This invention relates to smoke filter plugs or wads for cigarettes, cigarette holders, cigars, tobacco pipes and the like and to a machine for the manufacture of wads of this kind.

It has already been proposed to provide cigarette paper tubes with smoke filter wads or plugs which are formed of a multiple strip of a plurality of thicknesses of crepe paper, either with or without absorbent filling material e.g. cellulose or absorbent paper inserted between and alternating with the crepe paper sheets, said multiple or compound ribbon being wound into a loose spiral.

As the rollers which roll the crepe paper strip into the spiral must not be rotated too high a speed,—else the crepe paper would be stretched so as to lose its creping,—it is necessary to roll the wad or plug from a length of crepe paper ribbon as short as possible, say for example about 2 inches, so that the plug can be made with a few windings of the spiral. In order to fill the cross sectional area of the cigarette paper tube with but few windings of the spiral it is necessary to use a ribbon consisting of a plurality of crepe paper and filling layers, say about five layers altogether, so that the ribbon will have considerable thickness. If the spiral were rolled from a single crepe paper ribbon, the spiral would consist of a comparatively great number of windings and the rolling would take a correspondingly long time since the speed of rolling cannot be increased without danger of stretching the crepe paper.

However, in forming, the smoke filter wad of a single spiral located within a cigarette paper tube, as shown in enlarged cross section in Fig. 1 of the accompanying drawings, the center of the spiral will contain a free channel b which will be the wider, the greater the thickness of the ribbon from which the spiral is wound. This central channel will offer the least resistance to the smoke so that a great part of the smoke will flow through this channel instead of through the narrower air gaps between the windings. This will reduce the absorbing effect of the plug.

According to my invention the multiple crepe paper ribbon forming the wad is doubled at the central part of the wad, so that at least the central part of the wad consists of a double-wound spiral.

A further object of the invention is to prevent the paper ribbon from slipping out of the space enclosed by the rollers through the gap between the rollers opposite to the gap, through which the paper ribbon is fed between the set of rollers.

Another object is to secure the rolling of a regular spiral.

With the above mentioned and other effects in view, a further object of my invention is to provide a machine securing exact supplying, feeding, cutting and forwarding of the strip material towards the apparatus for rolling the material, in a length necessary to form the smoke filter wad or plug.

In supplying the strip material, it is important to prevent any stretching of the corrugated paper strip as taken from the supply roll, an essential prerequisite in order to secure the efficient functioning of the smoke filter plug.

According to this invention the supply roll of the machine is provided with an automatic driving device which consists of a frictional driving roller positively driven from the shaft driving the feeding device of the plug rolling device and arranged on a pivotal arm, provided with means to press said driving roller in a yielding manner towards the circumferential surface of the supply roll.

In the accompanying drawings,

Figure 1 is a cross-section of one form of wad according to my invention.

Figure 2 is a cross-section of a wad according to this invention on an enlarged scale.

Figure 3 is a diagrammatical side elevation of the machine for the manufacture of the wads.

Figure 4 is a lateral view seen from the right side of Figure 3.

Figure 5 is a side elevation and

Figure 6 a vertical cross-sectional view of a rolling device for rolling a spiral according to Fig. 2.

Figure 7 shows a cross-sectional view of another form of the rolling device and the guiding means co-operating therewith at the beginning of the rolling of the spiral plug.

Figure 8 is a view, similar to Figure 7, at the completion of the spiral plug.

Figure 9 is a front view seen from the left side of Figure 7.

Fig. 10 is a schematic showing of the rolls and the drive means thereof.

In Figure 2, c is the cigarette paper tube and a is the multiple crepe paper ribbon doubled upon itself at its center part d so that a double spiral is formed, which fills out uniformly the whole cross sectional area of the cigarette paper tube.

The empty spaces seen in the drawings at / in reality do not appear, as the soft spiral is deformed slightly to evenly fill out the spaces f.

As will be seen from Fig. 2, the whole spiral need not be doubled, it being sufficient to double only the central part of the spiral.
It is to be understood that instead of crepe paper a regularly corrugated paper can be used.

The machine for the manufacture of the said warp or plugs comprises first a supply roll 1 (Figure 3) journaled on pin 9 in support 3. The corrugated paper ribbon as taken from supply roll 1 is led over roller 4 towards the feeding device 5, 5 of the rolling device r for rolling the smoke filter plugs, as hereinafter described. 7 is a usual knife for cutting the length of ribbon to be rolled, driven in known manner from the driving shaft of the machine.

A frictional roller journaled in arm 9 which is pivoted at 10 in support 3, and 11 is a spring which presses roller 8 against the circumferential surface of supply roll 1. Roller 8 is driven by means of a string or chain gear 12, 13, 14 (Figure 4) from a wheel 15 journaled on the pivot pin 10 of lever 9 while wheel 15 is driven by gears 12, 13, 14, 15 (Figure 4) which drives the shaft 17 of the feeding device 5, 5 of the device r rolling the smoke filter plugs.

Hence roller 8 rolls the supply roll positively, and automatically assumes the angle to the periphery thereof required to supply exactly the same length of ribbon a which is cut at 7 from the ribbon and fed into the rolling device r, so that the ribbon a will not suffer any stretching whatever.

According to Figures 5 and 6 the rolling device r consists of a plurality of rollers r1, r2, r3 and r4 adapted to be turned by a suitable gearing, shown in Figure 10, in the same direction shown by the arrows. Of course instead of two lower and two upper rollers a greater number of such rollers can be used. The upper pair r2, r3 of the rollers may be journaled in a movable bracket, so that it can be lifted and adjusted with respect to the lower pair of rollers.

