L. MORANE.

ARTIFICIAL SILK SPINNING MACHINE.

APPLICATION FILED OCT. 25, 1910.

1,069,456.

Patented Aug. 5, 1913.

6 SHEETS—SHEET 1.

Fig. 1

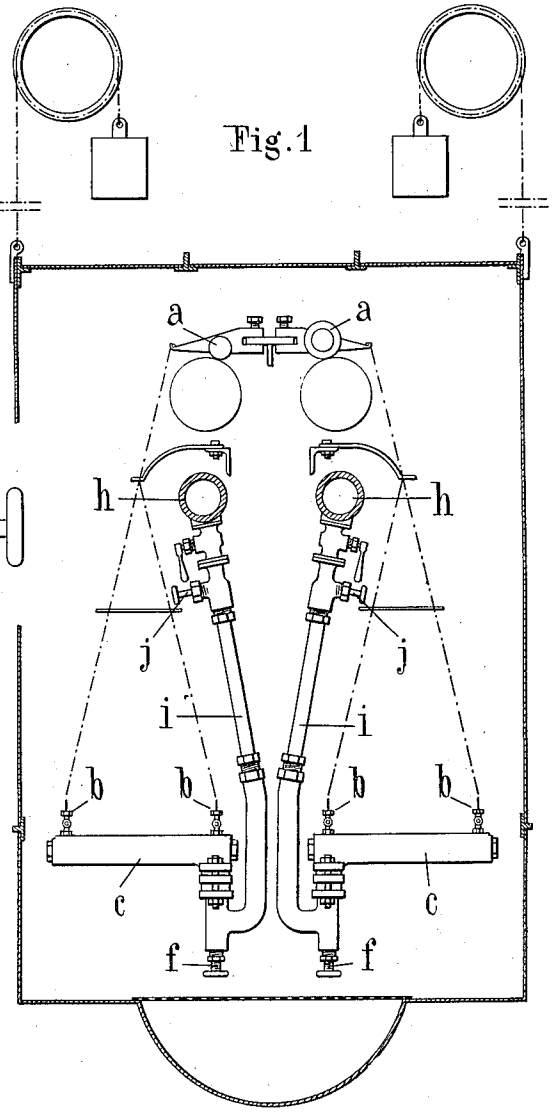
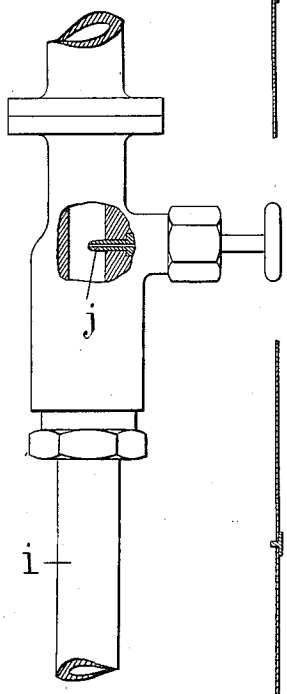


Fig. 6



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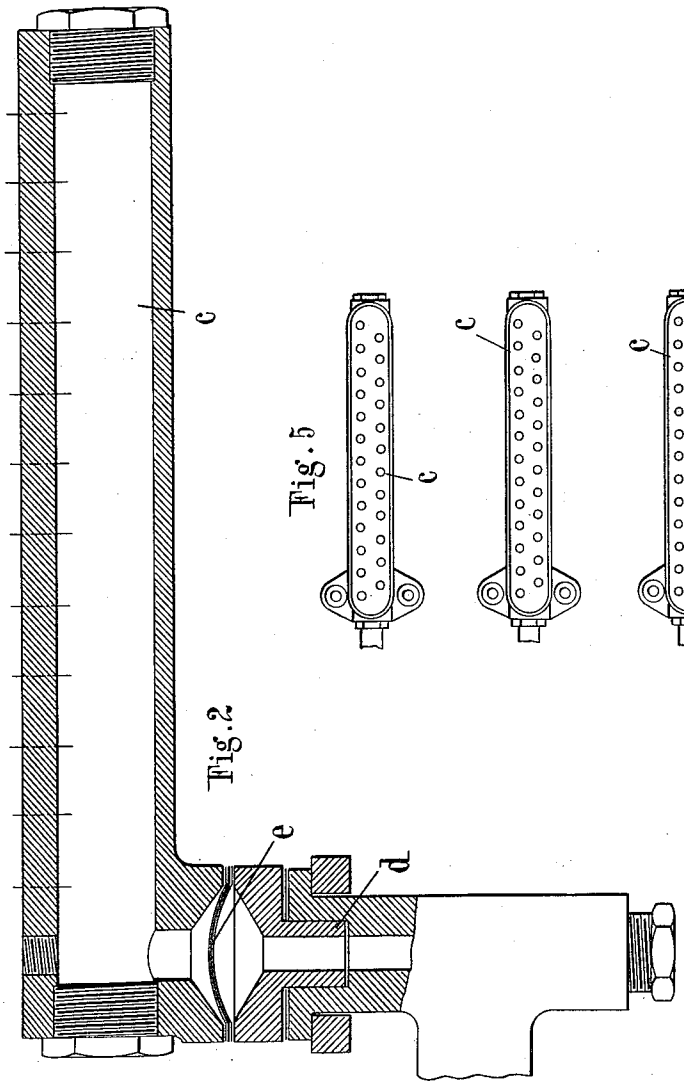

