W. BENJAMINOWITSCH.

CIGARETTE MOUTHPIECE MACHINE.

APPLICATION FILED FEB. 11, 1908.

976,624.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

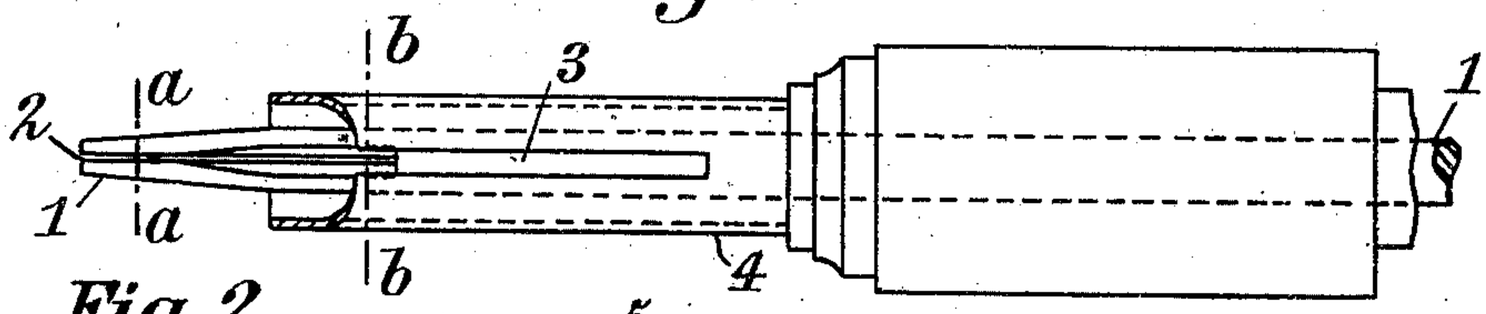


Fig. 2.

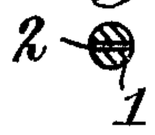


Fig. 3.

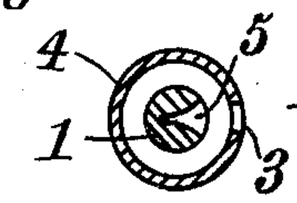


Fig. 4.

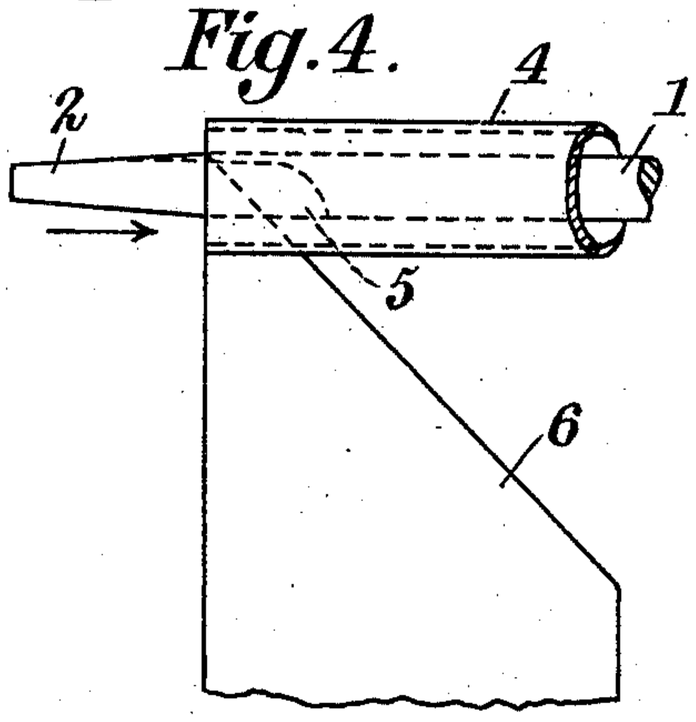


Fig. 5.

