J. C. MÜLLER.

APPARATUS FOR MAKING MOUTHPIECE TUBES.

APPLICATION FILED NOV. 15, 1909.

977,394. Patented Nov. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

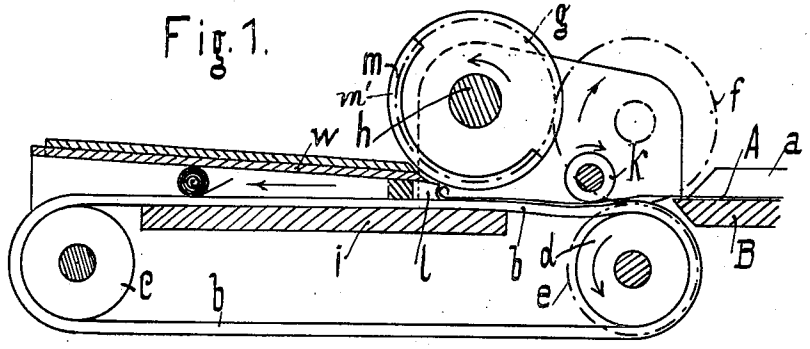


Fig. 3.

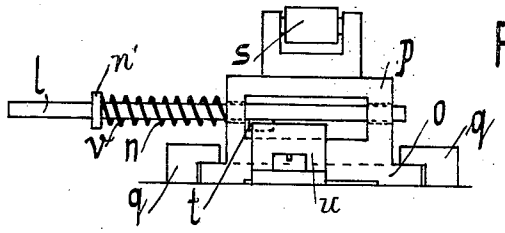
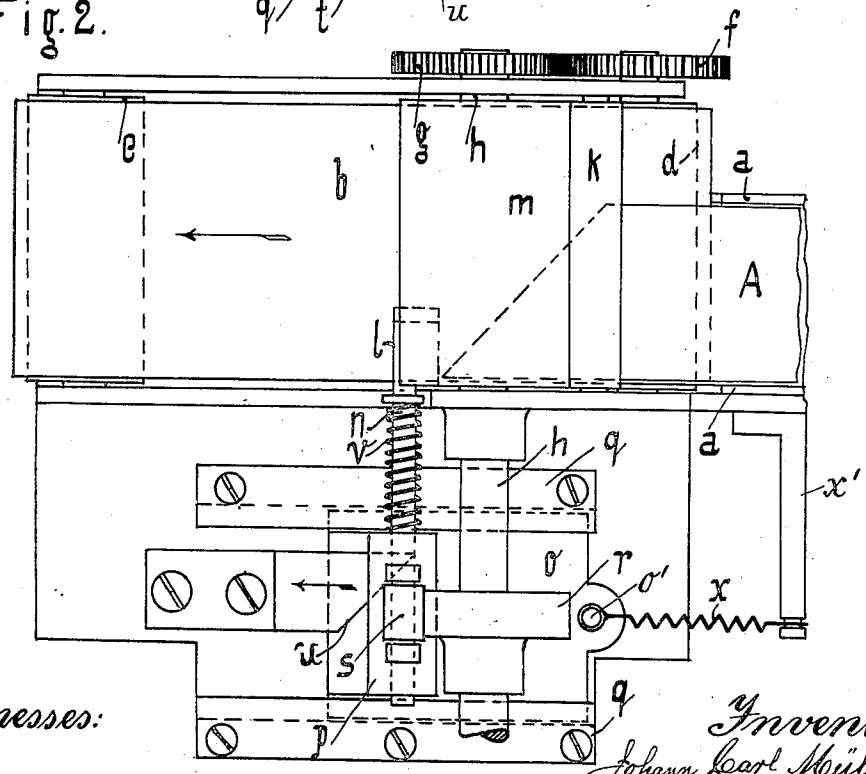


