March 2, 1971 H. WEIGAND 3,566,451

PROCESS FOR WIDENING AND LOOSENING CONTINUOUS ARTIFICIAL FIBER

Original Filed March 1, 1967 2 Sheets-Sheet 1

FIG. 1

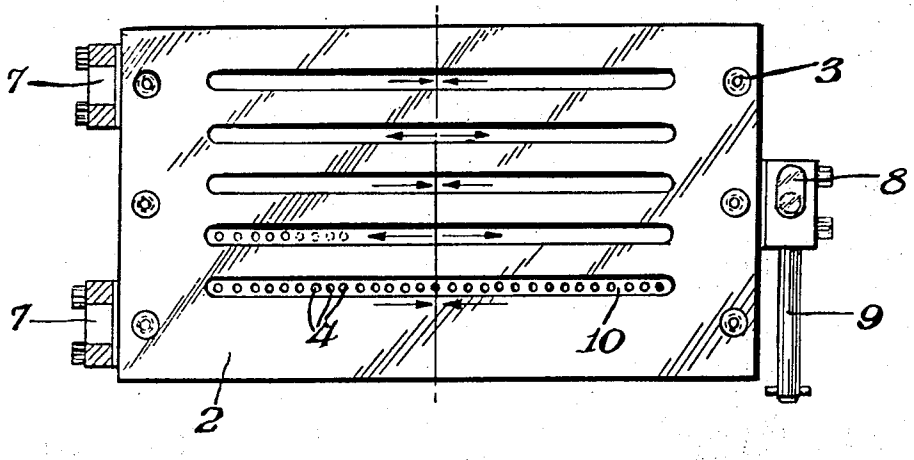
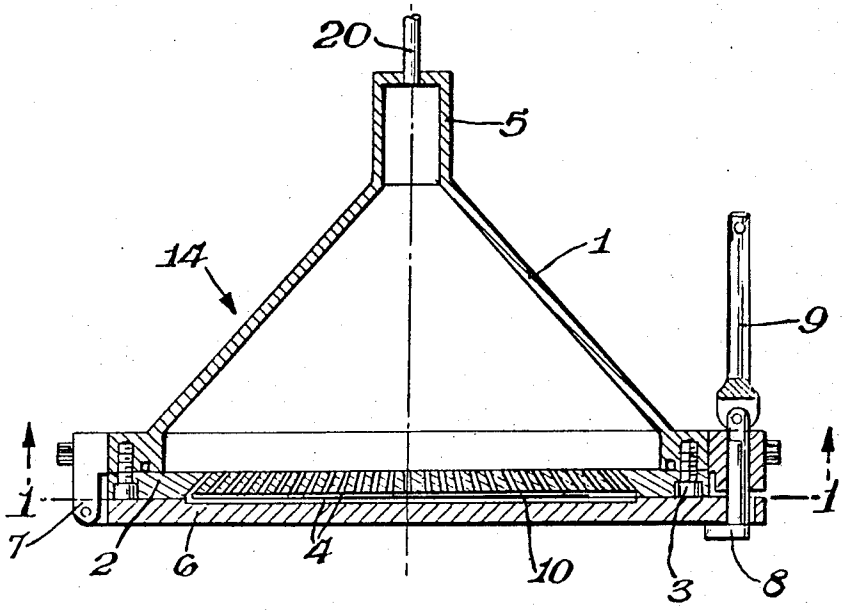