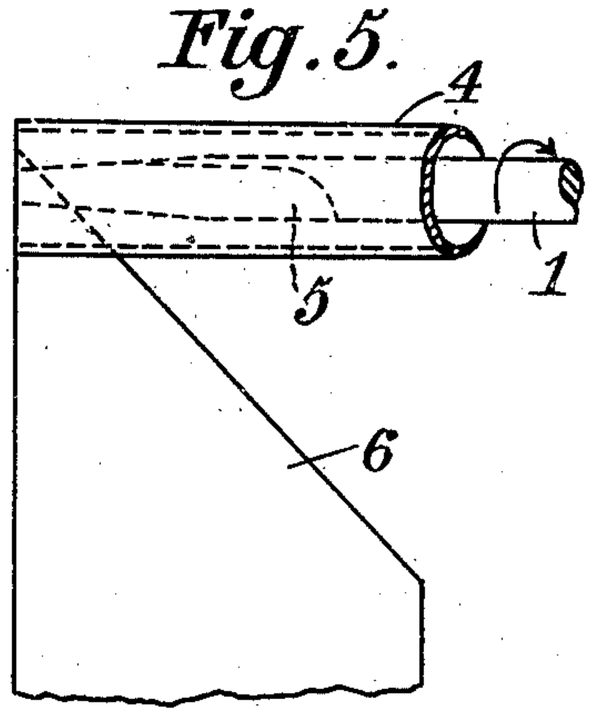


Fig. 6.

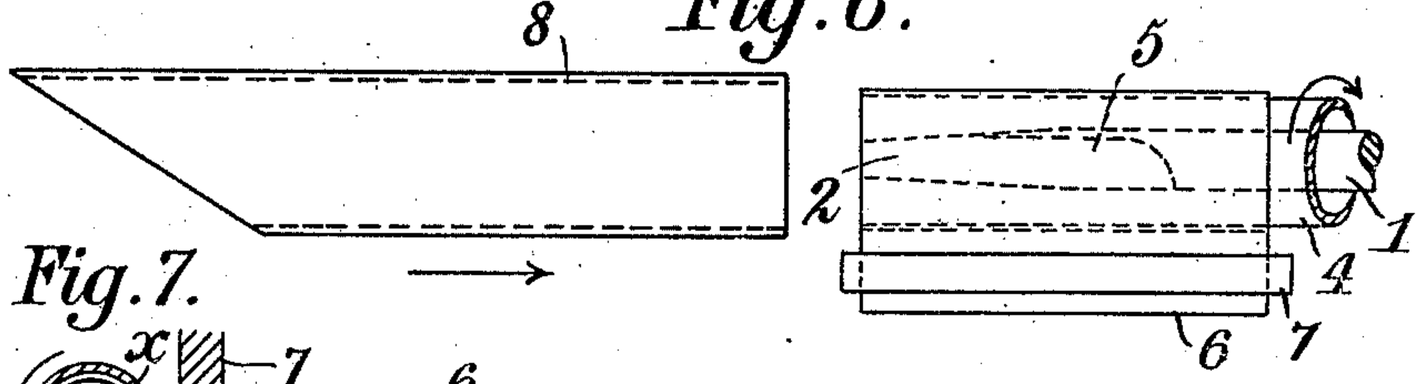


Fig. 7.

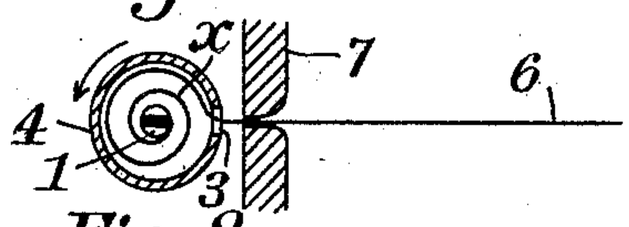
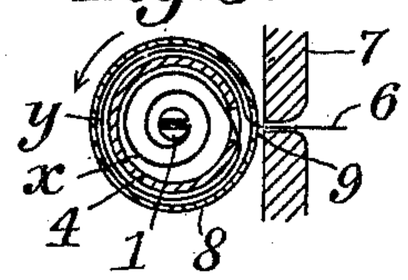


Fig. 8.



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2 SHEETS—SHEET 2.

Fig: 9.