According to this invention an abutment 19 is provided opposite to the feeding gap between rollers r1 and r2 within the free space enclosed by the rollers. The foremost edge 20 of the paper strip a will strike against abutment 19 so that when strip a is pushed forward by roller r1 and a guide co-operating therewith, shown in the drawings, with dotted lines, the end of strip a will be double to form the S-shaped central part x (Figure 2) of the wad.

In the modified form of the rolling device shown in Figures 7 to 9, r1, r2, r3 and r4 are again the rollers which are turned in the same direction, 21 is a guiding plate, from which the paper ribbon a is rolled is introduced through the gap between the rollers r1 and r2. The rollers are provided with at least one, preferably with a plurality of grooves or slots 22 (according to Figure 9 with two such slots). According to the drawings guide tongues 23 are projecting through grooves 22 which bar the passage of the paper ribbon a through the gap 24 between the rollers r2, r3 which is opposite to the feeding gap between rollers r1 and r4.

If the paper strip a is introduced between the rollers r1, r4 and roller r1 drives the paper ribbon towards gap 24 the paper ribbon abuts against tongues 23 and the end of the paper ribbon is forced backwards. The shape, according to which this end of the paper ribbon will be bent depends on the direction of the edge 25 of tongues 23 which comes into contact with the forward end of ribbon a. If edge 25 is perpendicular to the direction of the straight paper ribbon, the forward end of the paper ribbon will be folded upon itself so that the central part of the spiral will be doubled. If that is not desired, the edge 25 is made more or less oblique.

If it is desired that the foremost end of the paper ribbon should be folded upon itself to form a double spiral in the center of the plug, so that the tongues act as a simple abutment, it is not necessary to provide the rollers with circular grooves 22 as the stationary parts serving as abutment may be within the space enclosed by the rollers through gap 24.

Besides tongues 23 other tongues 26 may be arranged to project through grooves 22 into the space enclosed by the rollers. Tongues 26 are provided at their upper end with a curved outer guiding edge 27 to bend the paper strip a upwards and to lead the same in tangential direction towards guiding edge 25. The forward edge of guiding tongues 26 are provided with a substantially semi-circular recess 28 helping to roll the innermost end of the paper strip a, as shown in Figure 7. Guiding tongues 26 are pivoted at 29 and springs 30 tend to draw said guiding tongues into the position shown in Figure 7.

As the rolling of the spiral of paper ribbon proceeds and the diameter of the spiral increases, the guiding tongues 26 are pressed backward as shown in Figure 8.

When the plug 31 is rolled, a piston 32 (Figure 9) pushes the plug, in known manner, in its axial direction into a channel or sleeve 33 wherefrom it is introduced in any well known manner into the cigarette paper tube.

I claim as my invention:

1. A machine for the manufacture of wound articles, comprising means for feeding the stock to be wound, two sets of upper and lower rolls mounted closely adjacent to each other, means for guiding the stock between the first set of rolls, means for turning the said rolls, means extending between the rolls of the second set and having a surface adapted to receive and deflect stock after it passes through the first set of rolls, and resilient means also extending between the rolls and adapted to yieldingly cooperate with the said deflecting means for guiding the stock into its properly wound position.

2. A machine for the manufacture of wound articles, comprising means for supplying stock to be wound, two sets of upper and lower rolls mounted closely adjacent each other, means for guiding the stock between the rolls of the first set, means for rotating the rolls, and abutment means extending between the upper and lower rolls of the second set, and adapted to receive and deflect the stock after it is fed between the rolls of the first set, and spring-biased means also extending between the said rolls and having a recess therein adapted to yieldingly abut and guide the stock as it is deflected by the said abutment means and rolls into its finally turned position.

3. A machine for manufacturing wound articles, comprising supplying means for the stock to be wound, two sets of upper and lower rolls mounted closely adjacent each other, means for guiding the stock between the rolls of the first set, each of the rolls having annular recesses in the longitudinal surfaces thereof, means for rotating the said rolls, and resilient means extending through the recesses of the rolls of the second set and having a deforming surface facing the first set of rolls, and adapted to receive and deflect the stock as it passes between the rolls of the first set, and a spring-biased
member extending through the recesses of the lower rolls of the two sets into the space between the rolls and having a recess adapted to receive and guide the stock as the latter is deflected from the surface of the abutment member and from the rolls, whereby the stock is guided into its properly turned position.

4. A machine for the manufacture of wound articles, comprising means for supplying the stock to be wound, two sets of upper and lower rolls mounted closely adjacent each other, means for guiding the stock into the said rolls, the said rolls each having annular recesses therein along the longitudinal surfaces thereof, means for rotating the said rolls, abutment means extending between the rolls of the second set and having a deflecting surface facing the rolls of the first set, and adapted to receive and deflect from its deflecting surface the stock after the latter passes through the first rolls, and a spring-biased member extending between the lower rolls into the space between the said rolls and having a recess therein adapted to receive and guide the stock as the latter is deflected from the said deflecting surface and the rolls into its properly wound relation, the said member also having an additional recess adapted to engage about one of the lower rolls as the member is urged backwardly against the tension of the spring as the wound article increases in diameter.

5. A machine for manufacturing wound articles, comprising means for supplying the stock to be wound, two sets of upper and lower rolls, means for guiding the stock into the said rolls, means for rotating the rolls, abutment means extending between the rolls of that set of rolls remote from the feeding means and against which the stock is adapted to impinge after it passes through the rolls of the first set whereby it is deflected and thereafter guided by the said rolls into its properly wound position, and laterally movable means mounted adjacent the opening formed between the two sets of rolls for expelling the wound articles when the latter have been completed.

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