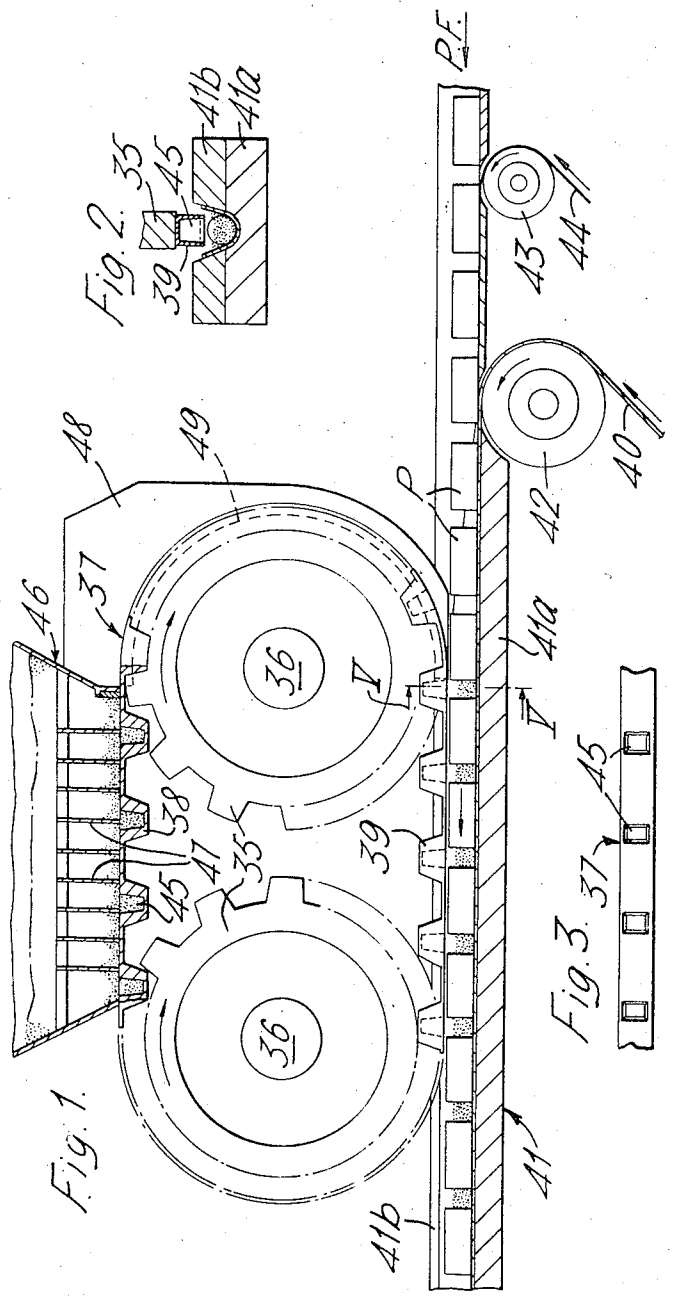
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APPARATUS FOR PRODUCING COMPOSITE FILTER PLUGS

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INVENTORS
David T. N. Williamson
Peter D. Loomes

By Watson, Cole, Grindle & Watson
ATTORNEYS

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APPARATUS FOR PRODUCING COMPOSITE FILTER PLUGS

David Theodore Nelson Williamson and Peter David Loomes, London, England, assignors to The Molins Organisation Limited, London, England, a corporation of Great Britain

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ABSTRACT OF THE DISCLOSURE

Apparatus is disclosed for making a composite rod of cigarette filters, including powdered filter material e.g. charcoal. An endless belt having spaced pockets is used to transfer the powdered material from a hopper to spaces between filter plugs traveling in a stream, with a continuous wrapper on a conveyor. Said belt has an upper run closing a discharge opening in the base of the hopper, and a lower run traveling immediately above the stream of plugs.

This invention relates generally to apparatus for producing composite filter plugs for cigarettes and more particularly to apparatus for producing a complete filter rod having portions of powdered filter material interposed between conventional plugs at regular intervals.