Fig. 2

Fig. 5

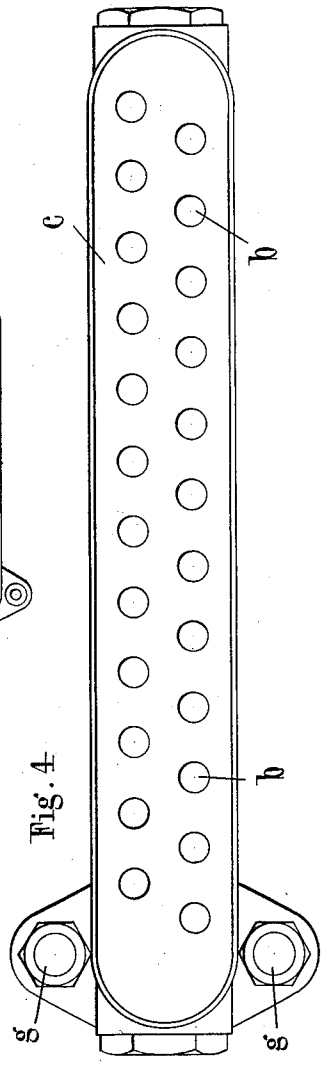

Fig. 4

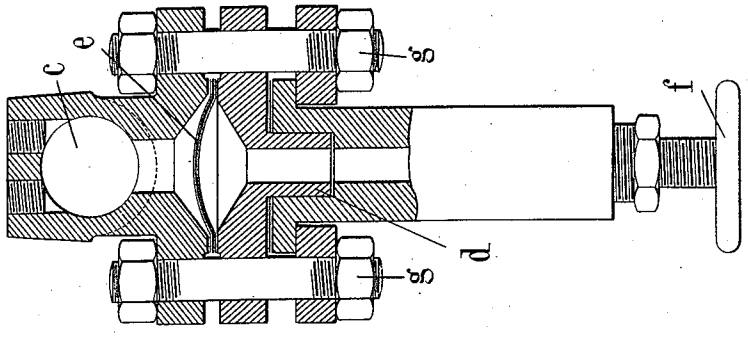

Fig. 3

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