Jan. 12, 1943. O. AHNE 2,307,906

APPARATUS FOR FORMING FILTER PLUGS ADAPTED TO BE INTRODUCED INTO CIGARETTE PAPER TUBES

Filed Sept. 4, 1940 4 Sheets-Sheet 1

Fig. 1

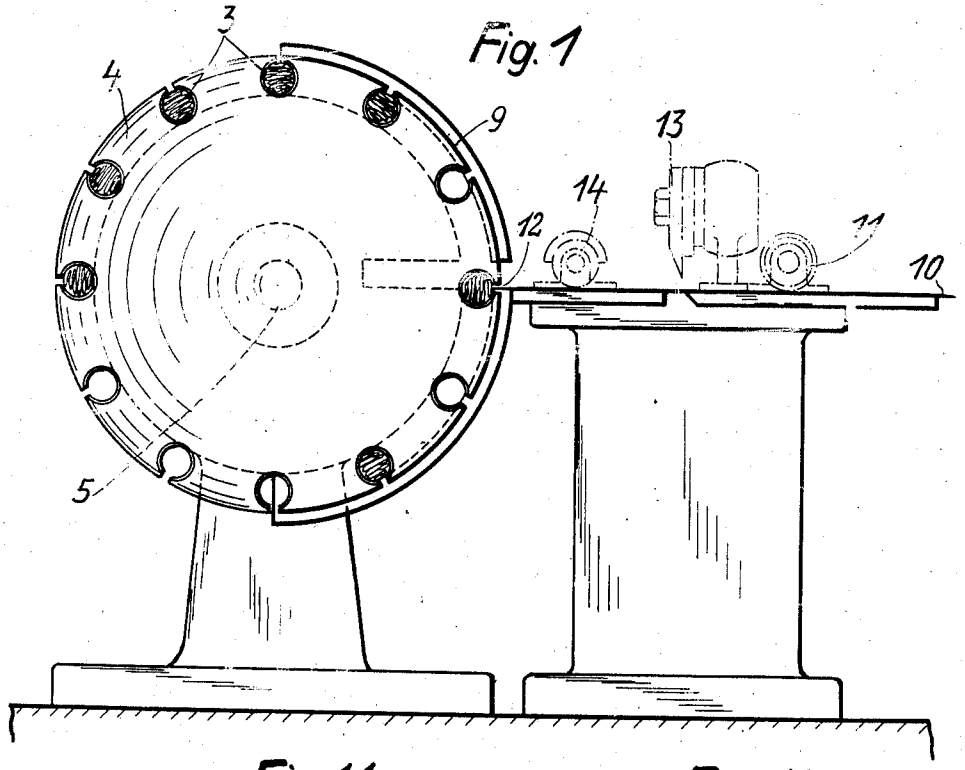


Fig. 11

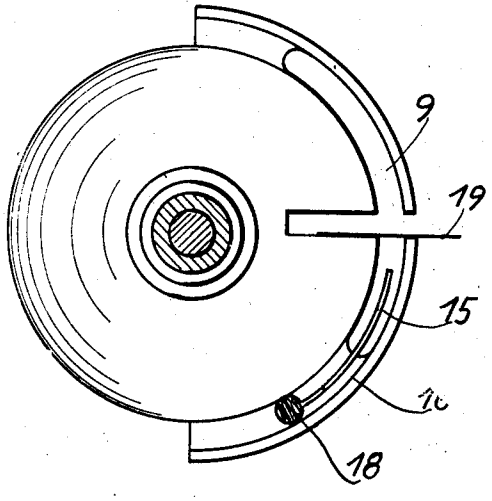
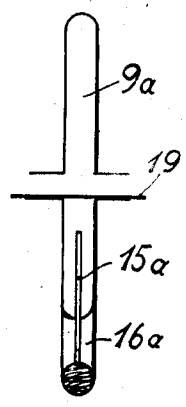


