the swing of lever 50 towards the right and so limits the swing of arm 46 and rollers 48 and 49 towards roller 23.

In the operation of forming the roll it is
 to permit forming rollers 48 and 49 to gradually move further away from roller 23. This movement is controlled by spring 141, one end of which is loosely connected to cam nected to a pin 140 on a lever 138 , the lower end of which is pivoted on stub shaft 137 on side frame 1. This lever 138 has a slide face 139 which acts against a slide block 142 arm 143 caried by rock shaft 47 at ar roll being formed increnses in diameter its pressure will act upon rollers 48 and 49 to swing arm 46 downward and to the left.
through slide block 142 to swing the upper end of lever 138 to the left against the force of spring 141. The action of spring 141 to thus press the rollers 48 and 49 against the roll may be supplemented by weights 145 to adjustable on arms 145 ' carried by arm 50 .
The knife cutting edge 60 of the knife is preferably futed as shown in Figure 6. The knife is caried by arms $27^{\circ}$ on rock shant 61. A weighted segment 62 depends from one end of shaft 61 on which it is loosely carried. On this segment 62 is a pin carrying roller 63 which is in the path of a tappet arm 64 on cam shaft 18 . The segment 62 is also provided with a finger $64^{\prime}$ which as the segment is rocked by the tappet arm 64 siriking roller 63 , strikes depending arm $63^{\prime}$ of a bell crank lever fast on shaft 61 , the upper arm 74 of which is connected by link 73 and pin 72 to depending arm 71 of a segment shaped weight 69 , pivoted at 70 above shaft 61. A spring $73^{\prime}$ is secured at one end to the frame of the machine and at the other end to link 73 . As the arm 64 is carried around on cam shaft 18 in the direction indicated by arrows in Figure 3, its end strikes roller 63 and rocks segment 62 upward bringing its finger 64' against the depending arm $63^{\prime}$ of the bell crank lever and rocks shaft 61 in a direction to swing lnife 27 to the position indicated in dotted lines in Figure 7, that is, away from stop 26. At the same time the upper arm 74 of the bell crank lever raises the lower end of link 73 and permits spring $73^{\prime}$ to draw the upper end of this link 73 to the left swinging the lower end of arm 71 leftward and jermitting weighted segment 69 to drop. The parts are temporarily held in this position by the engagement of the upper end of a stop arm $65^{\prime}$ pivoted at 66 , this upper end being in the path of the depending arm $63^{\prime}$ of the bell crank lever so that as the end of this depending arm passes the end of $65^{\prime}$ it moves it to the left against the force of spring 67 and this upper end of $65^{\prime}$ is at once swung by the spring beneath the end of arm 63'. Spring 67 is connected at one end to the stop arm and at the other end to a pin 68 on the frame of the machine. At the arm 64 is carried further around it strikes a block 76 at the base of stop arm $65^{\prime}$ causing the upper end of the stop arm to swing to the left to release amm $60^{\prime}$. This releases rock shaft 61 and permits it to be rocked in a divection to carry the knife 27 against the paper strip to cut it off by action of its edge 60 with comnter bar 59'. This cutting action is effected by spring 116 connected at one end to arm 117 on rock shaft 61 and connected at the other end to the frame of the machine.