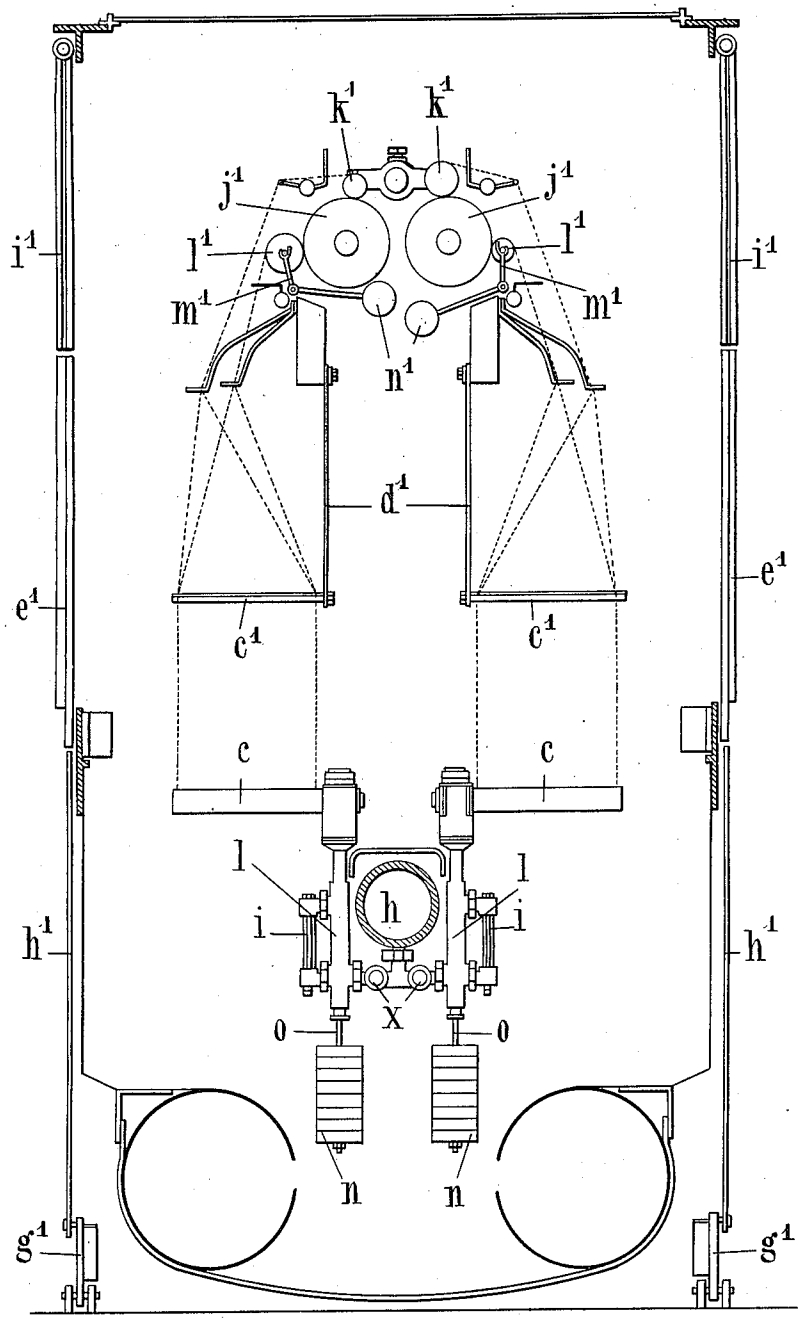
6 SHEETS—SHEET 3.

Fig. 7



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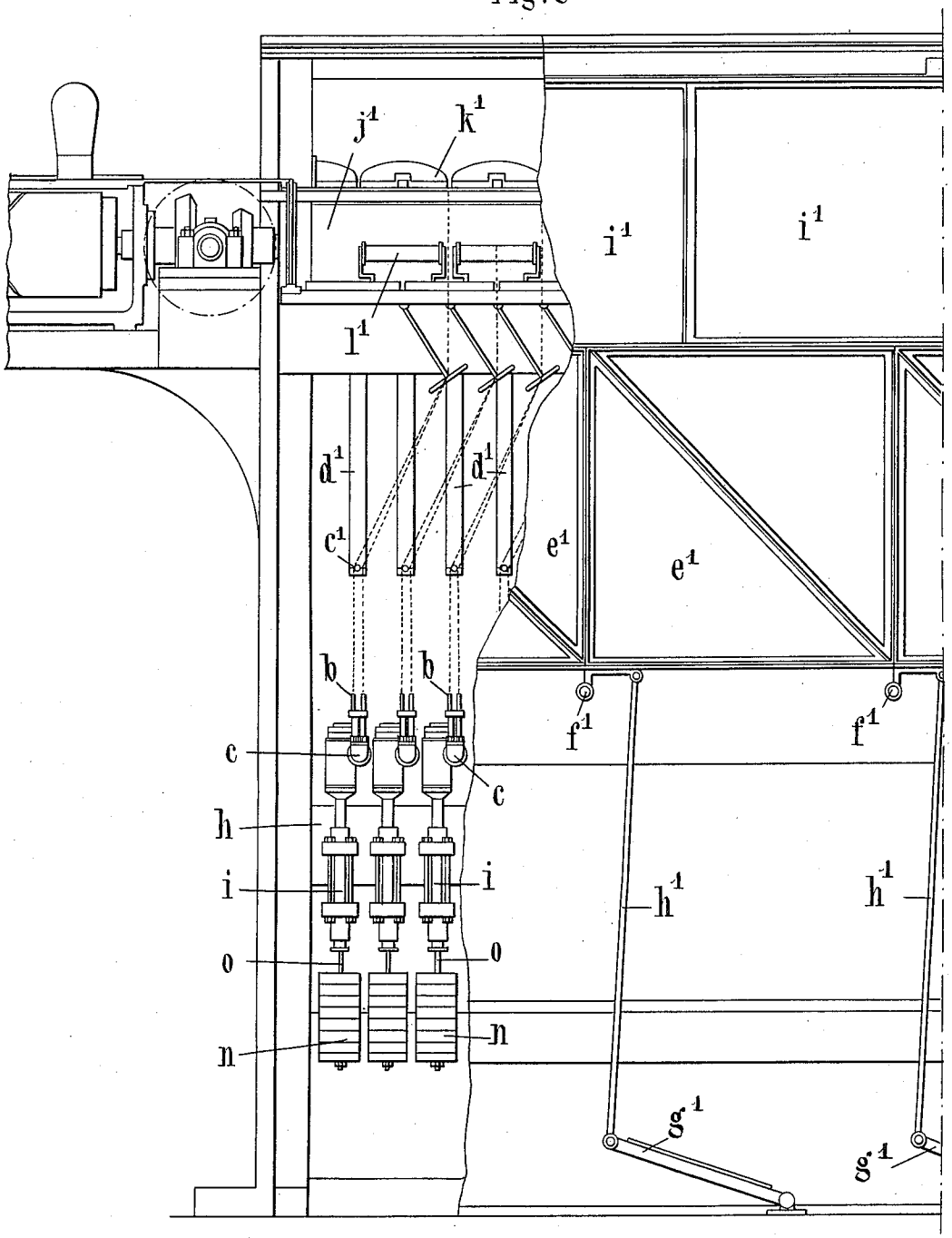
6 SHEETS—SHEET 4.