Fig. 12



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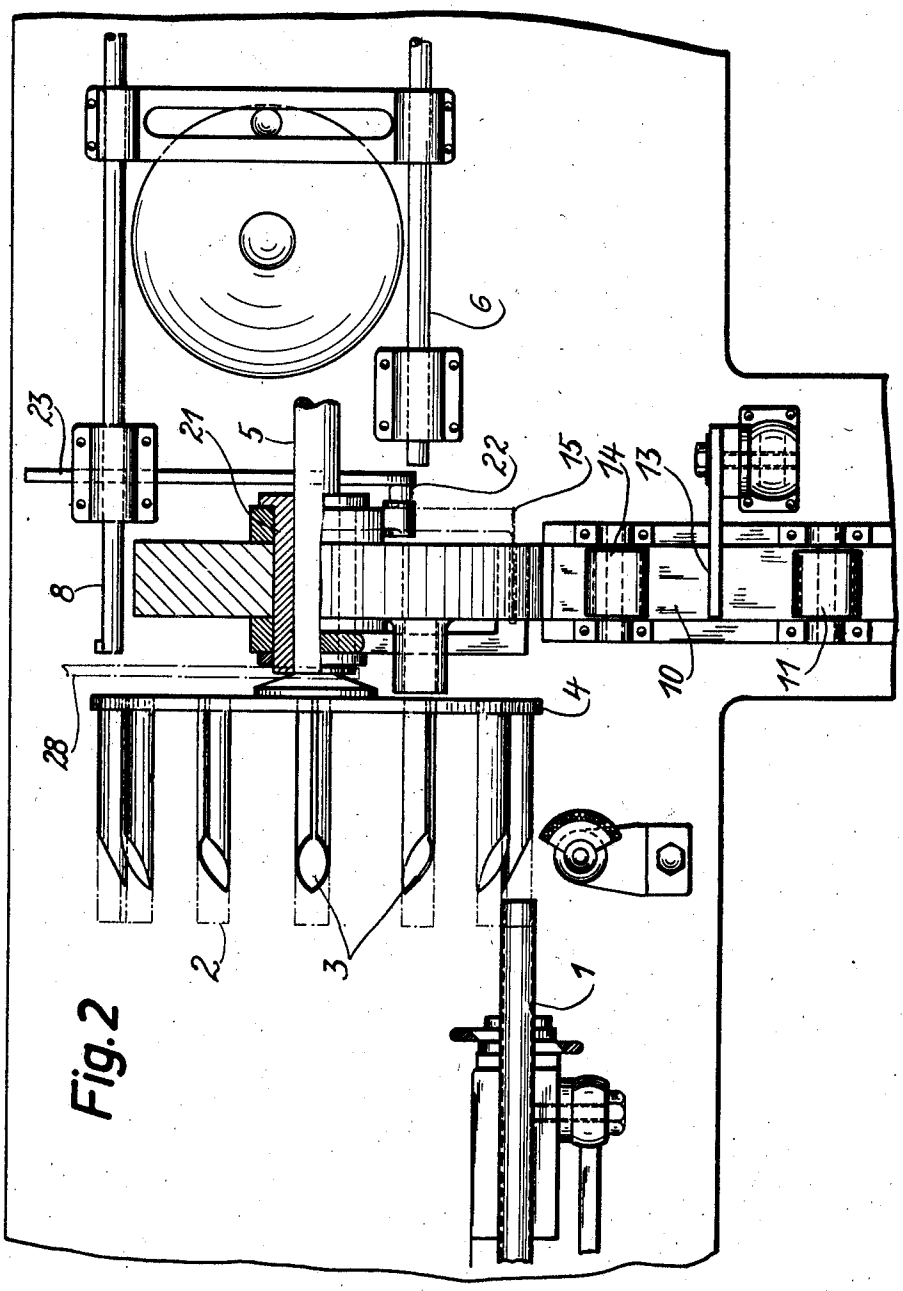