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

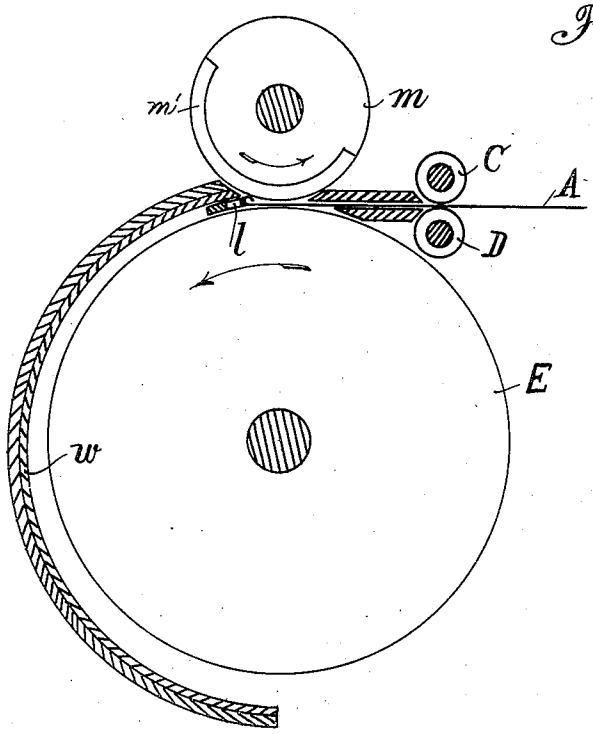


Fig. 5.

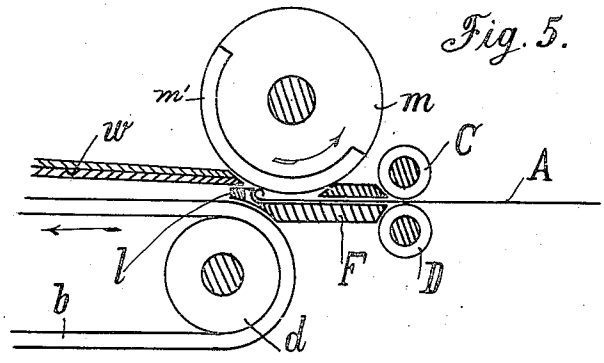
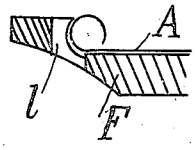


Fig. 6.



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APPARATUS FOR MAKING MOUTHPIECE-TUBES.

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Application filed November 15, 1909. Serial No. 528,142.

To all whom it may concern:

Be it known that I, JOHANN CARL MÜLLER, a citizen of the German Empire, residing at Dresden, in the Kingdom of Saxony and Empire of Germany, have invented a new and useful Improvement in Apparatus for Making Mouthpiece-Tubes, of which the following is a specification.

The object of the present invention is to perform the operations which have hitherto been performed by hand, by machinery. When making spiral mouth-pieces by hand in the usual way, the blank for the mouthpiece formed of a sheet of paper or similar material, which is cut obliquely at one end, is first rolled at the sharp angular end between the palm of the left hand and one finger of the right, whereupon the rolling process is completed by both palms to finish the mouth-piece. This operation requires considerable manual dexterity and training, and therefore requires the employment of skilled labor.

The apparatus embodying the present invention is so constructed as to carry out a similar operation with a blank formed as stated above, with the difference that the corner at which the rolling operation commences is caused to abut against and to be deflected in a gage arranged in the path of its movement, said gage having a rounded groove or recess for deflecting the corner. When the corner has thus been curved or rolled, the gage is withdrawn and the blank, continuing its movement, is rolled up between a forwardly moving surface and a stationary surface somewhat inclined with regard to the same in order to allow of the increase in thickness of the rolled-up mouthpiece. Thereby the blank is rolled up into the desired form. This operation can be performed by various mechanism under my invention, an essential feature, however, being that the acute angled corner or forward end of the mouth-piece blank meets the deflecting gage in its path, and that said deflecting gage at the proper period is withdrawn and the mouth-piece then is carried forward by a moving surface and held at the same time in contact with a fixed surface opposite thereto.

In the accompanying drawing: Figure 1 represents a vertical longitudinal section of an apparatus embodying my invention; Fig. 2 a plan view thereof; Fig. 3 a detail in side elevation showing the means for operating the deflecting gage; Fig. 4 a vertical longitudinal section of a modified form of apparatus embodying my invention; Fig. 5 a similar view of still another modification; and Fig. 6 a vertical sectional detail view thereof.

Referring to Figs. 1 to 3, it will be observed that B is a feeding table for the blanks having guide-flanges *a* to guide the strip of paper A as it is fed into the machine. The said paper blank A is of the form shown in Fig. 2, that is to say, it has parallel sides and is cut obliquely at its forward end.