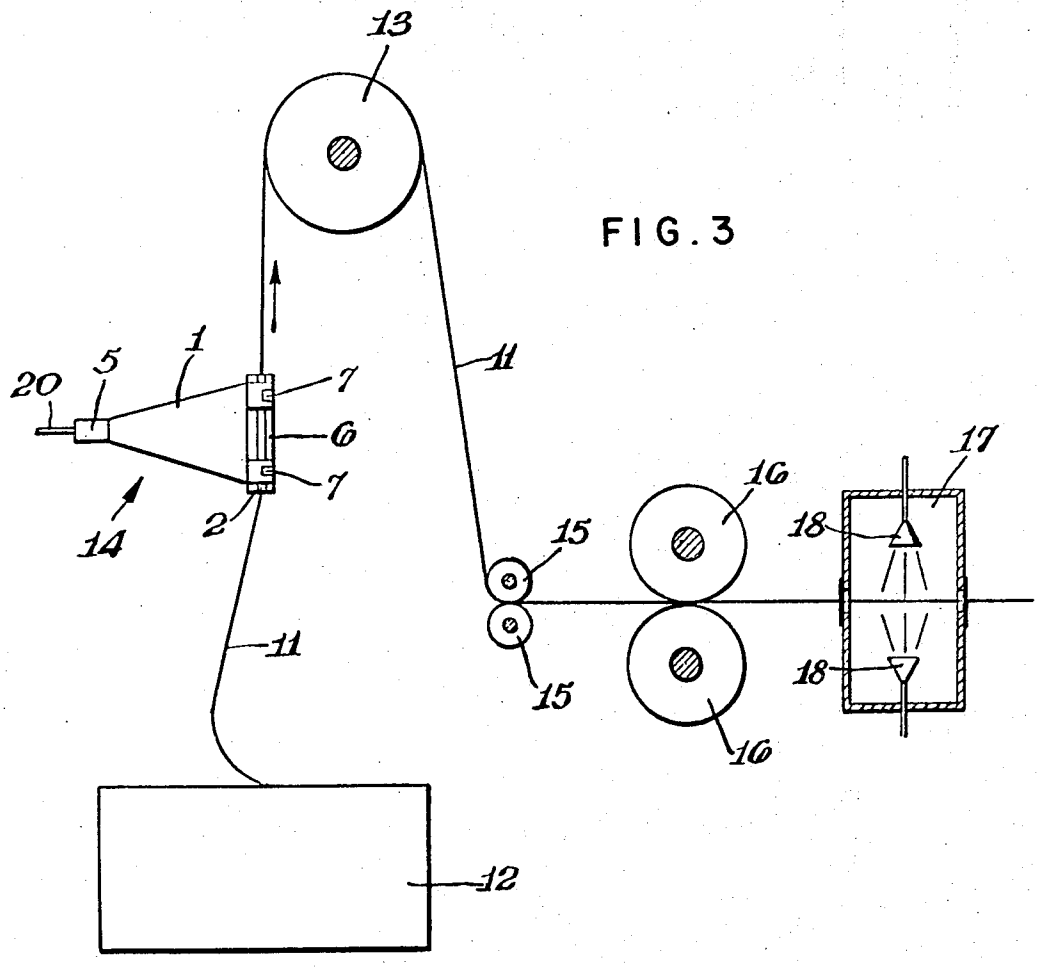
FIG. 2



PROCESS FOR WIDENING AND LOOSENING CONTINUOUS ARTIFICIAL FIBER

Original Filed March 1, 1967 2 Sheets-Sheet 2

FIG. 3



United States Patent Office 3,566,451 Patented Mar. 2, 1971

3,566,451

PROCESS FOR WIDENING AND LOOSENING CONTINUOUS ARTIFICIAL FIBER

Hans Weigand, Freiburg im Breisgau, Germany, assignor to Deutsche Rhodiaceta AG., Freiburg, Germany

Original application Mar. 1, 1967, Ser. No. 619,774, now Patent No. 3,444,592, dated May 20, 1969. Divided and this application Oct. 30, 1968, Ser. No. 794,442
Claims priority, application Germany, Mar. 2, 1966, D 49,482
Int. Cl. D01b 3/10
U.S. Cl. 19—66 2 Claims

ABSTRACT OF THE DISCLOSURE

Continuous artificial fiber strands are widened and loosened by means of a single or multiple passes through an apparatus having a plurality of rows of nozzles. Gas is blown through one row of nozzles away from the center, and is blown through the adjacent row of nozzles toward the center of the apparatus.

This application is a division of copending application Ser. No. 619,774, filed Mar. 1, 1967, now U.S. Pat. 3,444,592.

BACKGROUND OF THE INVENTION

The invention relates to a process for widening out and loosening up an endless or continuous running fiber strand, for example a strand of cellulose accetate. Fiber strands of this kind are employed as cigarette filters for tobacco smoke.

It is known to produce cigarette filters from strands of cellulose acetate which consists of about 10,000 to 20,000 endless fibers, and whose total titer is preferably between about 35,000 and 90,000 denier.

As a rule these strands possess a more or less intensive crimping whereby the individual fibers of the strand stick together so that the strand possesses only a slight volume. This condition is desired particularly for shipment because it permits the accommodation of a high weight in a given small volume.

It is further known to work up such filter strands—which possess a bandlike structure—on special so-called filter rod machines into filter rods for tobacco smoke. These filter rods are substantially longer than the length of the customary cigarette filter and are later cut into the filters of the desired length on known machine, in order thereafter to be combined with the tobacco portion of a filter cigarette.

In the filter rod machine the supplied, still closed and compact filter strand is broadened out and loosened up to such an extent that the stuck together fibers are completely loosened from each other and thereby are prepared for uniform reception of the softener.

The part of the apparatus for this portion of the manufacture customarily consists of a system of pairs of rolls in front of which and, if desired, between which there are arranged blower nozzles. While the pairs of rollers have the function of loosening the stuck together fibers by means of mechanical pressure, the loosening up of the fibers with the aid of the blower nozzles is accomplished by means of a more or less undirected gas stream. Nozzles of this kind, for example, consist of a plate having long slits that extend at right angles to the direction of movement of the strand. This plate rests as a closure upon the wide end of funnel-shaped air supply lines.