Fig. 2

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Fig. 3

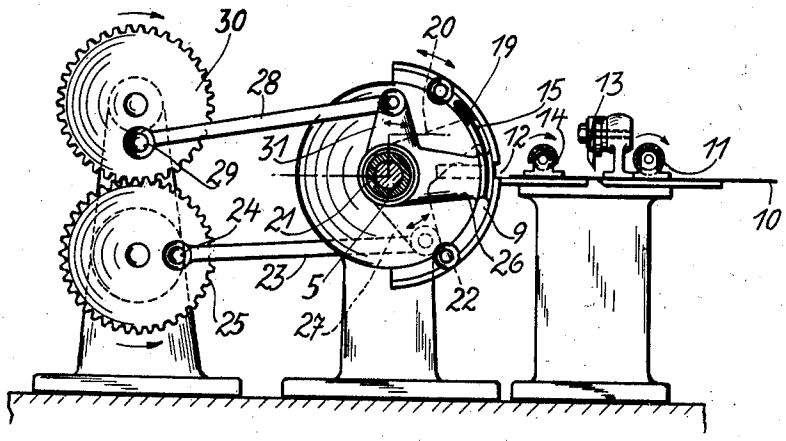


Fig.4

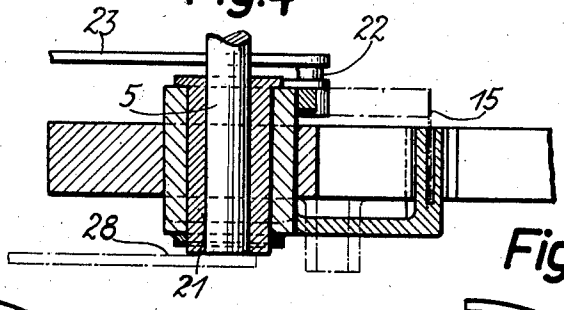


Fig.5

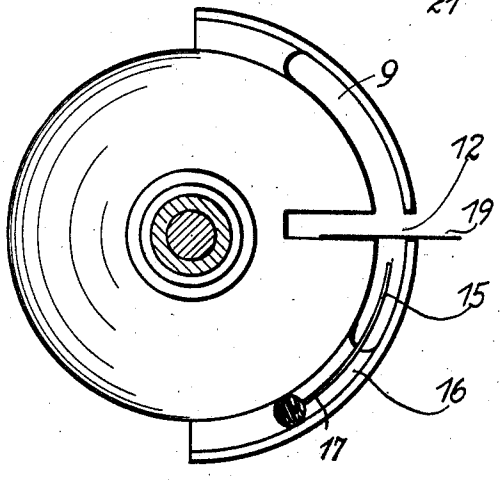
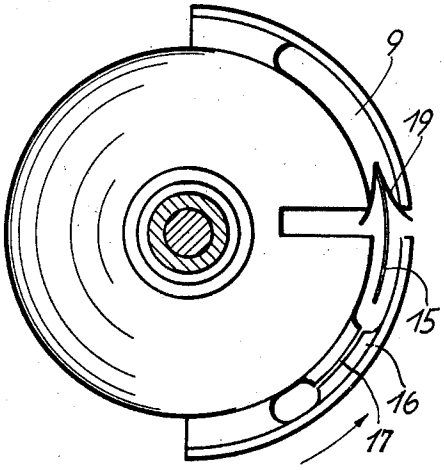