In advance of the feed-table B is arranged the movable apron *b* which passes over the end rollers *c* and *d* and is caused by the roller *d* to travel in the direction of the arrow in Figs. 1 and 2. The said apron runs over and is separated by the bed *i*. Movement is imparted to the roller *d* and hence to the apron *b* in the direction of the arrow, by the driving shaft *h* upon which is keyed a gear-wheel *g* which meshes with the gear *f*, which in turn meshes with the gear *e*, fixed upon the shaft of the roller *d*. An idler *k* is mounted above and held in contact with the apron *b*, as shown best in Fig. 1. This idler *k*, in connection with the apron *b*, serves to feed the blank A forward, as will be understood.

In advance of the roller or idler *k* is arranged the deflecting gage *l*, which, as shown, is provided at its face opposite the idler *k* with a curved concave deflecting surface, said concave surface facing toward the feeding end of the machine. Said deflecting gage, as shown in Fig. 2, extends only partially across and over the apron *b*, it being necessary only that it extend into the path of the forward pointed end of the blank A.

As shown in Fig. 1, the concave deflecting surface of the gage is substantially tangential to the surface of the moving support. This molding gage is provided with means for projecting it into the path of the blank A and withdrawing it from the same, such movement being timed in such a way that the gage will be in the path of the blank about the time that the corner of the same reaches the part of the apron onto which the gage is adapted to extend, and is held in such position until the forward corner has been rolled up sufficiently, whereupon it is with-

drawn so as to permit of the continued forward motion of the blank.

The mechanism for so actuating the deflecting gage *l* is the following: The said gage is mounted upon a spindle *n*, said spindle being provided with a collar *n'*. A bearing *p* is secured to a slide *o*, and in this bearing the spindle *n* is adapted to slide transversely with respect to the apron *b*. A helical spring *v* encircles the spindle and is held between the collar *n'* and the bearing *p* in such a way as to yieldingly urge the spindle and, with it, the deflecting gage forward, so as to occupy the position shown in the drawing over the apron *b*. In order to periodically withdraw the said spindle and the deflecting gage *l* from this operative position, into a position away from said apron, the slide *o* is arranged to be yieldingly urged in a longitudinal direction toward the feeding part of the machine by a spring *x* attached to a bracket *x'* mounted on a fixed portion of the machine and to the said slide *o* at *o'*. On a fixed portion of the machine there is arranged an incline or cam surface *u*, (see Fig. 2), which incline bears against a lug *t* fixed to the spindle *n* and which is so arranged with respect to the same that when the slide *o* moves toward the delivery end of the machine, the incline *u*, bearing against the lug *t*, causes the spindle and, with it, the deflecting gage *l* to be withdrawn transversely out of the path of the blank A, as will be clear from an inspection of Figs. 2 and 3.

In order to move the slide *o* in the direction of feed indicated by the arrow, and against the stress of spring *x*, so as to cause the incline or cam surface *u* to engage the lug *t* so as to withdraw the spindle *n* and the deflecting gage *l* away from the path of the blank A and against the stress of spring *v*, there is provided a cam disk *r*, Fig. 2, keyed to the shaft *h*, said cam disk *r* being adapted to impinge against a friction roller *s* journaled on standards rising from the slide *o*, as shown in Figs. 2 and 3.

Upon the shaft *h* is mounted a roller *m* which is covered on a portion of its periphery with a rubber mantle *m'* which is adapted to come into contact with the forward corner of the blank as the same is being curled or started by the deflecting gage and which, therefore, serves in further curling or rolling said corner, the roller *m*, as will be noted, turning in the direction of the arrow thereon, that is to say, in a direction opposite to that of the movement of the apron *b*. As stated, said roller is only partially covered with the rubber mantle, the other portion of its periphery being so arranged that it will be out of frictional contact with the corner of the blank already rolled as the rubber mantle leaves the same. The roller *m*, it will be noted, is arranged over the moving support and behind the deflecting gage, *l*, that is between the latter and the feeding end of the machine.

To the rear of the roller *m* is arranged the counter-surface *w* consisting of a fixed plate slightly inclined with respect to the bed *i* and the upper portion of the apron *b*. There is thereby formed a wedge-shaped space between which the blank A is carried forward by the apron *b*, the said blank being thereby rolled up, as shown in Fig. 1, by the combined action of the moving surface of the apron *b* and the fixed surface of the counter surface *w*, as will be readily understood. Said counter surface, as shown, extends to the rear of the machine and substantially to the end of the apron *b*.

The operation of the machine so described will be clear from the foregoing.