The roll formed by the upper group of forming rollers having been allowed to drop by the outward swing of arm 46 drops into
the space between lower forming rollers it and 79 onto roller 78 as indicated at 104, and the paper is severed by the knife. Roller 79 is carried on fixed shaft 81 on which is mount5 ed sprocket 80 which is rotated by sprocket chain 82 which is itself driven by sprocket 83 on drive shaft 8 . Roller 78 is carried by shaft 84 having its bearings in the upper ends of arms 92 which are secured at their lower sprocket 85 driven by sprocket chain 86 which extends about sprocket 88 on drive shaft 8 and idler sprockets 87 and 89 so that roller 78 may be moved towards and away from roller is 79 and still be positively driven. Idler sprocket 87 is carried by reighted arm 90 pivoted to the frame at 91 , the weight of arm 90 keeping the sprocket chain 86 under tension.
On shaft 93 is loosely mounted an arm 96 carrying at its free end a roller 94 which bears against a cam 95 on cam shaft 18. Above the roller 94 a toe 96 is formed on arm 96 adapted to be engaged by a hook 97 which 2. is fast on a stub shaft 103 which has a bearing in the side frame 1 and has secured to it an arm 100 carrying a roller $99^{\prime}$ on pin 99 so placed that as the arm 64 on cam shaft 18 rotates it strikes roller $99^{\prime}$ and swings the left
30 end of lever 100 downward retracting hook 97 and releasing toe $96^{\prime}$ of arm 96 to permit arm 92 to swing outward and move roller 78 and 77 away from roller 79.
The arm 92 may be adjusted relative to arm difference in diameter of the roll due to difference in thickness of the paper.
Roller it is carried on a shaft having its bearings in the upper ends of arms $77^{\prime}$ loosely 40 mounted on shaft 84, one of these arms $77^{\prime}$ being extended downward below shaft 84 and to the end of this extension is secured one end of a spring 127. the other end of which is secured to arm 92. The roller 77 thus moves toward of yielding against the force of spring 127 independently of roller 78 so as to permit the roll of paper as it drops from the upper group of forming rollers to press roller 77 outward sufficiently to permit the roll to enter the space between rollers 78 and 79 , roller 77 being at once moved inward by spring 127 to press against the roll at a point above the horizontal plane of its centre. Rollers 78 and 79 being positively driven the end of the strip between the roil and the knife 27 is quickly wound onto the roll.

When the hook 97 is released as above described and the arm 92 drops back to carry 0 the rollers 77 and 78 away from roller 79 , the roll now completed, drops onto the previously completed and dropped roll resting on the endless chain conveyor 106, against the inclined arms 150 , and 151 . which extend upward and to the right below the upper por-
tion of the conveyor 106. The drop of the roll is then continued by the roll last completed. At the same time the dropped roll acts upon the roll onto which it drops to cause it to move to the left to make room for the dropped roll. Each completed roll as it drops from the second group of roll forming rollers thus takes its place at the lower end of the incline up which the rolls are moved by the endless chain to its left hand or delivery end. At either side of the lower right hand end, side pieces 107 and 108 are provided (see Figure 5) connected by rods 109 to the lower ends of levers 110 which are pivoted at 111 to a rod 112, supported at its ends in the side frames 1 and 2 and are each provided at its upper end with a roller 113, the two rollers being in the path of a two sided cam 114 fast on cam shaft 18 so that at each rotation of the cam shaft the cam 114 forces the upper ends of levers 110 apart and forces their lower ends through rods 109 to draw side pieces 107 and 108 towards each other. The side pieces being thus forced towards each other act against the ends of the roll of paper to bring its ends into proper alignment and to square up the ends of each roll so that as the roll is carried away by the conveyor its ends will be in line with the ends of preceding rolls. Any tendency of the paper to umroll is counteracted by the movement of the conveyor chain and the resistance of the roll to the movement up the incline, the rolls being thus caused to rotate in the direction required to wind the end of the paper onto the roll.
In order to facilitate the introduction of the end of the strip or web into the space between the rollers of the upper group of forming rollers and to facilitate removal of paper which may have become jammer the right hand end of one of the arms 33 carrying roller 22 and guide 120 is connected by rod 40 to the end of lever 39 pivoted at 38 near the base of the machine and provided with pedal 37. By pressing one's foot on this pedal the arm 33 is swing upward to leave a substantial space between rollers 22 and 23 to give access to the mechanism.
To aid in introducing the end of the paper strip or web from which the rolls are to be formed are shaped arms 43 are provided pivoted at 44 near the front edge of the machine frame at such distance from the roller 23 that the ends of these arms 43 will, when the arms are swung downward, enter the space between the peripheries of rollers 22 and 23 and may carry the paper strip or web with them into this space.
In introducing the paper strip or web its end is passed under idler 20 over roller 21 and allowed to fall down onto table $44^{\prime}$. Its end may be readily torn off on the outer, right hand edge of $44^{\prime}$ in order to get the edge at right angles to the sides. By then swinging the arms 43 downward the edge of this arm
will strike the paper strip near its end, the paper folding over this edge, and will carry the paper in between rollers 22 and 23 .