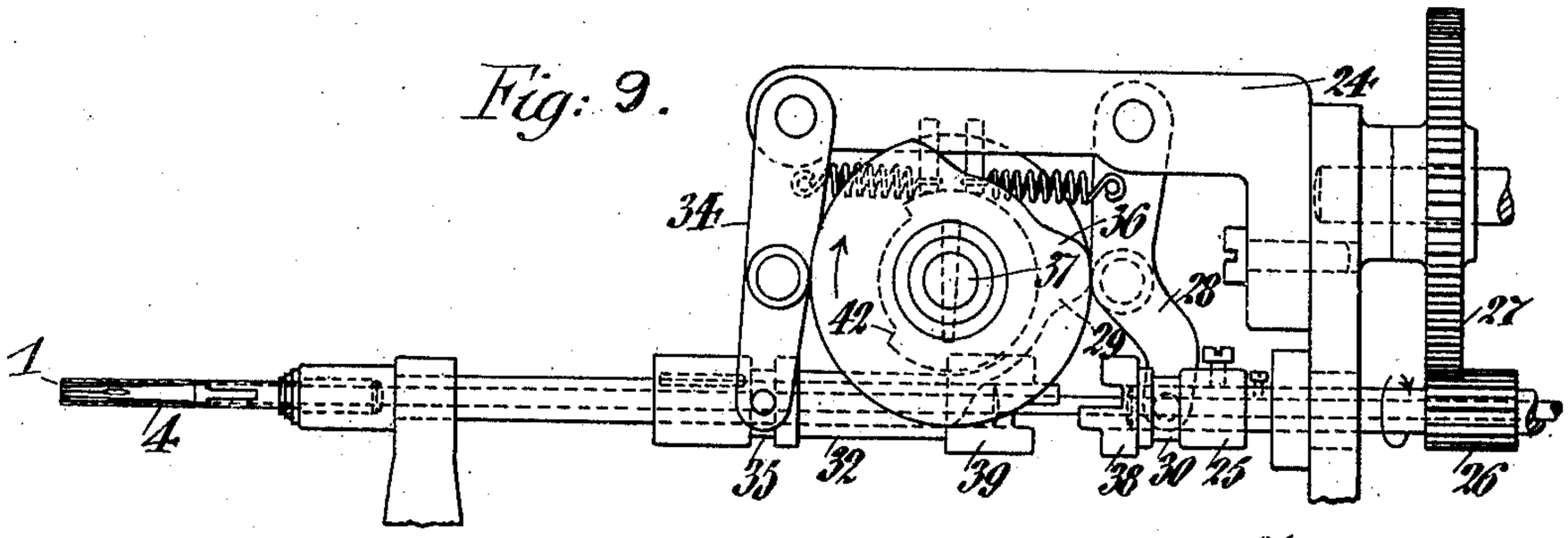


Fig: 10.

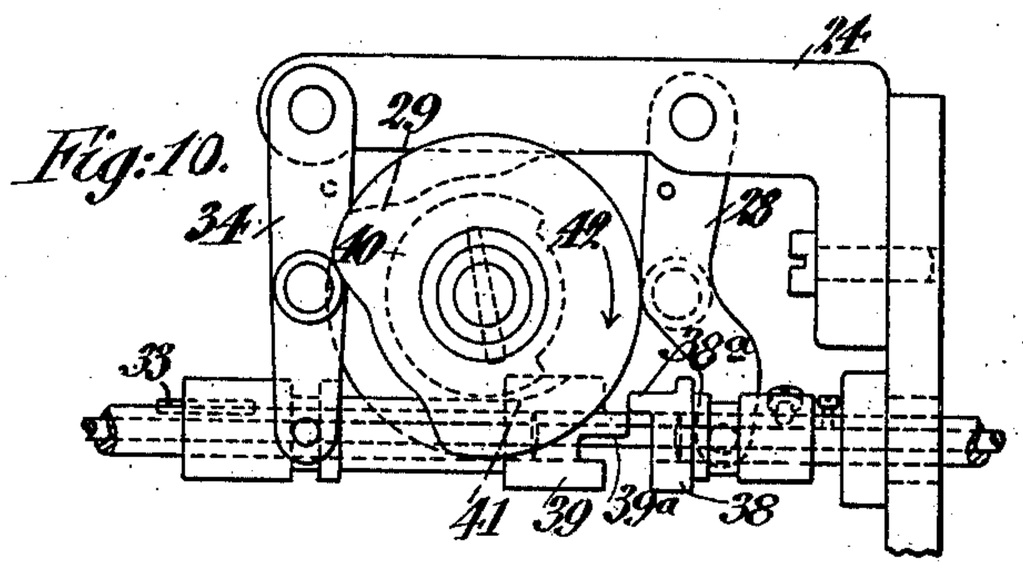


Fig: 13.

Fig: 11.