In the manufacture of filter-tipped cigarettes, it is a common practice to produce a rod of filter material wrapped in paper and thereafter to cut such rod into lengths sufficient for individual cigarettes; not infrequently the rod is first cut into lengths sufficient to furnish tips for two cigarettes, then placed between two cigarette lenghs (i.e. lenghs of tobacco wrapped in paper) and united therewith by a suitable band, whereafter the double-length portion of rod is cut in half to yield two tipped cigarettes. Such rods of filter material have been made as composite rods, i.e. containing two or more kinds of filter material, as for example one kind of filter material selected solely for its filtering efficiency, and another kind of filter material selected for its attractive appearance, the rod being then made and applied to cigarette lengths in such manner that the latter filter material appears at the end of the finished cigarette while the former filter material is interposed between the latter filter material and the tobacco.

Hitherto, however, the filter materials employed have been relatively coherent materials, e.g. paper or cotton wool, but it is now desired to improve the filtering efficiency by employing powdered material e.g. granules of activated carbon. With such material, it will be appreciated that there are practical difficulties in following the conventional practice of first forming short plugs of each filter material and then marshalling such plugs to construct a filter rod, even though some conventional plugs are still required, as powdered material is not suitable for the exposed end of a cigarette. It is an object of the present invention to provide apparatus with which filter rod containing powdered material may be made.

According to the invention, there is provided apparatus for producing composite filter rod including portions of powdered material, comprising means for feeding filter plugs in succession on to a continuous wrapper with gaps between successive plugs at regular intervals, means for filling said gaps with powdered material, and means for folding said continuous wrapper around said plugs and said material to form a continuous rod.

The plug feeding means is arranged to move the plugs

and the wrapper substantially horizontally through a loading zone, and the filling means comprises an endless flexible conveyor band having regularly-spaced carrier pockets therein, said band being so arranged that a lower run of the band travels through the loading zone immediately above said plugs with the pockets facing downward above the gaps between successive plugs, further means being provided for filling each of said pockets with the powdered material between successive passages of the pocket through the loading zone.

The folding of the wrapper may be performed by stationary folding blades, generally known in the art as a garniture, and preferably such blades are so placed that intitial folding, to bring the wrapper to a U section, is effected at each part of the wrapper before that part passes through the loading zone, so that the powdered material is not lost over the side edges of the wrapper.

In order that the invention may be fully understood, a preferred embodiment thereof will now be described in some detail, referring to the accompanying drawings, in which:

FIGURE 1 is a sectional elevation of part of a filter plug rod producing machine;

FIGURE 2 is a fragmentary section on line V—V of FIGURE 1; and

FIGURE 3 is a fragmentary plan view, from above, of a detail of the apparatus shown in FIGURE 1.

As seen in the drawings, two toothed wheels **35** mounted on parallel horizontal shafts **36** carry an endless conveyor band **37** so that it has horizontal upper and lower runs as indicated at **38**, **39** respectively. Below and parallel with the lower run **39** of band **37** is the top run of an endless conveyor belt **40**, which in operation moves from right to left as seen in FIGURE 4, while wheels **35** rotate clockwise so that lower run **39** of band **37** also moves from right to left at the speed of belt **40**. The belt **40** is supported by a base-plate **41** across which said belt slides, and although the whole length of belt **40** is not shown it will be understood that it has a return run below base-plate **41**, and at some convenient place on said return run the belt **40** passes around a driving pulley connected to a prime mover which is also connected to shafts **36** by any convenient form of transmission device (not shown). The belt **40** emerges from below the base-plate **41** to the right of said plate and there passes over a guide pulley **42**.

To the right of pulley **42** a further pulley **43** guides a continuous paper wrapper strip **44** fed from a supply reel (not shown), also below base-plate **41**, said strip **44** being fed on to the belt **40**. A succession of filter plugs P are fed from the right as indicated by arrow PF by any suitable means (not shown) driven by the same prime mover on to the strip **44** at regularly spaced intervals. As shown, each plug P is equally spaced from the preceding and succeeding plugs but it is noted that other arrangements are possible e.g. the plugs may be fed in pairs, with no gap between the two plugs of each pair.

The band **37** is toothed on its inner face, the teeth on said band being complementary in the form to the teeth of wheels **35** so that the drive to band **37** is positive. On its outer surface band **37** has regularly-spaced pockets **45**, the spacing of said pockets being equal to the spacing of successive gaps between plugs P and the connections from the common prime mover (not shown) to shaft **36** and to the plug feeding means being so arranged that each pocket **45** as it travels along the lower run **39**, immediately above plugs P, is aligned with one of said gaps.

