

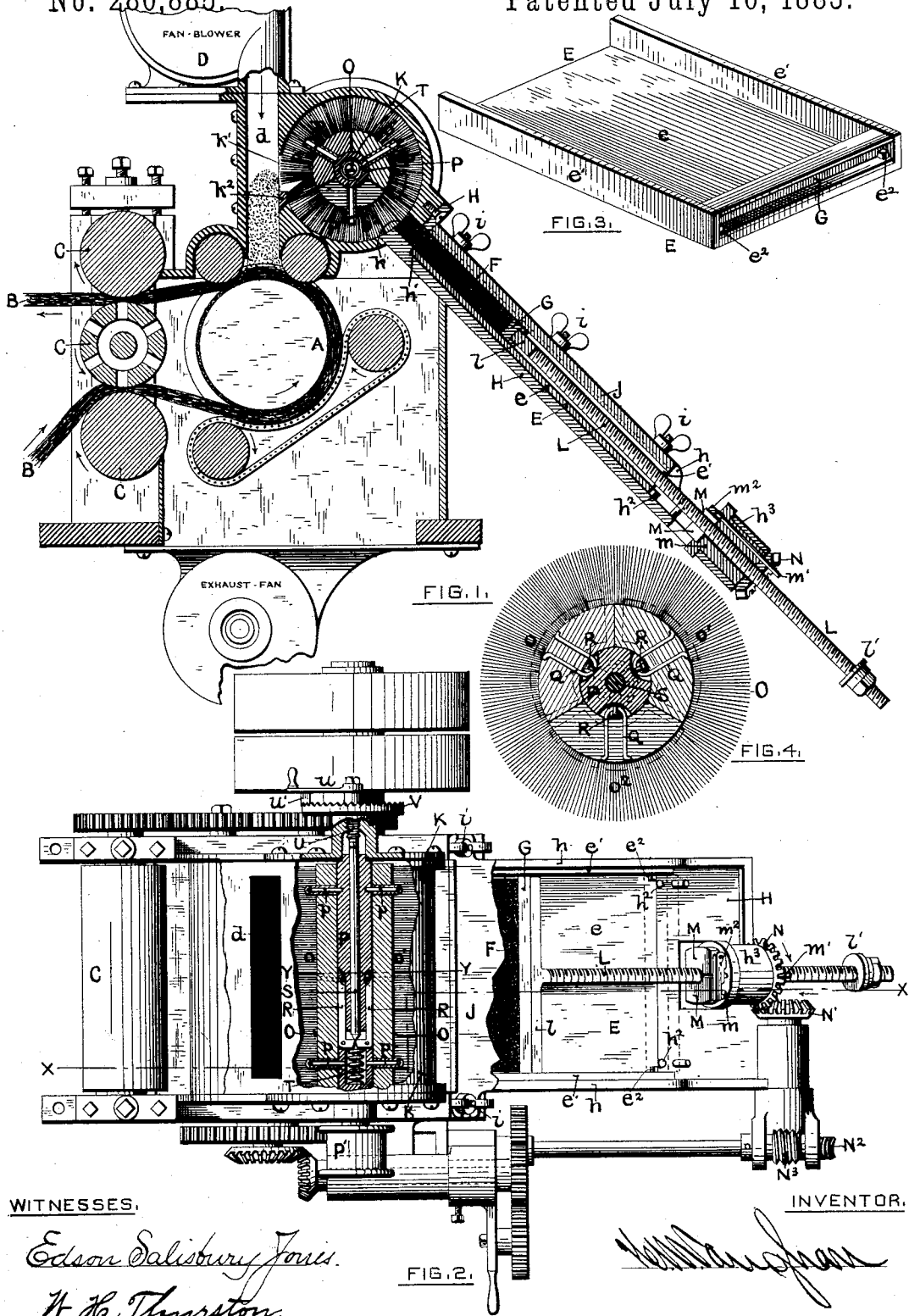
(No Model.)

H. W. VAUGHAN.

MACHINE FOR APPLYING COLORING MATTER TO FIBROUS MATERIAL.

No. 280,885.

Patented July 10, 1883.



UNITED STATES PATENT OFFICE.

HENRY W. VAUGHAN, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE
UNITED STATES DYEING COMPANY, OF SAME PLACE.