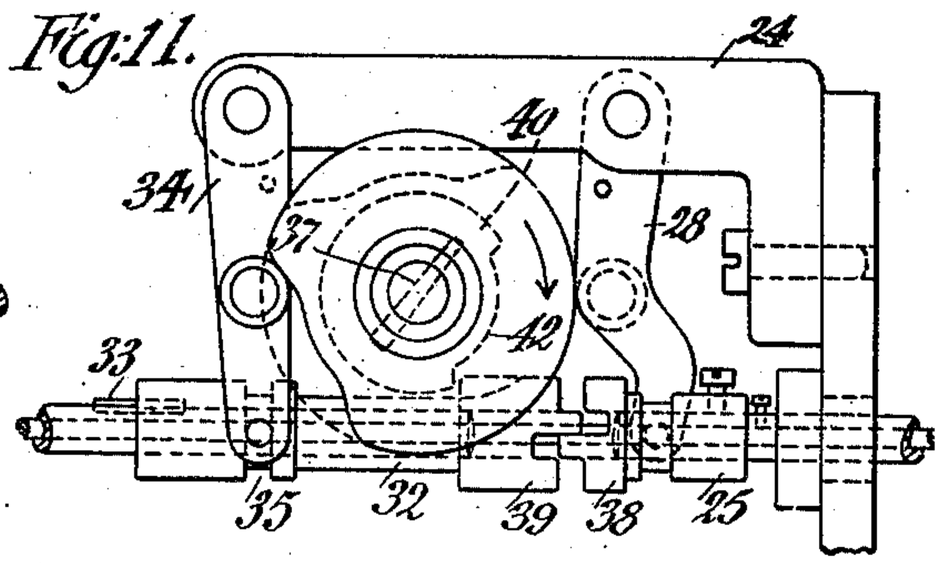
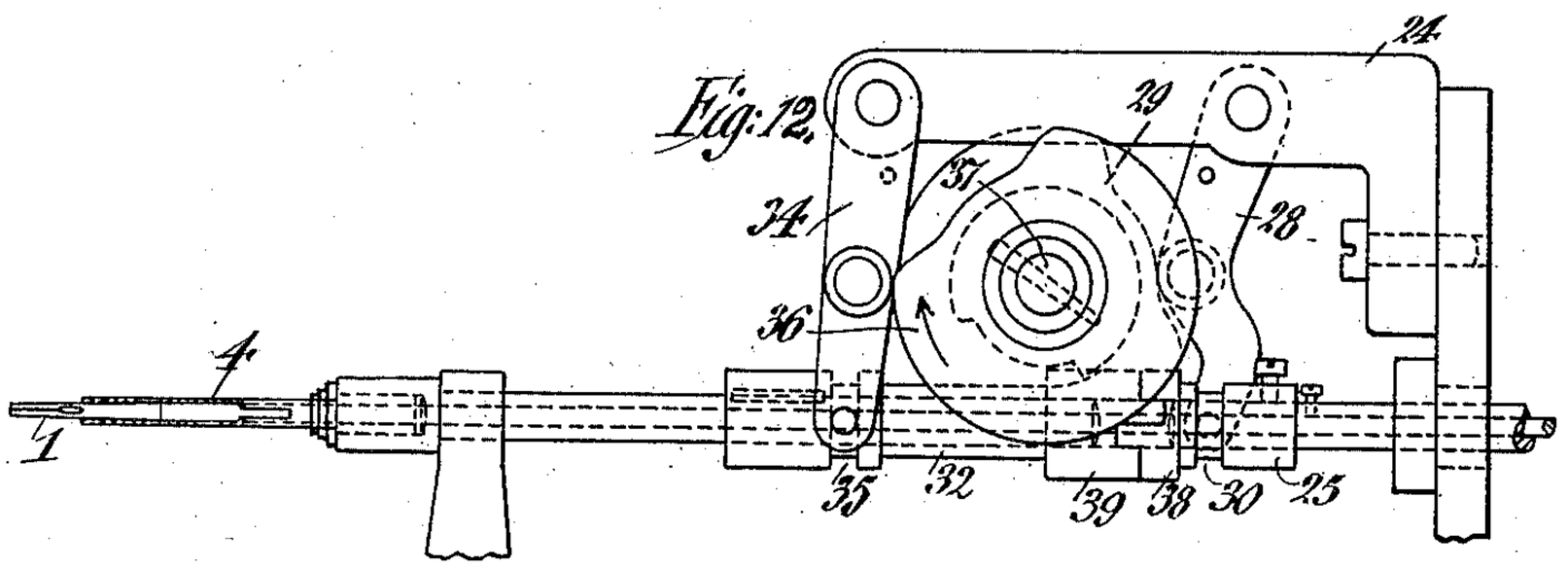


Fig: 12.