Nozzles of this kind have certain disadvantages. For example, a stronger gas stream occurs in the central portion of the nozzle, whereas the edge portions have a weaker gas stream. This has the result that the strand which is conducted along these nozzles tends to become thin in the central portion, whereas accumulations of fibers are formed at the edge portions thereby having a detrimental influence upon the loosening up of the strand and upon the quality of the resultant filter rods.

SUMMARY OF THE INVENTION

The subject of the present invention is a process for a more uniform distribution of the individual fibers. In accordance with this invention, instead of the slitted plate, a plate which incorporates a system of nozzle holes arranged in rows, whereby the nozzle holes are so arranged that from row to row alternately the air stream blows in the direction of the righthand and lefthand limits of the plate, namely outwardly and toward the center, respectively.

This is accomplished by boring the nozzle holes slantingly or at an angle whereby it is of particular advantage to alternate the distribution of the angle in such a manner that the angle of incidence of the outermost nozzle holes varies most strongly from the vertical. The minimum requirement is that there be at least two rows of hole nozzles. However, their number may be increased as desired. The greater the number of rows of hole nozzles, the greater is the loosening up effect. However, after a certain number of rows of hole nozzles, the loosening up is so good that increasing the number of the nozzle rows adds practically no advantage and therefore is economically useless. The diameter of such hole nozzles preferably varies between about 0.2–2.0 mm. The nozzles are preferably bored cylindrically. Yet, when special effects are desired, conical nozzles may also be employed. Their distance from each other may vary between about 1 and 10 mm. Determinative for these measurements is the characteristic of the strand that is to be worked up, particularly its thickness and its degree of crimping.

The above mentioned borings may end directly on the nozzle plate, i.e. in the plane on which the cable runs. It is, however, also possible to arrange them recessed in a groove whereby the depth of this groove may amount approximately between 0.1–2.0 mm.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is section view through FIG. 2 along the line 1—1;

FIG. 2 is cross-sectional view in elevation of an apparatus according to this invention; and

FIG. 3 is a schematic and diagrammatic view of an arrangement employing the apparatus of FIGS. 1–2.

DETAILED DESCRIPTION

In FIGS. 1 and 2 the blower nozzle **14** consists of an outwardly widening funnel **1** whose opening rests upon a gas exit plate **2** and is attached thereto by means of screws **3**. In this plate **2** are provided rows of holes **4**. The holes are so arranged that one row will blow the introduced compressed gas away from the center (centrifugal), whereas the succeeding row will blow the gas in the opposite direction against the middle (centripetal) as shown in FIG. 1. The stem of the funnel **5** is connected to the supply line **20** for the compressed gas. Through this supply line **20** there is conducted air or some other readily expandable gas under pressure into the funnel **1**.

The strand of fiber now runs between the gas exit plate **2** provided with the holes and a cover plate **6**. This cover plate **6** is movably attached at one side to the gas exit plate **2** by means of two hinges **7** and are closeable at the opposite side by means of a bolt **8**. The bolt **8** is locked by means of a toggle **9**.

The movable cover plate **6** serves inter alia to simplify the introduction of the fiber strand.

Into the gas exit plate **2** and the cover plate **6** a recessed portion **10** is cut out through which the fiber strand runs. The holes **4** of the gas exit plate all open into this recessed portion. The gas coming out of the nozzles escapes from this recessed portion in both directions (upwardly and downwardly in FIG. 2).

FIG. 3 shows how a strand of fiber **11** is pulled off from a ball or source of strand **12** in the direction of the arrow. The fiber strand runs over a direction reversing device **13**. Between the supply container **12** and the direction reversing device **13** there is arranged the blower nozzle **14** (consisting of elements **1–10**). The fiber strand **11** now runs at constant speed through the chamber (recessed portion) **10** of the blower nozzle, whereby air or some other gas under pressure is introduced into the funnel **1** and through the holes **4**. The strand of fiber is loosened up and broadened out in this operation. The loosened up and broadened out fiber strand runs over the reverse direction roller **13** and between two pairs of rollers **15** and **16** into a spray chamber **17**. In this spray

chamber **17** there is sprayed on to the fiber strand a softener by means of two opposed spray nozzles **18**. The fiber strand which has been moistened (wetted) with the softener is now worked up into filter rods.

What is claimed is:

1. A process for broadening and loosening continuous fiber characterized in passing the fiber through successive blasts of gas which alternate in the direction in which the gas is directed onto the fiber, with one blast of gas being directed from the sides toward the center of the fiber and the successive blast being directed from the center toward the sides of the fiber.

2. A process as set forth in claim **1** wherein the alternate blasts of gas emanate from a single device.

References Cited

UNITED STATES PATENTS

3,226,773	1/1966	Paliyenko	19—66
3,333,315	8/1967	Dyer et al.	28—72.2

DORSEY NEWTON, Primary Examiner