MACHINE FOR APPLYING COLORING-MATTER TO FIBROUS MATERIAL.

SPECIFICATION forming part of Letters Patent No. 280,885, dated July 10, 1883.

Application filed May 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. VAUGHAN, of the city and county of Providence, and State of Rhode Island, have invented a new and useful
5 Improvement in Machines for Applying Coloring-Matter, &c., to Fibrous Materials; and I do hereby declare that the following specification, taken in connection with the accompanying drawings, forming a part of the same,
10 is a full, clear, and exact description thereof.

In Letters Patent of the United States No. 273,198, issued February 27, 1883, on my application, there is described a machine for applying coloring-matter to fibrous material,
15 which consists generally of a bed for supporting the material to be treated, means for feeding the material through the machine, an air-blast-producing device, and mechanism for delivering color-charged powder into the air-current in order that said powder may be incorporated with the fibrous material.

My present invention relates to a machine for a similar purpose; and the invention consists in the improved means employed for supplying powder to the air-blast, whereby a measured quantity can be discharged with accuracy into the air-current for delivery to the material to be treated and the quantity be regulated, as will hereinafter appear.

20 The invention also consists in the method or process of applying pulverulent powder, color-charged or otherwise; to fibrous material in the practice of the processes and inventions described and referred to in Letters Patent of the United States heretofore
35 granted to me, and numbered 223,019, 242,080, and 242,081, by causing the powder with which the fibrous material is to be treated to be compressed into a cake, and then such cake
40 to be disintegrated or triturated by a device or devices which shall remove the end of the cake in the form of a pulverulent powder and discharge such powder into the air-blast in a quantity determined by the speed at which
45 the cake is fed forward and the speed at which the disintegrating or triturating device is revolved or worked.

The invention further consists in certain details of construction of the disintegrating device, as will hereinafter appear.

In the drawings I have illustrated mechanism for carrying out my improved method of delivering the powder to the air-blast, the said mechanism being combined with a machine having substantially the main elements of my
55 patented machine hereinbefore referred to.

Figure 1 represents a vertical section on line $x x$ of a machine embodying the invention. Fig. 2 shows a top view of the same, partially in section. Fig. 3 represents the form or mold
60 for holding the cake of compressed powder which is to be disintegrated. Fig. 4 shows on an enlarged scale a transverse section on line $y y$ of the device for disintegrating the cake.

The elements of the machine shown in the
65 drawings which are found in my prior machine are a revolving cylinder, A, having a perforated or open-work surface for supporting the sheet or sliver B of fibrous material, feed-rolls C for delivering the material to and
70 removing it from the machine, a fan-blower, D, or other air-blast-producing device, and a duct, d , for conveying the air under pressure to the fibrous material as it passes through
75 the machine. With these elements there are combined my improved mechanism for furnishing the air-current with the powder to be incorporated with the fibrous material, such mechanism consisting generally in a receptacle for powder in the form of a compact cake, 80
85 devices for gradually and uniformly feeding such cake from the receptacle, and means for disintegrating or triturating the end of the cake and delivering the pulverulent product to the air-current.

In carrying out my improved method of supplying the air-current with a measured quantity of pulverulent powder to be incorporated with the fibrous material, the powder, whether it be charged with coloring-matter or with a mordant, or with both coloring-matter and a mordant, for the purpose of dyeing the material, or consists of a white earth combined with an oleaginous constituent for the purpose of lubricating the material, and thereby facilitating
95 its manufacture into yarn, is first compressed in the receptacle or mold E, so as to form a compact cake, a portion, F, of which is shown in Figs. 1 and 2, or the powder having been
100 compressed into a cake is placed in such mold.

As particularly shown at Fig. 3, this mold has a bottom, *e*, and two sides, *e'*. One of its ends is open, and the other is closed by a bar, G, which is held in normal position (shown in Fig. 3, and by dotted lines in Fig. 2) by lugs *e''*, projecting from the sides of the mold, and is adapted to be slid through the mold to feed the cake of compressed powder, as will hereinafter appear. The mold, having been properly filled, is placed in a frame, H, which is secured to the machine, the ends of the mold fitting between a shoulder, *h'*, Fig. 1, and pins *h''* *h'''* on said frame, which, in connection with the sides *h* of the frame, hold the mold in place. A cover, J, is placed over the mold and clamped thereto and to the frame H by devices *i*, or in any preferred manner. The frame H is secured to a hollow cylinder or case, K, having an opening or throat, *k*, which is in alignment with the cake of compressed powder, and through which the cake is fed to be disintegrated.