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UNITED STATES PATENT OFFICE.

WOLFF BENJAMINOWITSCH, OF BERLIN, GERMANY, ASSIGNOR OF ONE-HALF TO ALBERT LOHMANN, OF BERLIN, GERMANY.

CIGARETTE-MOUTHPIECE MACHINE.

976,624. Specification of Letters Patent. **Patented Nov. 22, 1910.**

Application filed February 11, 1908. Serial No. 415,374.

To all whom it may concern:

Be it known that I, WOLFF BENJAMINOWITSCH, a subject of the Czar of Russia, residing in Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Cigarette-Mouthpiece Machines, of which the following is a specification.

The manufacture of paper or cardboard spirals for the mouthpieces of cigarettes is at the present time generally effected by merely winding a piece of cardboard (which may be cut obliquely) around a winding mandrel, the front extremity of this sheet of cardboard generally entering a slit in the winding mandrel whereby it is held. This method of manufacture, however, presents the defect that there is not formed a spiral sleeve but a tubular body composed of a number of convolutions lying closely one against the other. In order to prevent the tobacco from falling out through a mouthpiece of this kind it is therefore generally necessary to resort to some expedient such as radially projecting flaps, or a wad or the like. The reason why the convolutions of the mouthpiece are not spiral but lie closely one against the other with this method of formation, is mainly, that the winding mandrel presents a diameter which is substantially the same for all the convolutions of the sheet of cardboard, apart from the slight increase of diameter caused by the wound layer of paper. The result is that for the rolling back of the wound sheet of cardboard, which of course always takes place, the same bending moment is applied to the entire surface of the sheet, so that all the convolutions extend equally and closely one against the other.

Now primarily the present invention has for its object a machine for manufacturing paper spirals in which the separate convolutions of the sleeve do in fact lie spirally but are not pressed closely one against the other, as is the case with the mouthpiece spirals for cigarettes at present generally in use. To this end, the winding of the spiral is not effected upon a single mandrel but upon a number of concentrically arranged mandrels of different diameters, so that a different diameter is imparted even during the winding of the several parts of the paper spiral and consequently during the winding back of the spiral which takes place after the completion of the winding and the stripping-off; the bending moment thereby entailed is different in different portions so that the separate convolutions of the paper spiral no longer have a tendency to bear closely one against the other but constitute an actual spiral which when completed presents a somewhat larger diameter than the several winding mandrels. The manufacture of such a paper spiral is generally effected by giving the first part of the sheet of cardboard, which may be cut obliquely a diameter of only about one to two millimeters, so that when one or two convolutions of the spiral have been formed a slotted tube surrounding the inner mandrel likewise participates in the rotation so that the rest of the sheet of cardboard is no longer wound upon the inner mandrel but upon the outer tube which is of larger diameter, so that the paper spiral is formed on two mandrels having different diameters. It is of course also possible, if desired, to use a third or even a fourth tube as the winding mandrel for the last part of the sheet of cardboard, in which case these tubes should present correspondingly arranged slots and be arranged concentrically one with the other. In the greater number of cases it will be found, however, that two concentrically arranged mandrels will be ample for manufacturing well formed spirals.

An embodiment of invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a side elevation of the novel winding mechanism, consisting of two concentrically arranged mandrels. Fig. 2 represents a section on the line *a*—*a* of Fig. 1 and Fig. 3 is a section on the line *b*—*b* of Fig. 1. Fig. 4 is a plan view of the front part of the winding mandrel during the introduction of the sheet of cardboard. Fig. 5 is a similar view showing the operation at the beginning of winding. Fig. 6 is a similar view with a mouthpiece slide shortly before the end of the winding operation. Fig. 7 is a cross section through the winding mechanism during the first phase of the formation of a spiral. Fig. 8 is a similar cross section shortly before the finish of the formation of a spiral. Fig. 9 is a side-view of the mechanism which is used for operating the concentrically located winding mandrels

in uncoupled condition. Figs. 10, 11 and 12 are similar views showing different positions of the mechanism, and Fig. 13 is a side-view of the curved disks by which the coupling means are operated.