While in the description arm 46 , arm 33 , $5 \mathrm{arm} 33^{\prime}$ and arm $36^{\prime}$ are referred to, it should be understood that all the arms which carry a shaft or rollers are in pairs one near each side frame of the machine and of arms $33^{\prime}$ one is used for each roller 35.

The rollers 121 are shown fluted but the fluting may be dispensed with. As many of these rollers and of rollers 48,49 and 35 as may be desired may be used, the rollers on their shafts $12,48^{\prime}$ and $49^{\prime}$ being so spaced,
as indicated in Figure 4, that they do not conflict with one another.

It will be understood that while my invention has been described as a paper rolling machine and as particularly adapted for roll20 ing wall paper it is not intended to be limited to its use for rolling wall paper or any other paper or to any material capable of being rolled.

It will also be understood that I do not detion or himited to the particulas is above tion or arrangement shown as it is above, as that modification in details of construction and arrangement may be made without avoiding the essential features of the inven-

Having thus described my invention, what I claim is:

1. In a paper rolling machine a plurality of roll forming rollers grouped about a cen35 tral space adapted to form a roll within said central space from a paper strip, means for supplying the paper strip to the roll forming rollers, and means for forming a fold in the paper strip at a substantial distance from 0 its end and forming the folded portion of the strip into a core.
2. In a paper rolling machine a plurality of roll forming rollers grouped about a central space adapted to form a coll within said 45 central space from a paper strip, means for supplying the paper strip to the roll forming rollers, and means for forming a fold in the paper strip at a substantial distance from. its end and forming the folded portion of 50 the strip into a core, means for separating the roll forming rollers so as to permit the formed roll to drop from said central space, means for severing the paper strip between the roll forming rollers and the dropped roll strip to leave the end portion of the paper in pextending through said central space a succeeding roll.
3. In a paper rolling machine a plurality