A blank A is introduced into the machine on the feed table B, is taken into the bite of the apron *b* and the idler *k* and carried forward until its forward point strikes the deflecting surface of the deflecting gage *l*, which is at this time in the path of the said blank. The forward corner of the blank is then curled and turned by the combined action of the deflecting surface and the curling roller *m*. When the front pointed portion of the blank A has been sufficiently rolled up, the deflecting gage *l* is withdrawn transversely out of the path of the blank by the action of the cam surface *u*, impinging against the lug *t* on the spindle *n*, the cam *r* bearing against the roller *s* and forcing the slide *o* in the direction of the arrow, Fig. 2, against the stress of the spring *x*. The blank then passes forward into the wedge-shaped space between the apron *b* and the counter-surface *w* in which space it is completely rolled up and discharged from the machine after having passed the length of the apron *b*. The deflecting gage being mounted on the reciprocating slide *o* is caused to be moved forward to a slight extent in the direction of feed while being withdrawn and while the initial rolling operation is going on. Thereby the corner already rolled is more effectively introduced between the moving support and fixed counter-surface. The operations may be timed in such a way that, after the first rolling of the corner of a blank has been performed, a second blank is introduced into the machine, a third blank being completely rolled at the same time between the apron *b* and the counter-surface *w*.

In Fig. 4 I have represented a somewhat modified form of the device under my invention. In this case means for feeding the paper strip or blank consists of the feed-rollers C and D which here take the place of the feed-table B. The movable support is in this case in the shape of a drum E instead of an endless apron as in Fig. 1. The

deflecting gage *l* and the curling roller *m* are the same as in the first described construction. The counter-surface *w*, however, is in this case bent as shown, instead of straight as in Fig. 1. In this case again the space between the movable support or drum E and the counter-surface *w* is wedge-shaped, that is to say, flaring forwardly toward the delivery end.

Still another modification under my invention is shown in Fig. 5, which differs from the first described form shown in Fig. 1 in that the deflecting gage *l* is arranged at the beginning of the endless apron *b* instead of being mounted at an intermediate point of the same, as in Fig. 1. Under this construction the paper strip, on undergoing its initial curling action, does not come into any contact whatever with the endless apron, the feed of the same into the machine being performed in this case as in the construction shown in Fig. 4, by the initial feed-rollers C and D arranged in advance of the table F to the delivery end of which the gage is attached, as shown. The first rolling or curling of the forward end of the blank is here performed by the deflecting gage which turns up the said edge or point until it strikes against the roller *m* the frictional portion of which, *m'*, then coöperates with the said deflecting gage to curl up the said edge or point to impart to said blank the initial rolling up or curling. This arrangement will be in many cases sufficient to produce the necessary initial curling, but in general I prefer the arrangement under Figs. 1 and 4 whereby such initial curling is performed by the deflecting gage in cooperation with both the curling roller *m* and the movable support *b* or E, as the case may be. Under this modification, when the first rolling of the paper strip is finished and the deflecting gage *l* is moved away, as under the construction of Figs. 1 and 2, the paper continues its movement by virtue of the rollers C and D and passes on to the endless apron or movable support *b* and between it and the counter-surface *w*, where the further operation is the same as under the first described construction. Under this construction it is preferable that the lower edge of the curved deflecting groove in the gage *l* does not lie above the edge of the table F, because, in that case, there would be a danger that the corner of the blank or paper strip would be bent in such a way that it could not be curled readily. For this reason, as shown in Fig. 6, the lower edge of the said groove is a little below the edge of the table F, although it would be sufficient if it were just flush with the same. Under all the forms shown in the drawing, the length of the gage transversely of the movable support is such that after the same has completed the curling action of the forward end of the paper blank the entire gage can be withdrawn from the apron in sufficient time to allow the initially curled blank to pass forward between the moving base and the counter-surface without interruption. In this way a continuous action of the machine is assured.

While the present invention is applicable to the making of paper tubes and particularly mouth-piece tubes, it is to be understood that the same is applicable also to making tubes from other sheet material.

Reviewing the operations carried out by the above machine, it will be noted that they consist essentially in first deflecting the pointed tip of an obliquely cut blank and then curling the same spirally upon itself and then carrying the blank bodily forward and at the same time causing the curled portion of the same to work over a fixed surface. This curling action may be carried out under my invention by the coöperation of the deflecting gage having the curved groove presented toward the blank and arranged in the path of said blank, with a curling roller such as *m* which moves in a direction opposite to the direction of the feed of the said blank, said parts, under what I consider the best construction, coöperating also with a movable bed such as a movable apron as *b*, Fig. 1, or drum as E, Fig. 5. The curling roller *m* having a frictional surface *m'*, although in most cases sufficing to curl up the front edge or point of the blank, is greatly aided by such movable support which carries the blank bodily forward. By having the roller *m* provided only partly with a frictional surface and partly with a non-frictional surface, I attain the valuable result that as soon as the blank has been initially curled and the gage *l* has been withdrawn from the path of the paper, the said paper is positively fed forward by the movable bed without interference from the roller *m* and without necessitating the lifting away of said roller as would be the case were the same covered entirely with a frictional surface.