In the constructional form of the invention illustrated in Figs. 1–8 the winding device consists of the inner winding mandrel 1 which is bifurcated at its slightly tapered front end by a slit 2 in known manner. Concentric with the inner mandrel, a tube 4 formed with a slot 3 and likewise utilized as a mandrel is arranged. These two winding mandrels 1 and 4 are rotatable and in addition the mandrel 1 is movable longitudinally. With the bifurcated winding mandrels at present in use, it is necessary to have them made of a relatively large diameter in order that the slit may take the edge of the sheet of cardboard fed to it. It has already been proposed to introduce the cardboard from the end into the slit by longitudinal displacement of the mandrel. Even then, however, it is necessary in order to insure the proper seizing of the sheet of cardboard, to widen the slit conically at its outer end, this again entailing a larger diameter of mandrel. In order, however, to form the innermost and therefore narrowest convolutions properly in a correctly proportioned spiral, it is essential that the diameter of the inner winding mandrel should not exceed 2 millimeters, so that it almost presents the form of a pin. With a mandrel of such dimensions it is not possible to widen the slit at the end of the mandrel conically and a narrow slit does not admit the sheet of cardboard readily. In order to insure the ready introduction of the front edge of the sheet of cardboard notwithstanding the narrowness of the slit, the spindle 1 is provided at its rear part, that is to say where the spindle tapering toward its front extremity, presents a somewhat larger diameter, with a conical insertion slit or notch 5 (as shown in cross section in Fig. 3) which readily permits of the introduction of the front chamfered end of the sheet of cardboard 6 (see Fig. 4). In order that it may be possible to wind the sheet of cardboard, the end of which has thus been introduced into the slit in the mandrel 1, around the thinnest part of this mandrel, it is essential to displace the mandrel 1 longitudinally as indicated by the arrow in Fig. 4, so that the position shown in Fig. 5 is reached. The point of the chamfered sheet of cardboard 6 is now situated at the outermost end of the slit mandrel 1 and is ready for winding. For this purpose the mandrel is rotated in a manner known *per se* in the direction of the arrows, Figs. 5–8. As the point of the mandrel presents a diameter of from 1 to 2 mm., as already stated, an exceedingly narrow spiral is formed, and this portion of the spiral is located inside the tube 4 surrounding the mandrel 1 concentrically (see Fig. 7). This part of the spiral is marked *x*.

After one, two, three or more convolutions of the paper spiral have been formed by means of the mandrel, the external, tubular winding mandrel 4 is likewise rotated in the direction indicated by the arrows in Figs. 7 and 8. Up to this time the mandrel 4 has remained stationary in such a position that it is possible for the sheet of cardboard 6 to penetrate into the interior of the mandrel 4 through its slit 3 and become wound upon the mandrel 1. When the mandrel 4 has begun to rotate the rest of the sheet of cardboard is wound onto the outer surface of the tube 4 as shown in Fig. 8. In this manner there is formed a spiral portion *y* upon the outside of the tube 4, its diameter being considerably greater than that of the portion *x* of the spiral wound on the inner mandrel.

The sheet of cardboard 6 is fed to the winding mechanism in any suitable known manner, say by means of a stationary paper guide 7. Shortly before the moment at which the rear end of the sheet of cardboard 6 leaves this paper guide 7 in order to be likewise wound upon the mandrel 4 the known mouthpiece slide 8 (Fig. 6) effects its known displacement in the direction of the arrow (Fig. 6), that is to say, it moves over the concentrically situated mandrel members 1 and 4 and the portions of the paper spiral upon them. As is known, this mouthpiece slide is provided with a lateral slit 9 in such a manner that when the mouthpiece slide 8 is displaced the last part of the sheet of cardboard which is not yet completely wound up is situated inside the slit 9. At the moment at which the rear edge of the sheet of cardboard 6 rests upon the tubular mandrel 4 the mouthpiece slide 8 has attained its rear position, that is to say, lies completely over the winding mechanism, so that the rear edge of the sheet of cardboard 6 which is now likewise wound upon the mandrel 4 bears against the inner periphery of the mouthpiece slide 8. The entire paper spiral is therefore now located inside the mouthpiece slide 8 and may be stripped off the winding mechanism by means of a finger passing through the slits in the mouthpiece slide and the mandrel 4, in known manner, so that the finished paper spiral is carried along by the mouthpiece slide, where it is introduced into the sleeve of the cigarette in the usual manner.