Fig. 8



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ARTIFICIAL SILK SPINNING MACHINE.

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6 SHEETS—SHEET 5.

Fig. 10

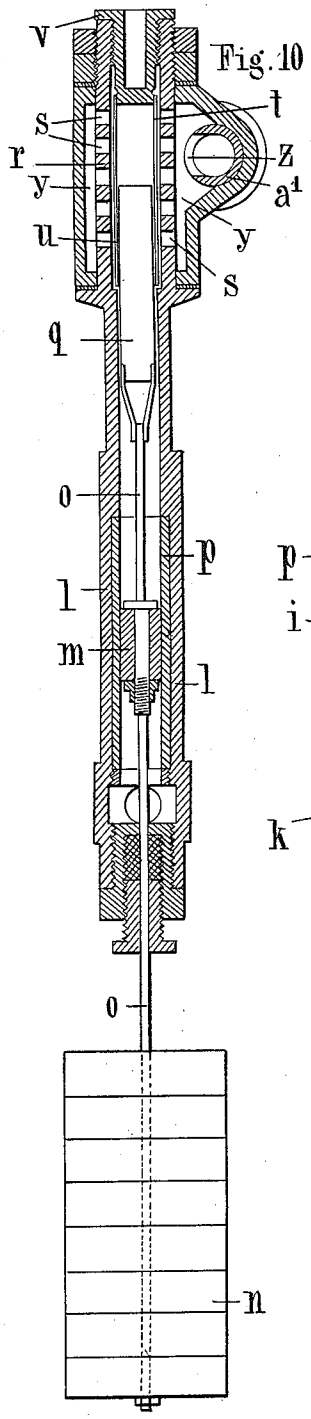

Fig. 9

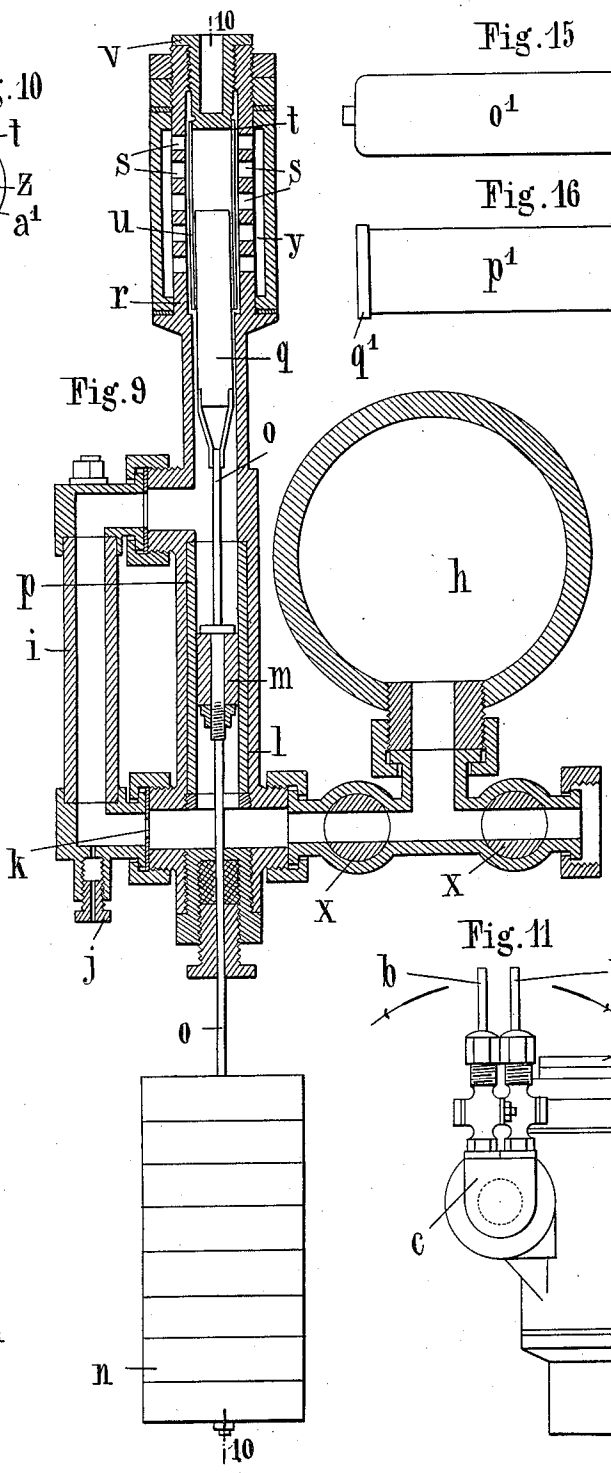

Fig. 15

Fig. 16