Various devices may be used for feeding the cake at a uniform speed; but in the drawings the devices employed are a screw, L, having a head, *l*, which fits into a recess in the bar G, as shown in Fig. 1, and a two-part nut, M, which engages said screw and is revolved. The two parts of the nut are mounted on the end of a cylinder, *m*, which has a bearing in a sleeve, *h''*, on the frame H, and to which a bevel-gear, N, is attached. This gear meshes with a gear, N', secured to a shaft which bears a worm-gear, N'', the said gear N'' being engaged by a worm, N''', which is driven by gearing, as shown in Fig. 2. The revolution of the nut M causes the screw L to move the bar G along the mold E, and thereby gradually to feed the cake F in a direction toward the axis of the hollow cylinder K.

The means by which the end of the cake F is disintegrated as it is gradually and uniformly moved forward under the action of the feeding devices consists of a brush, O, which is mounted on a shaft, P, and closely fits the bore of the hollow cylinder or case K, as shown in Fig. 1. By means of a pulley, P', attached to the shaft P, or by means of gears properly arranged, the brush is revolved, thereby disintegrating the end of the cake and reducing it to a pulverulent powder, which powder is carried forward by the bristles of the rotating brush, to be discharged through an opening, *k'*, into the duct *l*, where it is taken up by the current of air produced by the blower and conveyed to the fibrous material. The discharge of the pulverulent powder carried by the bristles of the brush O is effected by a lip, *k''*, Fig. 1, which projects into the bore of the cylinder K in such a manner as to bend the bristles backward and cause them to flip off the powder as they spring off the lip.

Since the bristles of the brush O are subject to wear, which would cause the brush imperfectly to perform its office after a certain amount of use, and would necessitate the substitution of new brushes at frequent intervals, I prefer to construct the brush in two or more

parts, so that it can be expanded as the bristles wear, and thereby be made to remove from the end of the compressed cake F the same amount of pulverulent powder at all times. In the drawings I have shown the brush as composed of three parts, *o o' o''*, each of which is mounted on radial pins *p*, secured to the shaft P, as shown in Figs. 1 and 2, in order that the parts of the brush shall be held in place and be revolved by the shaft. A brush constructed as described is susceptible of radial expansion during its revolution by centrifugal force; but since at low speeds this force will not be sufficient to cause the parts of the brush properly to act upon the cake F, and at high speeds will cause too much friction between the bristles and the interior cylindrical surface of the case K, it is desirable that the parts of the brush should be under the control of mechanical means capable of radially expanding the brush and of holding its parts in definite positions. One of many means which may be employed for these purposes is shown in Figs. 2 and 4. The body portions or backs of the parts *o o' o''* of the brush are supplied with staples or eyes Q, which project sufficiently beyond the inner surfaces of said backs to be engaged by the hooked ends of fingers R, lying in grooves in the shaft P, and pivoted thereto. The fingers R are in the form of bell-crank levers, the short arms of which are radial to the longitudinal axis of the shaft P, and are engaged by a rod, S, upon one side and a spring, T, upon the other, as particularly shown in Fig. 2. The outer end of the rod S is engaged by a screw, U, to which is secured a handle *u*. This handle is a spring, and is provided with a tooth, *u'*, which engages the ratchet-face of a disk, V, and holds said screw in a definite position.

It will be readily understood that the spring T, being of sufficient power, will move the fingers R radially, and thereby expand the parts of the brush radially if the handle *u*, and thereby the screw U, be revolved in the proper direction to allow the rod S to retreat, and that therefore the positions of the parts of the brush can be controlled, as the bristles wear away, by turning the handle *u*, so that the brush may be made to remove the same amount of material from the cake F at all times.

