Nov. 11, 1930. P. HILLEBRAND 1,781,231

ARTIFICIAL SILK SPINNING MACHINE

Filed Jan. 28, 1926 2 Sheets-Sheet 1

Fig.1

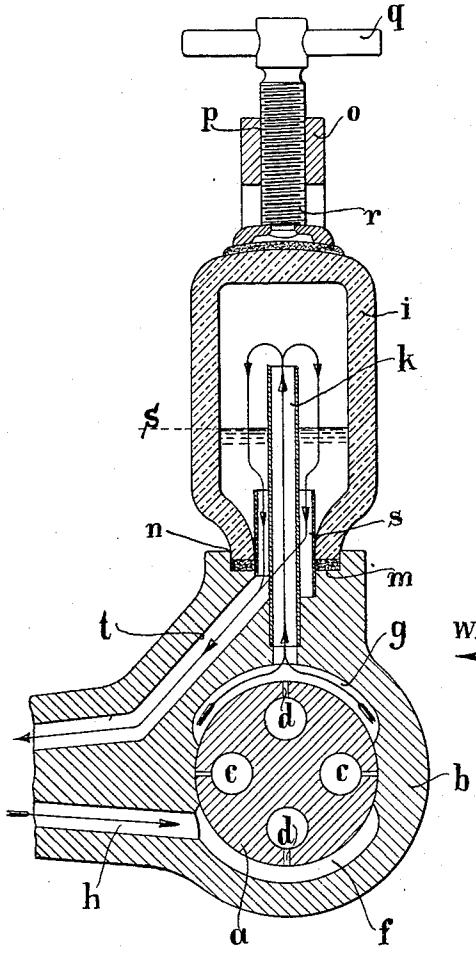
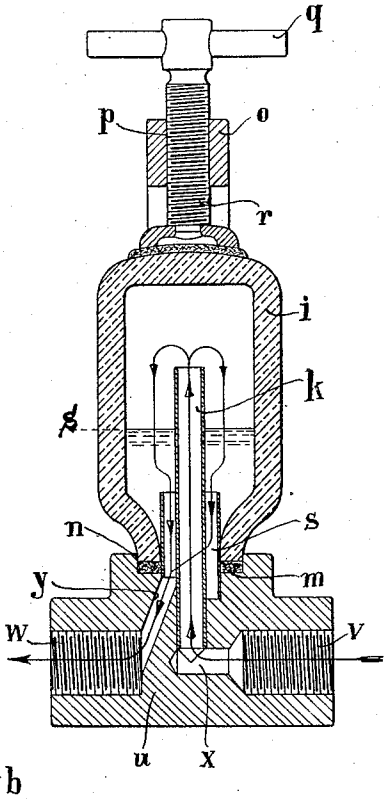


Fig.2



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ARTIFICIAL SILK SPINNING MACHINE

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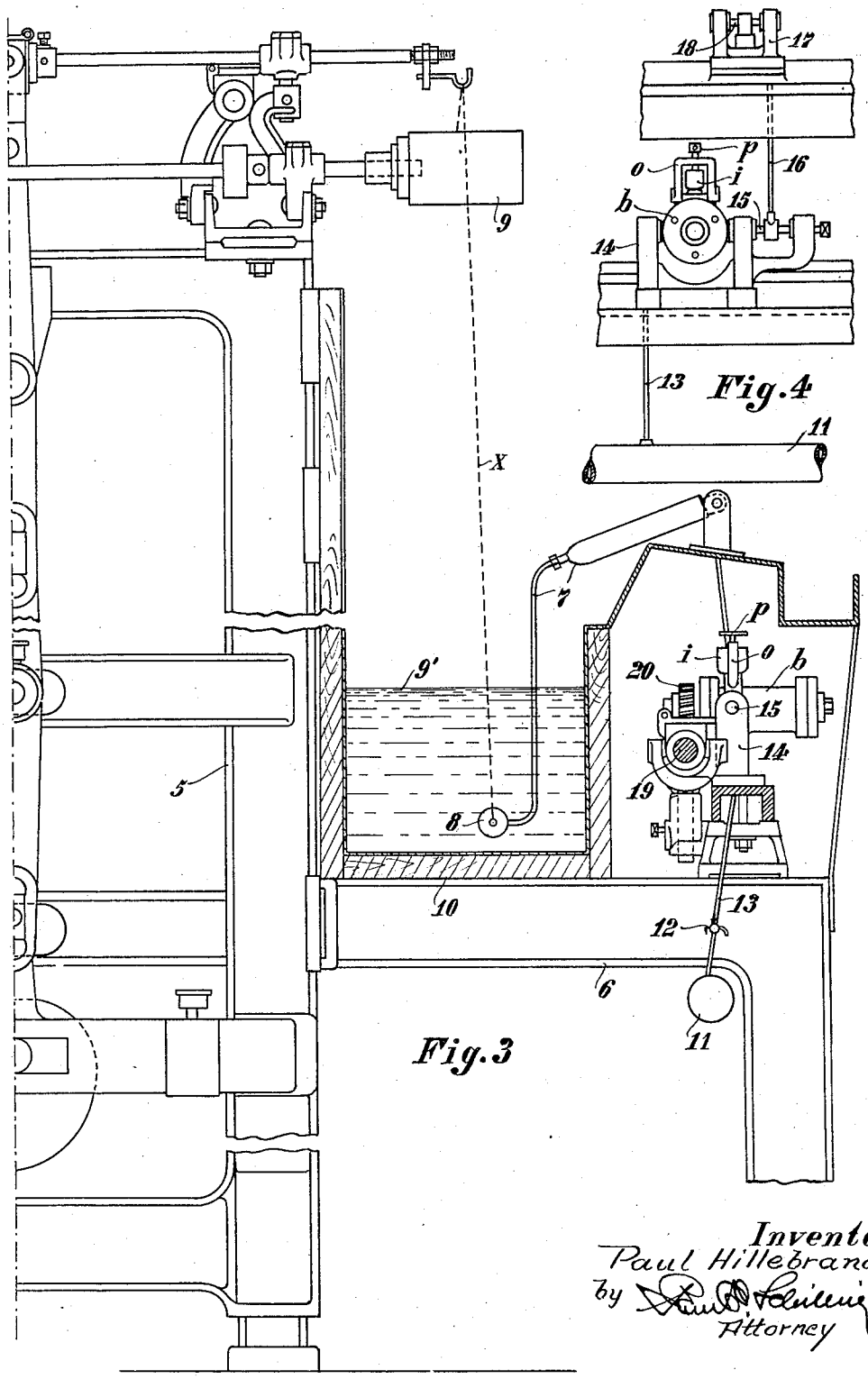