Fig.6



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Fig. 7

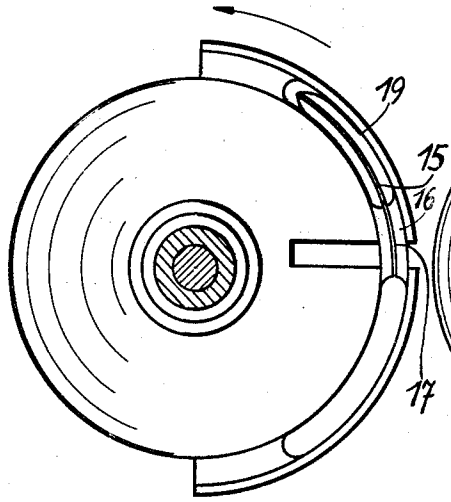


Fig. 8

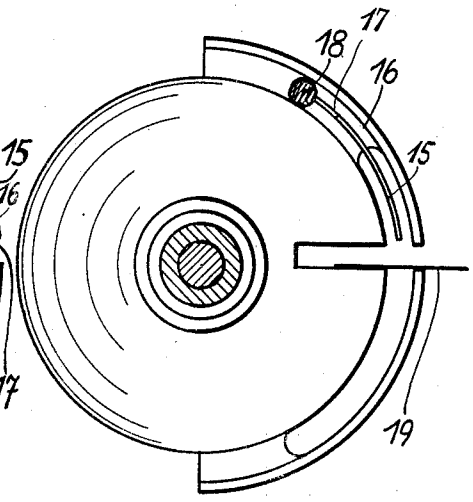


Fig. 9

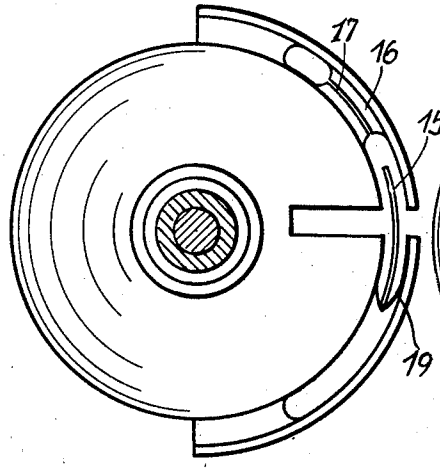
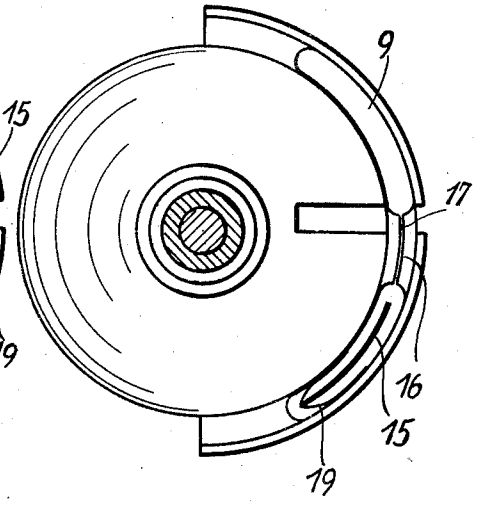


Fig. 10



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UNITED STATES PATENT OFFICE

2,307,906

APPARATUS FOR FORMING FILTER PLUGS ADAPTED TO BE INTRODUCED INTO CIGARETTE PAPER TUBES

Otto Ahne, Dresden, Germany; vested in the Alien Property Custodian

Application September 4, 1940, Serial No. 355,392
In Germany September 23, 1939

13 Claims. (Cl. 93—1)

It is already known to manufacture cigarette mouth-piece plugs from lengths of filter paper strip material in such a way that the length of paper strip after being fed before the opening of a pressing chamber is preformed by a preformer and thereafter is pressed between a plunger entering said chamber and the correspondingly profiled end of the chamber as to form a filter plug of circular area.

These filter plugs must be removed from the chamber and introduced into the cigarette paper tube. For this purpose the paper tubes are brought onto hollow mandrels, which are concentrically arranged on a stepwise rotating disc, and the filter plugs are introduced into the mandrels.

With the apparatus known until now it is only possible to manufacture filter plugs one after the other and to feed each plug from the pressing chamber into the corresponding hollow mandrel from which it is then removed together with the paper tube by a hook entering a longitudinal slot in the mandrel.