Fig. 11

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APPLICATION FILED OCT. 25, 1910.

1,069,456.

Patented Aug. 5, 1913.

6 SHEETS—SHEET 6.

Fig. 12

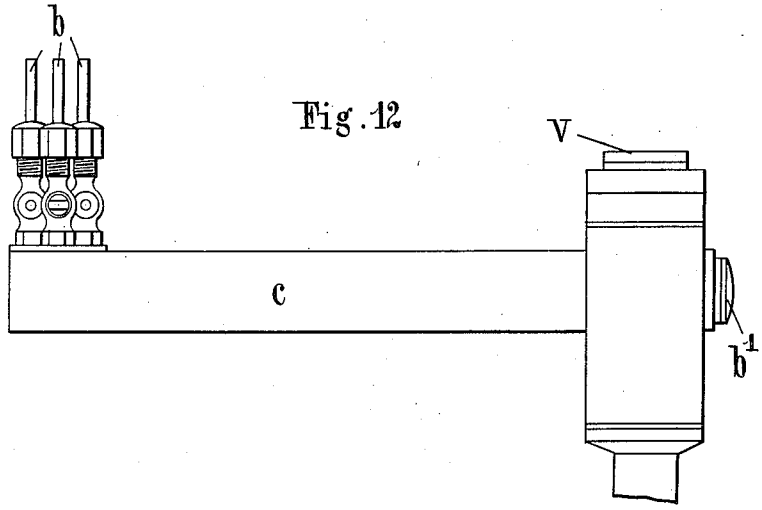


Fig. 13

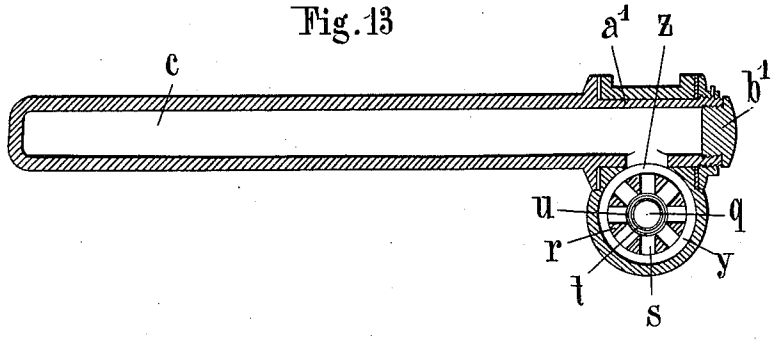
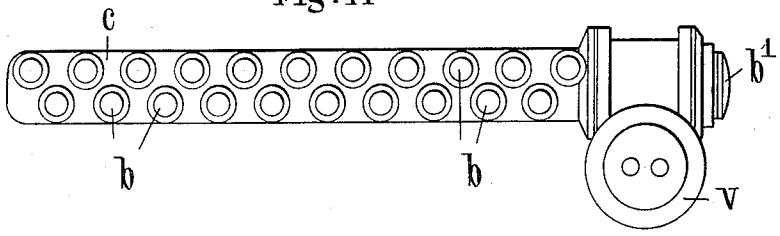


