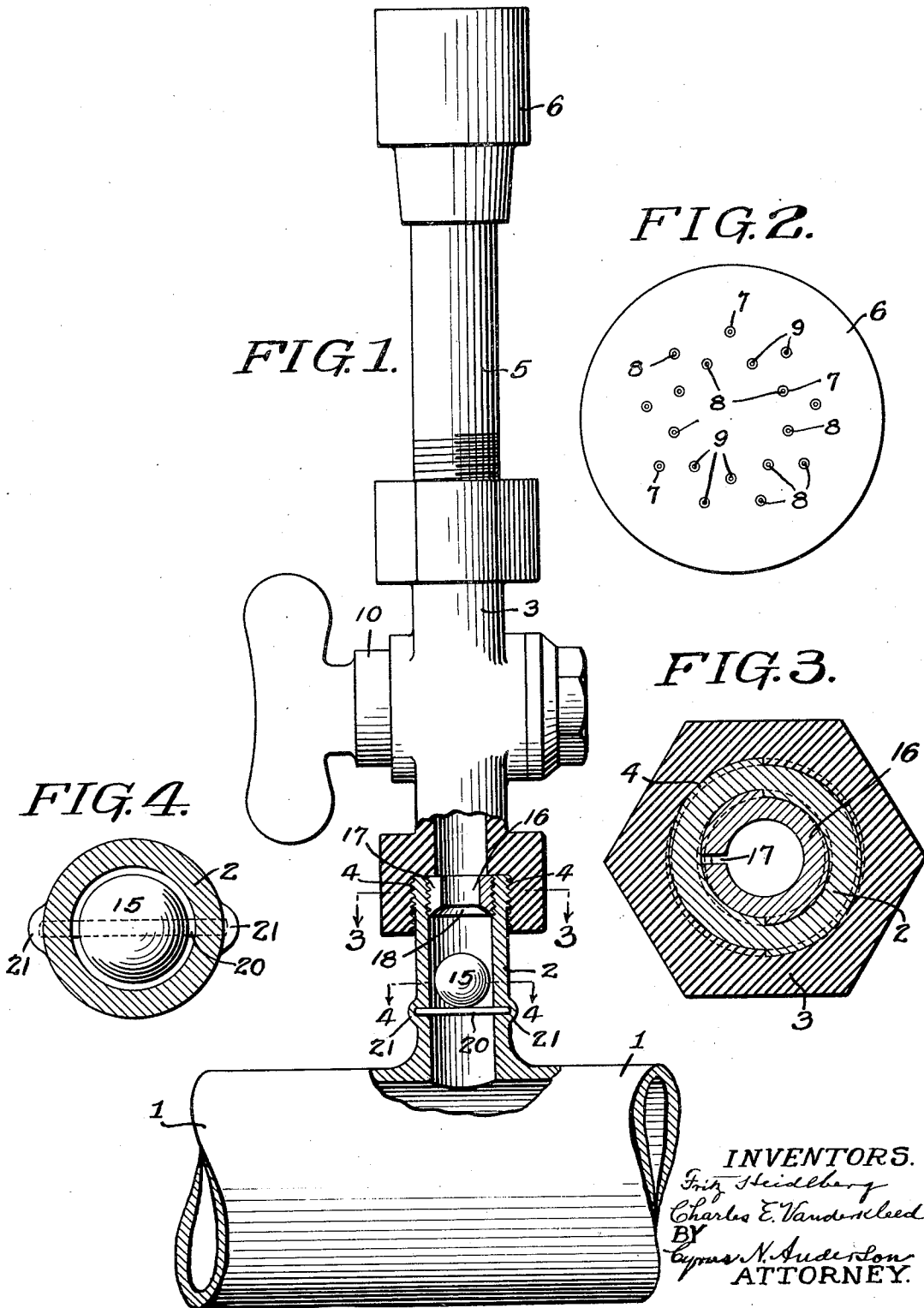


F. HEIDLBURG AND C. E. VANDERKLEED.
SAFETY MEANS FOR DISCHARGE NOZZLES.
APPLICATION FILED JAN. 26, 1920.

1,405,132.

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UNITED STATES PATENT OFFICE.

FRITZ HEIDLBERG, OF PHILADELPHIA, PENNSYLVANIA, AND CHARLES E. VANDERKLEED, OF COLLINGSWOOD, NEW JERSEY, ASSIGNORS TO THE PENNSYLVANIA COMPANY FOR INSURANCES ON LIVES AND GRANTING ANNUITIES.

SAFETY MEANS FOR DISCHARGE NOZZLES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FRITZ HEIDLBERG, a citizen of German-Austria, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, and CHARLES E. VANDERKLEED, a citizen of the United States, and a resident of Collingswood, in the county of Camden and State of New Jersey, have invented an Improvement in Safety Means for Discharge Nozzles, of which the following is a specification.