The object of the invention is to make possible a quicker operation. This problem is solved by providing a pressing chamber which is operative at both its ends, in which chamber a double-acting plunger reciprocates, said plunger, when moved in the one direction, pressing a filter paper length, which has been previously fed in the middle of the pressing chamber and preformed therein. When the plunger is moved in the other direction it forms a plug from the second paper length previously seized and preformed by the correspondingly actuated preformer means in the second half of the chamber.

In this way a filter plug is finished on one end of the chamber and, during the forming of this filter plug and its feeding into the corresponding spoon of the mandrel disc, the next filter plug is formed in the other half of the chamber, so that one plug is always finished and fed during the time that the next is being prepared.

Care must be taken that the preformer is removed in due time from the path of the advancing pressing plunger and is re-introduced as quickly as possible into the pressing chamber behind the plunger so that it may preform the next length of filter paper already fed into the second half of the pressing chamber.

To achieve this result the opening of the pressing chamber into which the filter paper length is introduced is arranged intermediately of the length of said chamber and the double-acting pressing plunger is provided with an opening or slot through which the preferably sword-like formed preformer passes, the operation of the plunger being so effected that the preformer after its work being finished can pass through the pressing plunger advancing to its operative position, and can begin the preforming of a new length in the other half of the pressing chamber, into which the pressing plunger enters afterwards. In this connection the pressing chamber may have the form of a circular arc and the correspondingly curved preformer and plunger may be mounted on arms rotatable about the centre of the circular arc and be driven by means of cranks or the like.

To bring the operative ends of the pressing chamber in conformity with the disc bearing the mandrels, the operative ends of the pressing chamber, according to the invention, are arranged with respect to the mandrel disc supporting the cigarette paper tubes and are rotated stepwise for the distance of two mandrel pitches from each other, in such a manner that said operative ends lie on the circle formed by the centres of the mandrels, an odd number of mandrel pitches being included between said operative ends of the chamber. The pushers transfering the plugs into the hollow mandrels operate alternately after each step motion of the disc.

The drawings show by way of example an embodiment of the invention.

Fig. 1 is a front view of a disc carrying mandrels adapted to be fed with cigarette paper tubes and with filter plugs.

Fig. 2 is a plan view of Fig. 1 partially in a section through said figure,

Fig. 3 is a similar view as Fig. 1 at a smaller scale and shows the driving mechanism.

Fig. 4 is a partial horizontal section through Fig. 2 or 3 respectively,

Figs. 5 to 11 show diagrammatically the forming of the filter plugs in the pressing chamber and the positions of the preformer and the pressing plunger relatively to each other at different moments during the forming of a plug.

Fig. 12 shows a modification of the means for forming the filter plugs in which the preformer and the pressing plunger are reciprocated in a straight line.

As to be seen from Fig. 2 the cigarette paper tubes 2 which are severed from an endless paper tube 1 are fed into hollow mandrels 3 carried by a disc 4 rotating stepwise about its axis 5. On the opposite side of the disc 4 two pushers 6, of which one only is shown, are provided serving for feeding the filter plugs. These pushers are alter-

nately operative after each step-motion of the disc. Another pusher 8 removes the paper tubes 2 with the inserted plugs from the disc in a manner known per se.

The apparatus described up to this point is known except that in the known apparatus only one pusher is provided for introducing the filter plugs into the mandrels. The working velocity of the apparatus depends therefore upon the working velocity of the plug forming means. To form good plugs it is desirable not to allow the plug forming means to run too fast.

According to the invention, a pressing chamber 9 is provided (Figs. 3 and 5 to 11) both ends of which are operative.

The filter paper strip 10 (Figs. 1 and 3) is fed by the feeding roller 11 and a suitable length of this strip is severed by a cutter 13. The severed length of the strip is fed by the roller 14, the circumference of which is offset, to the openings 12 lying transversely to the pressing chamber.