Owing to the fact that in this method of manufacture a part of the paper spiral is wound upon the inner winding mandrel which is of exceedingly small diameter, while the other portion is wound upon the concentric tubular winding mandrel 4, the diameter of which is considerably greater,

the result is obtained that during the back winding of the spiral which takes place inside the mouthpiece slide 8 the bending moment is different in the different portions of the spiral, so that the separate convolutions of the spiral do not lie close together but are in fact arranged spirally and thereby produce an actual closing of the mouthpiece without the necessity for employing other means to that end.

Figs. 9 to 13 show, by way of example, a mechanism for consecutively rotating the winding mandrels. For this mechanism it is assumed that the two concentric winding mandrels 1 and 4 are employed, of which the latter is made of a tubular shape. The winding mandrel 1 has at its rear-end a fixed or otherwise attached sleeve 25 on which is placed a gear-wheel 26, Fig. 9, which is operated by any suitable pinion, for instance, by means of a pinion 27, and thereby set intermittently in rotation. For the longitudinal shifting of the interior winding mandrel 1 is employed a lever 28, which is connected with the angle-piece 24 and which is acted upon in the direction of the arrow by a cam 29 and which engages at its end a groove 30 of the sleeve 25. The pinion 26 is wide enough so that notwithstanding the longitudinal shifting of the mandrel 1 it remains in constant gear with the gear-wheel 27.

On the exterior tubular winding mandrel 4, which has a slot 3 (see Fig. 1 of the drawing), and which is prevented by suitable means from longitudinal motion, is arranged a sleeve 32 which can be moved on the mandrel 4 in axial direction as, for instance, on the latter a spring 33 located in a groove (see Figs. 10 and 11) is arranged which permits the longitudinal motion of the sleeve 32, but secures on the turning of the latter the taking along of the winding mandrel 4. The sleeve 32 is acted upon by a lever 34, which is likewise pivoted to the angle-piece 24, and which engages at its end an annular groove 35 of the sleeve 32 and which is acted on by a cam 36 which is turned in the direction of the arrow, shown in Fig. 12, and which cam is located on the shaft 37 in the same manner as the cam 29.

Sleeves 25 and 32, which are connected with the mandrels 1 and 4, are provided at their adjacent ends with clutch members 38, 39 respectively, so that when these clutch members are placed into mesh with each other the sleeve 32, and thereby the exterior winding mandrel 4, takes part in the rotation imparted to the mandrel 1. For the proper positioning of the mandrels a disk 40 is mounted on the shaft 37 between the two cams 29 and 36 (see Fig. 13) which at a certain position engages a recess 41 of the clutch member 39 of the sleeve 32, but which is at one portion of its circumference provided with a cut-out 42 by which at the corresponding shifting of the clutch member 39 a rotation of the sleeve 32 is rendered possible. The operation of this mechanism is as follows: The shaft 37 with the cams 29 and 36 and the disk 40 are kept constantly in rotation. From the shaft 37 the gear-wheel 27 is periodically rotated by suitable means (not shown) so that by the gear-wheel transmission 27, 26 the mandrel 1 makes a certain number of rotations, but is brought to a position of rest at the moment when the introductory slot 2 is placed in register with the introductory slot 3 of the exterior winding mandrel, so that the newly fed paper blank can enter its point into the slot of the inner mandrel. It is assumed that in the position of the winding mandrel shown in Fig. 9 the point of the cardboard has been taken hold of and is in such a position that the winding of the paper blank can be proceeded with. The mechanism assumes the position shown in Fig. 9, in which the rotation is confined to the inner mandrel 1, while the exterior mandrel 4 is held in position. When the inner mandrel 1 has made several rotations and has rolled up a corresponding portion of the paper blank the remaining portion has to be wound up on the exterior mandrel 4, which has then to be turned for this purpose. To obtain this motion, the sleeve 32 is displaced by the lever 34 under the influence of the cam 36 (Fig. 9) toward the right hand, so that the clutch member 39 assumes the position shown in Fig. 13, in which the clutch-nose 39^a is placed in back of the nose 38^a of the clutch member 38.