It is desirable to provide some means for automatically stopping the mechanism for feeding when the powder-cake is nearly or quite exhausted. The means for this purpose which I have found convenient to use are as follows: Upon the feed-screw L is placed a nut, *l'*, which can be adjusted to any position on the screw, and with reference to the length of the powder-cake. As the cake is fed forward, the screw L progresses until the face of the nut *l'* strikes against the end of a pin, *m'*, and, moving the same, trips a latch, *m''*, which holds the two parts of the nut M in engagement with the screw to produce the feed, whereupon a spring (not shown in the drawings, but arranged so as to exert a constant tendency to

separate the two parts of the nut M,) will be permitted to act and disconnect the nut from the screw L. Consequently the feeding mechanism will be no longer operative. The feed-screw L, being no longer under the control of the nut M, will, from its gravity, slide downward, and this movement can be utilized to strike a bell to sound an alarm, or to work the belt-shipper to stop the whole machine by very simple devices within the capacity to provide of ordinary constructors of machinery.

The operation of the apparatus is as follows: The compressed cake of powder having been placed in its holder or receptacle, and the latter having been placed in proper relation to the brush, as shown at Fig. 1, with the edge of the cake projected so as to enter the opening or throat *k* of the case for the brush, the machine is put into action. The revolution of the brush disintegrates the end of the powder-cake and carries the pulverulent product along until it is discharged into the wind trunk or duct *d*, which leads to the supporting-cylinder A, over which the fibrous material which is to be supplied with powder passes; and after such pulverulent product is so discharged, so as to be under the influence of the air-current, the operation of the machine in applying the powder to the material is the same as that described in the Letters Patent No. 273,198, granted upon my application. When the powder-cake has been exhausted, the feed-motion stops, as above described, whereupon the machine should be stopped and a fresh cake supplied to be acted upon by the disintegrating-brush, as before.

It is apparent that with the cakes of powder of uniform or nearly uniform consistency, the rotating disintegrating-brush acting only against the end of the cake under a speed of rotation capable of easy regulation, the quantity of powder which is discharged into the air-current to be applied to the fibrous material will be practically constant and uniform in quantity.

I have shown in the drawings a revolving brush or disintegrator and a case for the same appropriate thereto, and in practice I have found this construction and arrangement to be entirely practical and satisfactory; but it is apparent that instead of a revolving disintegrator, one which has a reciprocating movement within a suitable case, combined with suitable means for introducing the end of the cake of powder into the case, so as to be disintegrated, can be employed; and it is also apparent that instead of a projecting salient lip, *k*², being employed, the interior of the case of

the disintegrator can be made eccentric in the neighborhood of the aperture *k*², connecting the disintegrator-case with the air-trunk. It is clear, too, that an active feeding device for feeding forward the compressed cake of powder can be dispensed with by locating the receptacle containing the cake of powder in such relation to the case that it will be projected gradually, so as to come under the action of the disintegrator by its own gravity, or by the aid of a weight.

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

1. The combination, substantially as hereinbefore set forth, of a holder or receptacle for a compressed cake of powder to be applied to fibrous material for dyeing, coloring, or similar purposes, suitable means, as described, for feeding forward the said compressed cake, and suitable means, as described, for disintegrating the end of such cake as it is fed forward.

2. The combination, substantially as hereinbefore set forth, of a holder or receptacle for a compressed cake of powder, a case for containing a brush or disintegrator, having a throat in alignment with said holder or receptacle, a disintegrator mounted within said case, and an air-trunk for receiving the powder removed from such cake by the disintegrator.

3. The combination, substantially as hereinbefore set forth, of an air-trunk for conveying powder to be incorporated with fibrous material for dyeing or similar purposes, a disintegrator mounted within a case, as described, and a flipper or equivalent means for discharging powder from the disintegrator into the air-trunk.

4. The combination, substantially as hereinbefore set forth, of a holder or receptacle for a compressed cake of powder, a case having a throat, as described, and a brush mounted in said case, and adapted, as described, to be expanded radially, for the purposes set forth.

5. The method, substantially as hereinbefore described, of applying pulverulent material, for dyeing or similar purposes, to fibrous matter, which consists in first forming or compressing the pulverulent material into a cake; secondly, in disintegrating said cake by suitable means, as described; and, thirdly, introducing the powder so obtained into an air-current to be incorporated with the fibrous matter, as set forth.

H. W. VAUGHAN.

Witnesses:

W. H. THURSTON,
I. KNIGHT.