60 of roll forming rollers grouped about a central space, means for feeding the end of a paper strip through said central space and means outside of the group of forming rollers for stopping further forward movement of
said end so arranged that further feeding of 65 the paper strip will cause a bight to be formed in the paper strip between the feeding means and the end stopping means.
4. In a paper rolling machine a plurality of roll forming rollers grouped about a central space, means at one side of the group of roll forming rollers for feeding the end of a paper strip through said central space and means on the other side of the group of forming rollers and independent thereof for stopping further forward movement of said end so arranged that further feeding of the paper strip will cause a bight to be formed in the paper strip between the feeding means and the end stopping means.
5. In a paper rolling machine a plurality of roll forming rollers grouped about a central space, means for feeding the ead of a paper strip through said central space, means for deflecting the paper strip out of a straight line as it is fed through said central space to form an initial bend, means outside of the group of forming rollers for stopping further forward movement of said end so arranged that further feeding of the paper strip will cause the initial bend to form a bight therein between the feeding means and the end stopping means.
6. In a paper rolling machine, a plurality of roll forming rollers grouped about a central space, a roller independent of said group of roll forming rollers arranged to cooperate with one of said group to feed a paper strip through said central space, a guide between said cooperating roller and said central space adapted to cause the paper strip to be curved out of a straight line, guiding means adapted to receive the end of the paper strip from said central space and a stop in the path of the end of the paper strip issuing from said guiding means so arranged that further feeding of the paper strip will canse the portion of the strip between said guide and said guiding means to be so further curved as to be brought in contact with a plurality of the roll forming rollers.
7. In a paper rolling machine a plurality of roll forming rollers grouped about a central space and so arranged as to leave an open passage into and away from said central space, means for feeding a strip of paper through said open passage and means for stopping the forward movement of the end of the paper strip which has passed through said open passage so as to cause a portion of said strip to contact with the periphery of one of the roll forming rollers, and means for so rotating said roll forming roller that its peripheral surface in contact with the strip will move in a direction opposite to the 125 direction of feed of the strip.
8. In a paper rolling machine a plurality of roll forming rollers grouped about a cen-
tral space adapted to form a roll from a paper strip within said central space, means for separating the roll forming rollers to permit escape of the formed roll and means for sev-
5 ering the paper strip between the roll forming rollers and the formed roll so as to leave a portion of the paper strip within said central space.
9. In a paper rolling machine a plurality of
 space adapted to form a roll from a strip within said central space, means for separating the roll forming rollers to permit escape of the formed roll and means for severing the 15 paper strip between the roll forming rollers and the formed roll so as to leave a portion of the paper strip. within said central space, means for feeding the paper strip and means for stopping the forward movement of the 20 severed end of the paper strip so arranged that further feeding of the paper strip will cause the portion of the paper strip within said central space to form a bight.
10. In a paper rolling machine a plurality ral tral space adapted to form a roll from a paper strip within said central space, means for separating the roll forming rollers to permit escape of the formed roll and means for sev30 ering the paper strip between the roll forming rollers and the formed roll so as to leave a portion of the paper strip within said central space, means for feeding the paper strip, and means for stopping the forward move5 ment of the severed end of the paper strip so arranged that further feeding of the paper strip will canse the portion of the paper strip within said central space to form a light and to be forced into contact with a plurality of into a core for a succeeding roll.
11. In a paper rolling machine a plurality of roll forming rollers grouped about a central space, means for feeding the end of a paper strip through said central space, means outside the group of forming rollers for stopping further forward movement of said end so arranged that further feeding of the paperstrip will cause a bight to be formed in the Paper strip between the feeding means and the end stopping means and will canse said bight to be bronght in contact with a plurality of the roll forming rollers to form a core for the roll, means for moving the stop out the roll forming rollers as to permit the formed roll to drop out of the said central space, leaving an unrolled portion of the paper strip extending through said central tween the formed roll and said roll forming rollers, and means for returning the stop to operative position to stop further formard movement of the severed end.
12. In a paper rolling machine a plurality 6 of roll forming rollers grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as a feed roller for feeding a paper strip through said central space, an arm mounted to swing toward and away from said central space, a roll forming roller carried by said swinging arm and a stop independent of the roll forming rolls movable into the path of the end of the paper strip to so stop it that further movement of the roll forming roller serving as a feed roller will cause a portion of the paper strip to contact with a roll forming roller other than the one serving as a feed roller.
13. In a paper rolling machine, a phurality of roll forming rollers grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve ats a feed roller for feeding a paper strip through said central space, an arm mounted to swing toward and away from said central space and a roll forming roller carried by said swinging arm, and a stop carried by said swinging arm adapted to stop the further forward movement of the end of the paper strip.
14. In a paper rolling machine a plurality of roll forming roller's grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as : fieed roller for feeding a paper strip through said central space, an arm mounted to swing toward and away from said central space and a roll forming roller carried by said swinging arm, a guide carried by said swinging arm below said central space adapted to gruide the end portion of the paper strip, and a stop carried by said swinging arm below said guide adapted to stop further forward 103 movement of the end of the paper strip.