As soon as the mandrel 1 has completed its rotation, then both noses 39^a and 38^a (see Fig. 11) are in mesh, so that the sleeve 32 and the mandrel 4 are rotated in the direction of the arrow (Fig. 9). In the meantime the disk 40 was turned so far that the cut-out 42 is placed opposite the notch 41 of the clutch member 39, and thereby the rotation of the latter, that is, of the sleeve 32, is rendered possible. During the then commencing turning of both mandrels the sleeve 32 is shifted by means of the cam 36 to such an extent that both clutch members are placed into mesh with each other, as shown in Fig. 12, whereby the last windings of the spiral paper blank are wound around the mandrel 4. As soon as this is done, the rotation of the gear-wheel 27 and of the pinion 26, as well as of both mandrels, comes to an end, so that the complete paper spiral during the time of rest can be drawn off in the well-known manner from the winding mandrels. The two cams 29 and 36 as well as the disk 40 continue their rotation without interruption. The levers 28 and 34 are thereby influenced by the cams 29 and 36 in such a manner that both levers are simul-

taneously moved toward the left, in order that the clutch members 38, 39 may be still held in mesh, as shown in Fig. 12. Simultaneously sleeve 25 as well as sleeve 32 is shifted in axial direction. The movement of the sleeve 32 has, however, no influence on the winding mandrel 4, as the sleeve 32 can by the arrangement of the spring 33 be shifted in longitudinal direction. The longitudinal shifting of the sleeve 25 produces the shifting of the winding mandrel 1, so that the latter, as shown in Fig. 12, projects by its point beyond the mandrel 4, whereby the wider portion 5 of the slot 2 assumes such a position that it can take up the point of the new paper blank which is fed into the same. The longitudinal shifting of the clutch members 38 and 39 permits then that the rotating disk 40 can enter into the notch 41 of the clutch member 39, and produce thereby a proper location of both mandrels 1 and 4 in the sense that the introductory slots are placed in such a position relatively to each other that they are located in one plane with the newly fed blank and permit the introduction of the same without any difficulty. As soon as the new blank is then taken up by the inner mandrel, the winding action takes place again in the manner described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a device for winding paper spirals, the combination of concentric rotatable mandrels of different diameters adapted to have paper blanks wound thereon and which are located a short distance from each other, so that a portion of the paper blank may be wound up on the inner mandrel while covered by the other mandrel, said inner mandrel being rotatable with respect to said outer mandrel and adapted to grasp said blank.

2. In a device for winding paper spirals, the combination of a tubular outer mandrel and an inner mandrel placed within and concentric with the outer mandrel and spaced therefrom, whereby a portion of the paper blank may be wound first on the inner mandrel while covered by the outer mandrel and then another portion on the outer mandrel, said inner mandrel being rotatable with respect to the tubular mandrel and adapted to grasp the blank.

3. In a device for winding paper spirals, the combination of a tubular outer mandrel, a separately rotatable inner mandrel placed within said outer mandrel and of smaller diameter than the inner diameter of the outer mandrel whereby a space is formed between said mandrels whereby a portion of the paper blank can be wound around the inner mandrel in said space and another portion of the blank wound around the outer mandrel.

4. In a device for winding paper spirals, the combination of a rotatable tubular outer mandrel having a longitudinal slot therein, and a separately rotatable inner mandrel within and concentric with the outer mandrel and spaced therefrom.

5. In a device for winding paper spirals, the combination of a rotatable tubular outer mandrel having a longitudinal slot therein, and a longitudinally movable and separately rotatable inner mandrel concentric with and adapted to move into said outer mandrel and having a diameter smaller than the inside diameter of the outer mandrel.

6. In a device for winding paper spirals, the combination of a rotatable tubular outer mandrel having a longitudinal slot therein, and a longitudinally movable and separately rotatable bifurcated inner mandrel concentric with and adapted to move into said outer mandrel and having a diameter smaller than the inside diameter of the outer mandrel.

7. In a device for winding paper spirals, an inner mandrel having a tapered bifurcated end, the tines of said end normally nearly touching at their free extremities and being spaced apart at a point removed from the extremity of said tapered end, and an outer tubular mandrel concentric with said inner mandrel.

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

WOLFF BENJAMINOWITSCH.

Witnesses:

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WOLDEMAR HAUPT.