Fig. 14



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UNITED STATES PATENT OFFICE.

LUCIEN MORANE, OF PARIS, FRANCE.

ARTIFICIAL-SILK-SPINNING MACHINE.

1,069,456. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed October 25, 1910. Serial No. 589,055.

To all whom it may concern:

Be it known that I, LUCIEN MORANE, a citizen of the Republic of France, and resident at 23 Rue Jenner, Paris, Seine, France, have invented Improvements in Artificial-Silk-Spinning Machines, of which the following is a specification.

The arrangement generally adopted in artificial silk spinning machines, particularly in the case of artificial silks, having a collodion base, has the following important disadvantages: The regulating of the quality or titer of the thread obtained, that is to say the quantity of collodion delivered by each thread former or spinning nozzle is only effected by regulating the general pressure of the collodion in the whole of the thread-forming machines. The pressure varies with the losses in the charge of collodion which differs in the different parts of the workshop, and is only regulated especially on resuming work, by trial and error after the titer of a large number of bobbins has been ascertained. Moreover, as it is necessary to place a filter at the entrance of each machine, each time that this filter is set, the machine has to be stopped. It has to be completely stopped in fact when a thread former or spinning nozzle breaks, and causes sudden losses of material producing a lowering of pressure in the main pipe. All these disadvantages are obviated by the arrangements which constitute the present invention.

The accompanying drawings illustrate two forms of machines to which the improvements are applied.

Figure 1 is a diagrammatic transverse section of a thread-forming or spinning machine. Fig. 2 is a longitudinal section of a movable bank of nozzles, with its filter. Fig. 3 is a transverse section of the same. Fig. 4 being a plan. Fig. 5 is a plan of some of the banks. Fig. 6 shows the mounting of the glass tube with the syringe for injecting the colored collodion. Fig. 7 is a transverse section of another form of thread forming machine with two stages of bobbins. Fig. 8 is a front view thereof partly in section. Fig. 9 is a transverse section of an automatic regulator and of its connection with the bank of nozzles on each of the two sides of the machine. Fig. 10 is a vertical section thereof through the line 10—10. Fig. 11 a front view of the upper part thereof. Fig. 12 is a side view of a thread-former or spinning-nozzle bank. Fig. 13 a horizontal section thereof. Fig. 14 a plan. Figs. 15 and 16 illustrate the body and the tube-casing of a lower bobbin.

In the arrangement according to Figs. 1 to 6 each bobbin *a* and thread-former or spinning nozzle *b* which supplies its multiple thread are regarded here as a separate machine. Each of these bobbins *a* is served by a bank *c* comprising the necessary number of nozzles *b*. The banks *c* may pivot at *d* in such a manner as to present a larger or smaller surface to the work-girl, who, consequently is able to apply herself without difficulty to the ordinary work consisting in refastening the threads and changing the thread-formers or nozzles *b*. The number of the nozzles is no longer limited by the length of the machine, and may, in some sense be indefinite, depending only on the length of the bobbins. Thus in the example illustrated each bank comprises 25 nozzles. A larger number may be put on if the depth of the machine be increased. Each of these banks carries a filter *e* and a regulating cock *f* enabling the flow of the collodion to be micrometrically regulated. When once the regulator is closed it is possible by simply unscrewing the two nuts *g*, to remove the platform *c* and to change the filter *e* without stopping the rest of the machine. Finally, in order to regulate the flow of collodion in the platform it is necessary to know the rate of this flow. This is the object of the following arrangement: Between the regulator *f* and the main pipe *h* for the collodion, a thick glass tube *i* is introduced through which the collodion can be seen to pass. In order to make its movement more visible a small drop of the collodion colored with a material that is destructible by the reagents employed subsequently in the treatment of the threads is injected by means of a syringe *j* with a

capillary opening that opens into the middle of the stream of collodion. This small drop follows the movement of the collodion, and serves as an index. Between the pipe h, and the glass-tube i is a stop-cock enabling the glass tube to be isolated if it breaks or requires cleaning.