In the manufacture of cellulosic filaments, employed in the production of artificial silk, the cellulose is dissolved in a suitable solvent, such as cupro-ammoniacal liquor, and the solution thus formed is placed under pressure and caused to be discharged from a pipe, the end of which may terminate in a head having therein a greater or less number of capillary openings. Such head is known as a spinneret. Such pipe may, however, terminate in a single capillary opening. The cellulosic solution is discharged from the capillary openings in the form of filaments into a suitable coagulating or fixing bath, such, for example, as a fifty per cent solution of sulphuric acid or a forty per cent solution of sodium hydroxide. The coagulant employed, for instance acid, either is in contact or is liable to contact with the nozzle structure, in consequence of which it is customary to employ in the construction of the same, a material which will not be affected by the acid, as for instance hard rubber. Such material is apt to be brittle and more or less easily or likely to be broken. Upon the occurrence of such breakage, if no means is employed to prevent it, the cellulosic solution will gush from the pipe, shooting many feet into the air, the height depending upon the pressure under which the cellulosic solution is maintained, and will continue to escape therefrom in a gushing stream until the pressure thereon is removed or until the pipe is in some way disconnected or cut off from the supply. In addition to causing the loss of valuable material, such occurrence is likely to injure the operative in charge of the work.

Some of the objects of our invention are to provide means for preventing the gushing or shooting out of the cellulosic solution from a pipe in case the nozzle or discharge

portion thereof should become broken and at the same time permit a small flow of the said solution through a portion of the said pipe.

Other objects and advantages of our invention will be referred to in the detailed description thereof which follows or will be apparent therefrom.

In order that our invention may be readily understood and its practical advantages fully appreciated, reference may be had to the accompanying drawing in which we have illustrated one convenient form of embodiment of the same.

In the drawing:

Fig. 1 is a view showing the portion of a main supply pipe and a branch pipe partly in central, longitudinal section and partly in elevation, connected therewith;

Fig. 2 is a top plan view of the nozzle structure showing the front of the spinneret with the capillary openings therein;

Fig. 3 is an enlarged transverse, sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged transverse, sectional view taken on the line 4—4 of Fig. 1.

Referring to the drawing: 1 designates a main supply pipe having connection with a tank or other source (not shown) of the cellulosic solution which is to be supplied to the branch pipes, having connection therewith, only one of which is shown in the drawing for the purpose of illustrating our invention. The pipe 1 is of lead or other material which will not be affected by the acid or other material employed in the process of manufacturing the cellulose filaments. 2 is a branch pipe of the same material as the pipe 1 to which is connected an extension 3 thereof consisting of hard rubber or other material not affected by acids or other substances employed in connection with the process. In the construction as shown the parts 2 and 3 have screw threaded connection with each other as indicated at 4. However, these parts may be otherwise connected to each other. The part 3 is provided with an additional extension 5, although if desired the parts 3 and 5 may be formed integrally. The outer end of the extension consisting of the parts 3 and 5 is provided with a head or spinneret 6 of hard rubber or other suitable material, provided in its outer face or end

with a series of openings 7 in which short glass plugs 8 are situated, through each of which a capillary opening 9 extends.

Ordinarily the passage of the solution through the branch pipe comprising the parts 2, 3 and 5, is controlled by means of a valve 10. In the normal operation of the process the solution in the pipe 1 is under a pressure of approximately one and one-third atmospheres and is forced through the branch pipes and is caused to extrude through the capillary openings 9 in the spinneret 6. These filaments are discharged directly into a coagulating medium which is provided in proper relation to the spinneret in any known manner. The several filaments are collected together to form a single thread which is wound upon a suitable roll in known manner.

As already indicated, it some times happens that some portion of the structure above or beyond the section 2 (which is of metal) of the branch pipe becomes broken, in which event the solution will be discharged in a gushing stream through such broken pipe, projecting a relatively great distance therefrom.

In order to prevent an unnecessary waste of material in case of breakage and also to prevent the solution from projecting to any great extent beyond the end of the branch or the broken portion thereof in case of breakage, we have provided a ball valve 15 which is situated in the branch 2 a short distance below its upper, outer end. To provide a seat for the valve 15 when it is in position to close the branch pipe, we have provided a relatively short, inner sleeve or lining portion 16 of suitable material as iron at its outer end which is externally screw threaded for engagement with internal screw threads adjacent the outer end of the member 2. 17 designates a slot through the sleeve or lining member 16 constituting a by-pass for the passage of solution from the branch pipe 2 when the valve 15 is in position upon its seat 18 at the lower, inner edge or end of the sleeve or lining member 16. It will be observed that the diameter of the ball valve 15 is considerably less than the internal diameter of the pipe 2, so that the solution may pass readily between the surface of the said ball and the interior surface of the portion 2 of the branch pipe. For the purpose of retaining the ball 15 within the portion 2 of the branch pipe during the normal operation of the process, we have provided a pin of iron or other suitable material 20, which extends diametrically across the tube 2. Its outer ends are protected by means of coverings 21 of lead or other material which will not be affected by the acid or other material employed as a coagulant.