Fig. 3

Fig. 4

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UNITED STATES PATENT OFFICE

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ARTIFICIAL-SILK-SPINNING MACHINE

Application filed January 28, 1926, Serial No. 84,407, and in Germany March 4, 1925.

The present invention refers to artificial-silk spinning machines of that character wherein a pressure-equalizing chamber formed in the manner of an air-vessel is arranged between the pump for propelling the liquid to be spun and the spinning nozzle. In prior spinning machines of this character the spinning liquid issuing from the pump enters at some depth below the level of the liquid, namely, at the lower end of the air-vessel and at the same level as that whereat the liquid again leaves the air-vessel. The consequence of this is that only the lower portion of the liquid contained in the air-vessel is continuously renewed, while on the other hand the upper layer of liquid which is in contact with the compressed air above the liquid in the air-vessel undergoes no renewal. This upper layer of liquid congeals (sets) quickly and thus loses its elasticity so that the pressure variations caused by the pump are no longer "buffered" by the air in the air-vessel. The pressure variations on the other hand, continue in the duct leading to the spinning nozzle and cause marked inequalities in the thickness of the threads of artificial silk produced.

This drawback is obviated by the present invention, in which the spinning liquid is introduced into the air-vessel at a level located at least at the height of the liquid-level in the air-vessel or at a still greater height and in which the spinning liquid is discharged from the air-vessel below the liquid-level and preferably from the lower end of the air-vessel. By this method no longer merely the lower portion of the liquid in the air-vessel but the entire liquid-column contained in said vessel is maintained in constant flux and constantly renewed. The surface layer in contact with the air is therefore constantly changing so that this layer can no longer stiffen or solidify. The elasticity of the liquid in the air-vessel is therefore constantly maintained so that the pressure-variations set up by the working of the pump can be equalized by the compression and expansion of the air in the air-vessel and consequently threads of uniform thickness may be continually produced.

The apparatus for carrying out the invention is characterized by the feature that the spinning liquid is introduced into the pressure-equalizing chamber through an overflow pipe opening into the upper portion of the latter.

Two forms of apparatus for carrying out the invention are shown by way of example in the accompanying drawing, wherein

Fig. 1 shows a pressure-equalizing chamber mounted directly on the pump and arranged in accordance with the present invention, and

Fig. 2 shows the chamber mounted on the duct which connects the pump with the spinning nozzle.

Fig. 3 is a vertical cross-section through one-half of a spinning machine for viscose silk, showing the application of my invention according to Fig. 1 thereto.

Fig. 4 is a fragmental view in elevation from the operative side of the machine, i. e., from the right hand side of Fig. 1.