With the system described above the sudden lowering of pressure produced by the breaking of a thread-former or spinning nozzle can not immediately accelerate the flow of the collodion, to such an extent as to produce in the main pipe a lowering of pressure capable of interrupting the thread-forming in the rest of the machine. This is due to the long course or passage and the losses in the pressure, which are caused between the main pipe, and the nozzles. The bringing together of the nozzles, in the manner described, is very favorable for the recovery of the solvent, if it be desired to effect this. In that case it is necessary to inclose the machine, and to open it only partially during the replacing of the nozzles on the bobbins.

The arrangement illustrated in Figs. 7 to 10 as a modification of the preceding arrangement comprises an automatic regulator replacing the regulator f and capable of working with precision as long as the material to be formed into thread is manufactured uniformly or regularly. In the construction of the automatic regulator use is made of the principle of hydrodynamics that when a liquid or a gas passes through an opening in a diaphragm, the rate of flow is determined by the difference in the pressure on the two sides of the diaphragm. If the loss in the pressure is uniform the rate of flow and the quantity of liquid passing in a given time will likewise be uniform. In order to apply this principle the collodion coming from the main pipe h and flowing to a thread-former bank c, passes through a tube i furnished with a diaphragm placed at k for example: the opening in which is of course fixed. A small pump body l contains a differential piston m which receives on one of its faces the pressure from the incoming side of the diaphragm, and on the other face the pressure from the outgoing side of the diaphragm. If this difference of pressure can be kept uniform, the rate of flow of the liquid and consequently the titer obtained will be uniform. The piston m is vertical and furnished with a counterweight n formed of lead or cast iron disks carried by a rod o. The piston moves in a glass tube p in order that metallic friction in the collodion may be avoided. The upper part of this rod o is extended into the inlet passage for the collodion by a metal tube q, which is raised and lowered, being actuated by the piston m in the interior of a thick metal tube r drilled in places with horizontal cylindrical holes s. These holes are nearer together on the inside of the tube r and on the outside are sufficiently wide apart to leave a quantity of sufficiently resistant metal between them. Between the tube r and the tube q controlled by the piston m, a wire-gauze tube t is placed surrounded by one of the filtering layers usually employed, for example a silk bolting-cloth u. The operation of the apparatus is then as follows: By means of the counterweight n, the loss of pressure through the diaphragm is regulated, a loss of pressure corresponding to the rate of flow previously determined. If the loss of pressure increases, the piston m ascends and reduces the filtering surface until completely closing it at the upper end of its course, but at this moment the passage of the collodion being reduced, the counterpressure is increased, and causes the descent of the piston m which thus returns uniformly to its position of equilibrium. When the filter u becomes less permeable in consequence of being choked the piston m is free to take its position of equilibrium lower down, further uncovering the filter. The wire gauze t surrounded by the filtering cloth u is fixed to the plug v that closes the regulator, so that in order to change the filter it is only necessary, after first closing the stop-cock x of the bank, to unscrew this plug v and to replace it by another furnished with a new filter. The arrangement for observing the passage of the collodion described in relation to Figs. 1 to 6 is slightly modified. The glass tube i is much shorter and is placed in the branch tube provided with the diaphragm k. The piston intended for forcing in the drop of colored collodion is replaced by a Pravaz syringe, the needle of which passes through a stuffing box j. The mounting of the nozzles is not the same as in the arrangement illustrated in Figs. 1 to 6.

According to the arrangement shown in Figs. 7 to 14 each inclined bank c, instead of turning at its extremity on a horizontal axis inclines itself vertically from one side to the other as shown by the arrows in Fig. 11 at an angle which may extend to 45°, without reducing the passage of the discharging holes Z (Fig. 13), so that by inclining the two adjacent banks in opposite directions, more space than is necessary is obtained for refastening the threads and replacing the thread-formers or spinning nozzles. For this purpose the bank c is terminated, on the side of the filter, by a cylindrical bearing a' engaged in a hole formed in the upper part of the regulator, and in which it can pivot. A nut b' in combination with washers or rings, keeps the bank under slight friction in its pivot seating.