Fig. 5 shows the position of a severed strip length 19 in the opening 12. For forming the plug the preformer 15 now engages the strip length and draws it into the upper part of the pressing chamber 9, as seen from Fig. 6. When the action of the preformer is finished the strip has the position shown in Fig. 7 and the pressing plunger 16 begins to become active. The pressing plunger is provided with an opening or slot 17 through which the sword-like preformer 15 may pass. Therefore, the preformer 15 can pass through this opening 17 in the pressing plunger 16 and begin to preform a new filter plug, as clearly seen from Fig. 9, while the pressing plunger is finishing the forming of the filter plug 18 in the manner seen from Fig. 8. The ends of the pressing chamber and the opposite ends of the pressing plunger are so shaped that in the end positions of the plunger there is left a space between the opposite faces of the chamber and the plunger respectively corresponding to the desired form of the plug.

Figs. 10 and 11 show the manner of forming a filter plug in the lower half of the pressing chamber 9. From Fig. 11 and also from Fig. 8 it is seen, that while the preformer and the pressing plunger are clearing the opening 12 a new strip length 19 is introduced, so that the preformer as well as the pressing plunger form a filter plug at each to and fro movement.

According to the embodiment of the invention shown in Figs. 5 to 11 the pressing chamber 9 has an arc-shape, and preformer and pressing plunger move consequently in a curved path. However, as illustrated in Fig. 12, it is also possible to move the preformer 15a and the pressing plunger 16a in a straight path if the pressing chamber 9a and the said preformer and plunger are correspondingly shaped.

From the foregoing description it is seen that the preformer 15 always runs in advance of the pressing plunger 16. Such motion may be obtained by mechanism as shown for example in Figs. 3 and 4.

The preformer 15 is fastened to one arm 20 of a double-armed lever, rotating about the axis 21, the other arm 27 of which is pivoted to one end of a connecting-rod 23 by means of a bolt 22. The other end of the connecting-rod 23 is pivoted to a toothed wheel 25 by means of a crank-pin 24; the wheel 25 is rotated by any suitable means in the direction of the arrow and thereby gives the connecting-rod 23, the lever 20 and the preformer 15 an oscillating movement.

In a similar manner the drive of the pressing plunger is effected by a double-armed lever 26, 31, connecting-rod 28, crank-pin 29 and toothed wheel 30, the latter meshing with the toothed wheel 25 and rotating in the direction of the arrow. As the crank-pins 24 and 29 are offset with respect to each other, there results a corresponding lead in the travel of the preformer. As the preformer 15 must pass through the opening 17 in the pressing plunger 16, the lever 20, 27 is arranged on the one side and the lever 26, 31 on the other side of the pressing chamber.

As to be seen from Figs. 1 and 2 the ends of the pressing chamber 9 are so arranged with respect to the disc 4 that they lie on the circle described through the centres of the mandrels and they include an odd number of mandrel pitches. As already stated the paper tubes 2 are brought onto the mandrels 3 at each stepwise motion of the disc 4. As two pushers 6 and 7 are provided for feeding the plugs 18 only one of these pushers 6 and 7 becomes active, alternately, at each stepwise motion of the disc.

I claim:

1. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination, a pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a double-acting preformer and a double-acting pressing plunger both reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the length of material and finishing a plug respectively during each to or fro movement of the preformer and plunger, and means adapted to reciprocate said preformer and plunger within said pressing chamber.

2. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination, a pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a blade-shaped double-acting preformer, a double acting pressing plunger having an opening through which said preformer passes, said preformer and pressing plunger reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the length of material and finishing a plug respectively during each to or fro movement of the preformer and plunger, and means adapted to reciprocate said preformer and plunger within said pressing chamber.

3. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination, a pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a blade-shaped double-acting preformer, a double-acting pressing plunger having an opening through which said preformer passes, said preformer and pressing plunger reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the material length and finishing a plug respectively during each to or fro movement of the preformer and plunger, and means adapted to reciprocate said preformer and plunger within said pressing chamber in such a way that the preformer runs in advance of the pressing plunger.

4. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes compris-

ing, in combination, an arc-shaped pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a double-acting preformer and a double-acting pressing plunger both correspondingly curved and reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the length of material and finishing a plug respectively during each to or fro movement, levers oscillating about the centre of curvature of said pressing chamber and being connected with said preformer and plunger respectively, and means for oscillating said levers in such a way that the preformer runs in advance of the pressing plunger.

5. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination, an arc-shaped pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a double-acting preformer and a double-acting pressing plunger both being correspondingly curved and reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the length of material and finishing a plug respectively during each to or fro movement, levers oscillating about the centre of curvature of said pressing chamber and being connected with said preformer and plunger respectively, and means for oscillating said levers in such a way that the preformer runs in advance of the pressing plunger, said means consisting of toothed wheels meshing with each other, crank pins on said wheels, and connecting-rods pivoted with their one end to said pins and with their other end to said levers respectively.

6. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination an arc-shaped pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a double-acting preformer and a double-acting pressing plunger both being correspondingly curved and reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the length of material and finishing a plug respectively during each to or fro movement, spoons into which the plugs are introduced, a spoon disc carrying said spoons and arranged by the side of said chamber, and means for rotating said disc stepwise a distance of two spoons, the arc shape of said chamber being coincident with a portion of the circle described through the centres of said spoons and the operative ends of said chamber including an odd number of spoon distances.

7. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising, in combination an arc-shaped pressing chamber operative at both ends and having an opening between the opposite operative ends for introducing a length of material, a double-acting preformer and a double-acting pressing plunger both being correspondingly curved and reciprocating within said pressing chamber and coacting with the opposite operative ends thereof thereby preforming the material length and finishing a plug respectively during each to or fro movement, spoons into which the plugs are introduced, a spoon disc carrying said spoons and being arranged by the side of said chamber, two pushers coacting with said spoons and working alternately to introduce a plug into a spoon, and means for rotating said disc stepwise a distance of two spoons, the arc-shape of said chamber being coincident with a portion of the circle described through the centres of said spoons and the operative ends of said chamber including an odd number of spoon distances.

8. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising a member having a chamber therein provided with an opening for introducing a length of material to the chamber and an end section, a preformer and a pressing plunger both movable in said chamber in coincident paths, and means adapted to actuate said preformer and plunger in their coincident paths whereby the preformer preforms the length of material in its path from the opening to the end section and then the plunger presses the material into a finished plug in the end section.

9. Apparatus according to claim 8, in which the plunger is provided with a slot through which the preformer passes in the coincident path of travel of the plunger and the preformer.

10. Apparatus for forming filter plugs adapted to be introduced into cigarette paper tubes comprising a member having an elongated chamber therein having a semi-round portion at each end thereof and an opening intermediate the semi-round portions for introducing a length of material to the chamber, a preformer and a pressing plunger both movable in said chamber in coincident paths, said plunger having a semi-round portion at each end thereof cooperating with each semi-round portion respectively of the chamber, and means for reciprocating said preformer and plunger in their coincident paths whereby the preformer preforms the length of material in its path from the opening to the respective semi-round portion in the chamber and the plunger presses the material into a finished plug by the respective cooperating semi-round portions one in the chamber and the other in the plunger.

11. Apparatus according to claim 10, in which the preformer is blade-shaped and in which the plunger is provided with a slot for the passage of the preformer in the coincident path travel of the reciprocating preformer and plunger.

12. Apparatus according to claim 10, in which the preformer is blade-shaped arranged in the form of an arc, and in which the chamber and the plunger are circular.

13. Apparatus according to claim 10, in which the plunger is provided with a slot for the passage of the preformer in the coincident path travel of the reciprocating preformer and plunger, and in which the chamber, preformer, plunger and slot are circular whereby the plunger and preformer follow an arc-shaped path.

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