Referring to the drawing, the drum *a* of the pump rotates in the cylinder *b* and contains four axial bores *c* in each of which moves a piston (not shown). From each bore *c* a transverse bore *d* leads to two arcuate grooves *f*, *g* each occupying somewhat less than half the circumference of the casing, of which grooves the one *f* is connected to the supply duct *h* and to the other is connected an overflow pipe *k* leading into the air-vessel *i*. The said overflow pipe *k* opens into the upper portion of the air-vessel and therefore at a place which is above the highest liquid-level existing in practice, this level fluctuating possibly about the line S. The air-vessel *i* is closed above, and below is mounted on a flanged facing *n* on the cylinder *b*, a packing ring *m* being inserted between. A bridge piece *o* fastened to the cylinder *b* embraces the air-vessel *i*. In a threaded-hole *p* of the bridge-piece is arranged a spindle *r* provided with a handle *p* and capable of being screwed down, so pressing at its lower end against the air-vessel *i*.

The overflow pipe *k* is surrounded by a second, but shorter pipe *s* which terminates in the lower portion of the air-vessel *i* and

serves for conducting away the spinning liquid. To this pipe is connected the duct *t* leading to the spinning nozzle.

In the modification shown in Fig. 2 the air-vessel *i* is mounted on a union *u* connected in the duct between the pump and the spinning nozzle, into the threaded holes *v*, *w* of which union are screwed the supply and delivery pipes. The hole *v* is connected by a duct *x* to the overflow pipe *k* and the hole *w* by a duct *y* to the discharge duct *s*.

The liquid flowing through the pipe *k* distributes itself on the surface of the liquid contained in the air-vessel *i*. The liquid flowing away through the pipe *s*, on the other hand, is withdrawn from the layer of liquid existent at the lower portion of the air-vessel. There thus occurs within the air-vessel a continuous flow of liquid downwardly so that no particles of liquid remain constantly in the air-vessel.

In order that my invention in its application may be fully understood, I have shown in Figs. 3 and 4 its mode of use, in the form shown in Fig. 1, in a machine for spinning viscose silk. As shown, 5, 6 is the frame of the machine, which carries on each side of its longitudinal middle plane a series of spinning units. Each such unit includes a feed pump *b* for the spinning solution with communicating pressure equalizer *i*, a spinneret 8 carried by a swingable pipe 7, and a take-up device 9 for the spun thread. The pipe 7 with the spinneret extends into the precipitant 9′ contained within a trough 10 extending along the entire length of the machine. 11 denotes the feed pipe common to a series of spinning units for feeding the spinning solution, which feed pipe is connected with the individual pumps *b* by means of branch pipes 13, each provided with a cut-off and discharge valve 12. The branch pipes communicate with a bore of the journal cheeks 14, which bore also communicates with the sucking side of the pump *b*, which latter can be swung about a horizontal axis formed by trunnions 15. The pressure side of the pump *b* communicates through one of these trunnions 15 which is hollow, and a pipe 16, with a bore within one of the journal cheeks 17 for the swingable pipe 7 supporting the spinneret 8. The journal cheek bore, in turn, communicates through the hollow trunnion 18 with the pipe 7 and thereby with the spinneret 8.

Each pump *b* is driven from a common drive shaft 19 by means of a worm meshing with the worm wheel 20 of the pump. By swinging the pump about its horizontal axis the worm wheel 20 may be disconnected from the shaft worm, so that each individual pump may be independently placed into or out of operation.

What I claim is:—

1. In a silk spinning apparatus, the combination with a spinning liquid supply pump, and a spinning nozzle, of a pressure equalizing chamber disposed between the pump and nozzle, said chamber having an inlet communicating with the pump and serving to deliver the liquid into the chamber at or above the normal working level of the liquid in the chamber, and said chamber having a liquid discharge outlet leading to the nozzle from a point below the normal working level of the liquid in the chamber.

2. In a silk spinning apparatus, the combination with a spinning liquid supply pump and a spinning nozzle, of a pressure equalizing chamber disposed between the pump and the nozzle, an outlet tube projecting into said chamber and free from contact therewith at its inner end and at its outer end leading to said nozzle, and an inlet tube of materially less diameter than the outlet tube and extending into the chamber therethrough, said inlet tube communicating at its outer end with the pump and delivering the liquid into the chamber at or above the normal working level of the same therein, the inner end of the outlet nozzle being normally below the working level of the liquid.

3. In a silk spinning apparatus, a spinneret, a source of supply of a spinning solution, a pump between said supply and said source, and means between the pump and the spinneret for preventing material fluctuations of pressure of the fluid and atmospheric influences affecting its degree of fluidity, said means comprising a vessel having a solution receiving chamber and an air space above the level of the solution therein, a supply conductor for introducing the solution to said chamber above the surface level of the body of solution therein, and a discharge conductor for conducting away solution from the chamber below the surface level of the body of solution therein.

In testimony whereof I affix my signature.

PAUL HILLEBRAND.