Above the bank c the first guide is formed by a ring c'. All these guides or rings are fixed horizontally on bars d' pivoted at the top, so that they can be moved horizontally for the purpose, when necessary of leaving a large empty space, allowing work to be carried on at any height. The inclining movement of the banks c enables the nozzles b to be put near and to be crossed for the purpose of covering them with a protective covering, during the stoppage of the thread-forming, and thus to prevent the obstruction of the nozzles. Up to the guides at v which unite the threads, the machine is closed by panes of glass e' pivoted at f' around one of their corners. A powerful spring inclosed in a box keeps the frame closed, that is to say raised. When the work-girl requires to reach the nozzles, she puts her foot on a pedal g', which, through the medium of the rod h' lowers the pane of glass e', and so has her hands free. When she releases the pedal g' the frame a' closes, that is to say rises automatically. On the other hand in the upper part of the machine, which is not opened except for renewing the bobbins, panes of glass are arranged to slide horizontally one in front of the other and which must never be put apart except at the times fixed for changing the bobbins.

It would be of no use to increase the number of nozzles over the same space, unless the number of bobbins could be increased at the same time. To remedy this two stages of bobbins are caused to run on the driving cylinder j'. One of these k' rolls on it through its weight, while the second series of bobbins l' is carried by an oscillating arm m' furnished with a counterweight n' which locks the bobbin against the cylinder j' by the movement of which it is carried along. These bobbins are composed of a cylinder or body o' (Fig. 15) furnished with trunnions, over which a thin tube p' is placed (Fig. 16), which is made of metal and furnished with flanges q'. When the tube-bobbin is full of silk, it is removed and is replaced by a fresh one, after which the whole is put in position. The bodies of the bobbins, k', which roll by their weight are made of metal, those of the bobbins l' are made of wood with steel trunnions.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In artificial silk spinning machines, the combination of a conducting pipe, a nozzle pipe pivoted at its inner end to said conducting pipe two parallel rows of vertically projecting nozzles on said nozzle pipe longitudinally thereof, the number of nozzles corresponding to the number of elementary threads joined on the same nozzle, said nozzle pipe being adapted for independent pivotal movement, in either direction, in a horizontal plane, whereby either of said rows may be turned to face the operator.

2. In artificial silk spinning machines, the combination of a conducting-pipe, a nozzle-pipe pivoted thereto and communicating therewith, a filter carried in the pivoted joint between the pipes carrying a filter for effecting a final purification of the collodion, movable means for partially covering the filter whereby the active area of the filter may be varied, and means operated by the pressure in the pipe for moving the movable means.

3. In artificial silk spinning machines, the combination of a conducting pipe, a nozzle pipe pivoted thereto and communicating therewith, a filter carried in the pivoted joint between the pipes for effecting a final purification of the collodion, this filter being proportional in its dimensions to the number of nozzles of the nozzle-pipe and pressure operated means for varying the active area of said filter as the velocity of the liquid varies.

4. In artificial silk spinning machines, the combination of a conducting pipe, a nozzle pipe pivoted thereto and communicating therewith, a filter carried in the pivoted joint between the pipes for effecting a final purification of the collodion, this filter being proportional in its dimensions to the number of nozzles of the nozzle-pipe, and comprising a filtering surface similar to that of the filters for the first and second filtration of the collodion, and pressure operated means for varying the active area of the filter.

5. In an artificial silk spinning machine, a collodion regulator, comprising a conducting-pipe, a perforated diaphragm therein, a pump cylinder having its opposite ends connecting with the pipe on opposite sides of the diaphragm respectively, a regulating valve in said pipe and a counterweighted differential piston in said cylinder and operatively connected to the valve.

6. In an artificial silk spinning machine, the combination of a main-pipe, a nozzle-pipe, a conducting-pipe connecting the nozzle-pipe to the main pipe, a perforated diaphragm in said conducting pipe, a pump-cylinder having its opposite ends connecting with the conducting tube on opposite sides of the diaphragm respectively, a piston in said cylinder between said ends, a counterweighting-means connected to the piston and a controlling valve in said conducting tube and operatively connected to the piston.

7. In an artificial silk spinning machine, a glass conducting pipe, and a syringe

mounted on the pipe and provided with a needle point opening in the middle of the pipe.

8. In an artificial silk spinning machine, the combination, with the machine, of a closure therefor, comprising automatic means for holding the frames yieldably closed and pedals connected thereto and adapted to hold the frames open by pressure on the pedals.

In testimony whereof I affix my signature in presence of two witnesses.

LUCIEN MORANE.

Witnesses:
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