What I claim and desire to secure by Letters Patent is:—

1. In an apparatus for making paper tubes, a deflecting gage normally held in the path of the blank and adapted to curl the advancing end of the same, in combination with a moving support and a fixed counter-surface arranged opposite said moving support, means for withdrawing the gage out of the path of the blank, and means for feeding the blank forward against the gage and between said moving support and fixed counter-surface.

2. In an apparatus for making paper tubes, a deflecting gage having a curved surface facing toward the feeding end of the machine and adapted to deflect and curl the

forward end of the blank, in combination with a moving support and a fixed counter-surface arranged opposite said moving support, means for withdrawing the deflecting gage out of the path of the blank, and means for feeding the blank against the gage and between said moving support and fixed counter-surface.

3. In an apparatus for making paper tubes, a deflecting gage having a concave surface facing toward the feeding end of the machine and adapted to be held in the path of the tube blanks and to deflect and curl the forward end of the blank, in combination with a moving support and a fixed counter-surface arranged opposite the said moving support, said counter-surface forming a forwardly flaring wedge-shaped space with the moving support, means for periodically withdrawing the gage from the path of the blank, and means feeding said blank against the gage and between the said moving support and fixed counter-surface.

4. In an apparatus for making paper tubes, a deflecting gage having a curved groove therein facing toward the feeding end of the machine and adapted to deflect and curl the forward end of the blank, means for periodically introducing and withdrawing the deflecting gage into and out of the path of the blank, in combination with a moving support and a fixed counter-surface arranged opposite the said moving support, and means for feeding the blank toward the gage and between the said moving support and fixed counter-surface.

5. In an apparatus for making paper tubes, a moving support for the blanks, in combination with a deflecting gage having a concave deflecting surface facing the feeding end of the machine and arranged in the path of the blank, and a roller arranged over the moving support and behind the gage, and rotating in a direction opposite to that of the moving support, whereby the blank is curled and rolled up at its forward end as it is fed against the gage.

6. In an apparatus for making paper tubes, a moving support for the blanks, in combination with a gage having a deflecting face and arranged in the path of the blank, and a roller rotating in a direction opposite to that of the moving support and provided on a part of its periphery with a frictional surface, the remainder of its periphery being non-frictional, whereby the blank is curled and rolled up at its forward end as it is fed against the gage.

7. In an apparatus for making paper tubes, a moving support for the blanks, in combination with a deflecting gage normally held stationary in the path of the approaching blank, means for periodically withdrawing said gage from such path after the end of the blank is curled, and a roller rotating in a direction opposite to that of the moving support, whereby the blank is curled and rolled up at its forward end as it is fed against the gage.

8. In an apparatus for making paper tubes, a moving support for the blanks, in combination with a deflecting gage normally held stationary in the path of the blank, means for periodically withdrawing said gage from such path, and a roller rotating in a direction opposite to that of the moving support and provided on a part of its periphery with a frictional surface, the remainder of its periphery being non-frictional, whereby the blank is curled and rolled up at its forward end as it is fed against the gage.

9. In an apparatus for making paper tubes, a movable base for feeding forward the tube-blanks, a gage extending over the same at an intermediate point, the gage having a deflecting surface substantially tangent to the movable base, in combination with a roller arranged over the deflecting gage and rotating in a direction opposite to the movement of the movable base, and a counter-surface arranged to hold the tube against the movable base.

10. In an apparatus for making paper tubes, means for giving to a blank an initial curl, in combination with a moving support, and a fixed counter-surface arranged opposite said moving support and at a gradually increasing distance therefrom, whereby the initially curled blank is further rolled up between the support and counter-surface with uniform pressure.

11. In an apparatus for making paper tubes, means for giving to a blank an initial curl, in combination with a moving support and a fixed counter-surface arranged opposite said moving support and forming between the same a forwardly flaring space of substantially uniformly increasing size, whereby the initially curled blank is further rolled up and the pressure on the same maintained constant.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JOHANN CARL MÜLLER.

Witnesses:
RICHARD IFFERTE,
OTTO WOLFF.