Above the upper run **38** of band **37** is a powder hopper **46**, said hopper having in its base an elongated discharge opening of dimensions such that it is closed by said upper run **38**. Immediately above said discharge opening

the hopper **46** has a set of vertical guide vanes **47** to promote smooth flow of powder down to the opening. It will be understood that such vanes may be omitted if a powder having no tendency to clog is used, while if a powder containing relatively large granules, or otherwise especially susceptible to clogging, is in use the vanes **47** may need to be movably mounted and provided with some form of agitator. The powder employed may for example be granules of activated carbon.

A retaining plate **48** bears against the outer surface of band **37** around the right-hand wheel **35**, the plate **48** being fitted with side plates **49** overlapping the band and wheel slightly, so as to close the pockets **45** as they pass from the upper run **38** to the lower run **39**.

The base-plate **41** is of composite construction, comprising a main member **41***a* to the upper surface of which two parallel spaced strips **41***b* are secured. Together these three members define a central trough in which belt **40** and wrapper **44** travel. Below the lower run **39** of band **37** the form of the trough is as illustrated in FIGURE 2, but immediately above pulley **41** the trough is wider and its central portion is more gently curved, to avoid a sudden change in the form of belt **40** as it leaves pulley **41**.

In operation, as any given pocket **45** of band **37** travels from left to right in the top run **38**, it fills with powdered filter material from the hopper **46**, and then as that pocket travels round the right-hand wheel **35**, the powdered material is retained in the pocket by plate **48**. As the pocket leaves that wheel **35** and enters the lower run **39**, the powdered material is free to fall and does so; as the pocket is aligned with a gap between two successive plugs P, the falling powder fills said gap, being retained there by the adjacent plugs and by the wrapper **44** in view of the trough-like configuration to which the said wrapper and the belt **40** have been brought at this stage (FIGURE 2). During its passage along the lower run **39**, each pocket **45** has time to empty itself completely, even at high speeds of operation, so that a measured quantity of powdered filter material is delivered to each gap between successive plugs P. At the left-hand end of said lower run **39**, each pocket **45** travels round the left-hand wheel **35** to be filled again, while plugs P and wrapper **44**, with powdered filter material filling the gaps between the plugs, are fed to the left for further folding and sealing of the wrapper **44** in known manner to produce a wrapped composite filter rod.

We claim:

1. Apparatus for producing composite filter rod including portions of powdered material, comprising means for feeding filter plugs in succession onto a continuous wrapper with gaps between successive plugs at regular intervals, means for filling said gaps with powdered material, and means for folding said continuous wrapper around said plugs and said material to form a continuous rod, said plug feeding means being arranged to move the plugs and the wrapper substantially horizontally through a loading zone and said filling means comprising an endless flexible conveyor band having regularly-spaced carrier pockets therein, said band being so arranged that a lower run of the band travels through the loading zone immediately above said plugs with the pockets facing downward above the gaps between successive plugs, including further means for filling each of said pockets with the powdered material between successive passages of the pocket through the loading zone.

2. Apparatus as claimed in claim **1** including two toothed wheels rotatable on parallel horizontal shafts, the band being toothed on its inner face and carried by said wheels in positive drive relationship therewith.

3. Apparatus as claimed in claim **2** in which the further means comprises a powder hopper so arranged above an upper run of said band that said upper run closes an elongated discharge opening in the base of said hopper.

4. Apparatus as claimed in claim **3**, including a retaining plate arranged to bear against said band so as to close the pockets as they pass from the upper run to the lower run.

5. Apparatus as claimed in claim **4**, in which the folding means comprises stationary blades, including blades arranged to fold each part of the wrapper to a U section before that part passes through the loading zone.

6. Apparatus for producing composite filter rod containing portions of powdered filter material comprising means for feeding a stream of filter plugs with gaps between successive plugs at regular intervals onto a continuous wrapper, means for advancing said wrapper through an elongated loading zone, filling means comprising an endless flexible conveyor band mounted so that a lower run thereof extends parallel to and immediately above said stream of plugs on said wrapper in said loading zone, said band having a plurality of regularly-spaced powder-receiving pockets therein, a powder hopper arranged to allow powder to descend onto said conveyor band, and common driving means connected to drive the wrapper-advancing means and the conveyor band in synchronism so that each of the pockets of said conveyor band travels facing upwardly beneath said hopper and is filled with said powder after which each of said filled pockets of said band travels to said loading zone where it is facing downwardly and is in register with one of said gaps between successive plugs whereby the powdered material is transferred to the gap as said pocket of said band and said gap continue to pass through said loading zone.

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