During the operation of the process and when the cellulosic solution is being extrud-

ed through the capillary openings 9, the pressure upon both sides of the ball 15 is the same so that it occupies the position shown in Fig. 1 of the drawing. Assume, however, that the branch pipe should be broken off at any point beyond or above the outer end of the portion 2 thereof, or assume that the face of the spinneret or head 6 should be blown out. Such released pressure in the branch pipe beyond the portion 2 thereof would permit the solution to rush through the branch pipe. This would effect movement immediately of the ball valve 15 against its seat 18 to close the passageway through the pipe except for the by-pass 17. In this way the rushing or gushing out of the solution would be prevented. The size or transverse area of the by-pass 17 is such that a quantity of material is permitted to flow therethrough equal to the combined quantity which flows or is extruded through the capillary openings 9 in the spinneret. The purpose of this is that after the broken portion of the branch pipe has been removed and a new, unbroken one substituted therefor, the material will flow through the by-pass and gradually fill the portion of the branch pipe above or beyond the outer end of the portion 2 thereof, so that ultimately the pressure, on opposite sides, that is, on the inner and outer sides of the ball valve 15, would become equalized. It will then drop from its position against the seat 18 into the position in which it is shown in Fig. 1 of the drawing, upon the opening 20. But for the presence of the by-pass 17 there would be no means of permitting the portion of the branch pipe above or beyond the outer end of the portion 2 thereof to become filled with the solution to thereby effect an equalization of pressure upon opposite sides of the valve.

Although we have shown and described our invention as applied to a branch pipe employed in the process of manufacturing cellulosic filaments, it will be understood that it may be employed in connection with nozzle structures for other like or analogous purposes. It will also be understood that any desired number of branch pipes may be connected with the main supply pipe 1.

We claim:

1. In combination, a pipe provided with a valve seat a distance from one end thereof through which a fluid material under pressure is adapted to flow, a valve supported in operative relation to said valve seat and normally in open position but adapted to be automatically closed upon release of pressure beyond said valve seat, and a continuously open by-pass for permitting flow of material around said valve when it is in closed position.

2. In combination, a pipe through which a viscous fluid is adapted to flow under pressure, said pipe being provided with a

valve seat interiorly thereof a relatively short distance from the discharge end thereof, a valve in normally open position, means for retaining said valve in the said pipe in operative relation to the said seat, the said valve normally permitting the said fluid to pass readily through the said pipe and being adapted, when the pressure beyond the said valve seat is released, to move into engagement with the said valve seat under the influence of the pressure of the said fluid, and a continuously open by-pass for permitting flow of the said fluid beyond said valve when it is in closed position.

3. In combination, a pipe through which a liquid under pressure is adapted to flow, the discharge end of said pipe being provided with one or more capillary openings, the said pipe being provided a distance from its discharge end with an interior valve seat, a valve situated in the said pipe in operative relation to the said valve seat and being adapted to move longitudinally of the said pipe toward and from the said seat, means within the said pipe for retaining the said valve in operative relation with respect to the said seat and the said valve being adapted, upon release of pressure between the said seat and the said discharge end of the said pipe, to be moved under the influence of the pressure of the said liquid into position upon the said seat, and a continuously open by-pass to permit the said liquid to flow beyond the said valve when it is in closed position.

4. In combination, a pipe through which a liquid, as cellulosic solution, is adapted to flow under pressure, said pipe comprising two or more sections, one section consisting of metal and the other of a relatively brittle material, the latter terminating in a discharge nozzle having capillary openings through which the said solution is adapted to be extruded in the form of filaments, the said metal section being provided with a valve seat upon its interior adjacent the end thereof which is connected to the said relatively brittle section of the said pipe, a valve situated in the said metal

section of the pipe in operative relation with respect to the said valve seat, the pressure of the said solution upon opposite sides of the said valve normally being the same whereby the said valve remains in open position, means for supporting the said valve in operative relation to the said seat, the said valve being adapted to be moved longitudinally of the said pipe into closed position under the influence of the pressure of the said solution in case of the release of pressure beyond the said seat, and a continuously open by-pass for permitting a flow of the said solution beyond the said valve when in closed position.

5. In combination, a main supply pipe for supplying a cellulosic solution under pressure, a branch pipe leading therefrom, said branch pipe comprising a relatively short section of metal and a section of a relatively brittle material, as hard rubber, the two sections being detachably connected, the latter terminating in a discharge head provided with a plurality of capillary openings through which the said solution is discharged in the form of filamentary threads and the former being provided adjacent its outer end with an interior sleeve member provided with a valve seat upon its inner end, a valve situated in the said metallic section, which valve normally is in open position and is adapted to be moved into closed position under the influence of the pressure of the solution in the event of release of pressure in the portion of the branch pipe beyond the outer end of the said metal section, and a by-pass for permitting a small flow of the solution beyond the said valve when it is in closed position and means for normally retaining the said valve within the said metal section in operative relation with respect to the said seat.

In testimony that we claim the foregoing as our invention, we have hereunto signed our names this 5th day of January, A. D., 1920.

FRITZ HEIDBERG.
CHARLES E. VANDERKLEED.