15. In a paper rolling machine a plurality of roll forming rollers grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as a feed roller for feeding a paper strip through said central space, a roller adapted to hold the paper strip against said roller rotating on a fixed axis and a stop independent of the roll forming rolls movable into the path of the end of the paper strip to so stop it that further movement of the roll forming roller serving as a feed roller will cause a portion of the paper strip to contact with a roll forming roller other than the one serving as a 120 feed roller.
16. In a paper rolling machine a plurality of roll forming rollers grouped ahout a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as a feed roller for fecding a paper strip through said central space, an arm mounted to swing toward and from said roller, and a roller.
carried by said swinging arm adapted to hold the paper strip against said roller rotating on a fixed axis, and means for swinging said arm to separate the roller carried thereby 5 from the roller rotating on a fixed axis.
17. In a paper rolling machine a plurality of roll forming rollers grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as a
10 feed roller for feeding a paper strip through said central space, a roller adapted to hold the paper strip against said roller rotating on a fixed axis, and a guide having a curved face adapted to cooperate with said roller rotating on a fixed axis to cause the paper strip to curve downward.
18. In a paper rolling machine a plurality of roll forming rollers grouped about a central space comprising a roller mounted to rotate on a fixed axis adapted to serve as a feed roller for feeding a paper strip through said central space, an arm mounted to swing toward and from said roller and a roller carried by said swinging arm adapted to tating on fared ried by said swinging arm having a curved face adapted to cooperate with said roller rotating on a fixed axis to cause the paper
3:i strip to curve downward, and means for swinging said arm to separate the roller and guide carried by it from said roller rotating on a fixed axis.
19. In a paper rolling machine a group of from a paper strip, means for releasing the roll from said group of roll forming rollers, a second group of roll forming rollers adapted to receive the roll released from the first dep, means for severing the paper strip between the two groups of roll forming rollers and means for causing the second group to complete the roll.
20. In a paper rolling machine a group of roll forming rollers adapted to form a roll from a paper strip, means for releasing the roll from said group of roll forming rollers, a second group of roll forming rollers adapted to receive the roll released from the first group, means for severing the paper strip between the two groups of roll forming rollers and means for causing the second group to complete the roll, means for releasing the completed roll from said second group and means for further rotating the roll.
21. In a paper rolling machine a group of roll forming rollers adapted to form a roll from a paper strip, means for releasing the roll from said group of roll forming rollers, a second group of roll forming rollers adapted to receive the roll released from the first group, means for severing the paper strip between the two groups of roll forming rollers and means for causing the sec-
ond group to complete the roll, means for releasing the completed roll from said second group and means for further rotating the roll comprising an inclined conveyor.
22. In a paper rolling machine a plurality 70 of roll forming rollers grouped about a central space aclapted to form a roll within said central space from a paper strip, means for supplying the paper strip to the roll forming rollers, means for separating the roll 75 forming rollers so as to permit the formed roll to drop out of said central space, so as to leave a portion of the paper strip between said central space and the dropped roll, means for severing the paper strip between said central space and the dropped roll, and means for winding on the dropped roll the portion of the paper strip between it and the line of severance.
23. In a paper rolling machine a plurality of roll forming rollers grouped about a central space adapted to form a roll within said central space from a paper strip, means for supplying the paper strip to the roll forming rollers, means for separating the roll forming rollers, so as to permit the formed roll to drop out of said central space so as to leave a portion of the paper strip between said central space and the dropped roll, means for severing the paper strip between said central space and the dropped roll, and a second group of roll forming rollers adapted to receive the dropped roll and to wind thereon the portion of the paper strip between the dropped roll and the line of severance to complete the roll.
24. In a paper rolling machine a plurality of roll forming rollers grouped about a central space adapted to form a roll within said central space from a paper strip, means for supplying the paper strip to the roll forming rollers, means for separating the roll forming rollers so as to permit the formed roll to drop out of said central space, so as to leave a portion of the paper strip between said central space and the dropped roll, means for severing the paper strip between said central space and the dropped roll, a second group of roll forming rollers adapted to receive the dropped roll and to wind thereon the portion of the paper strip between the dropped roll and the line of severance to complete the roll, means for separating the roll forming rollers of the second group to permit the completed roll to drop therefrom and a conveyor adapted to receive the completed roll from said second group of roll forming rollers and to move it out of the way of a succeeding roll, said conveyor being arranged on an incline so arranged that it will cause the roll to be carried in the direction required to keep it from unrolling.
25. In a paper rolling machine a group of roll forming rollers adapted to form a roll from a paper strip, means for releasing the
roll from said group of roll forming rollers, a second group of roll forming rollers adapted to receive the roll released from the first group, means for severing the paper
5 strip between the two groups of roll forming rollers and means for causing the second group to complete the roll, means for releasing the completed roll from said second
group, means for further rotating the roll comprising an inclined conveyor, and moans acting against an end of the roll to bring its end in proper line.

In testimony whereof I hereunto affix my signature.

WILIIAM F. MARRESFORD.

