F. BLAU.

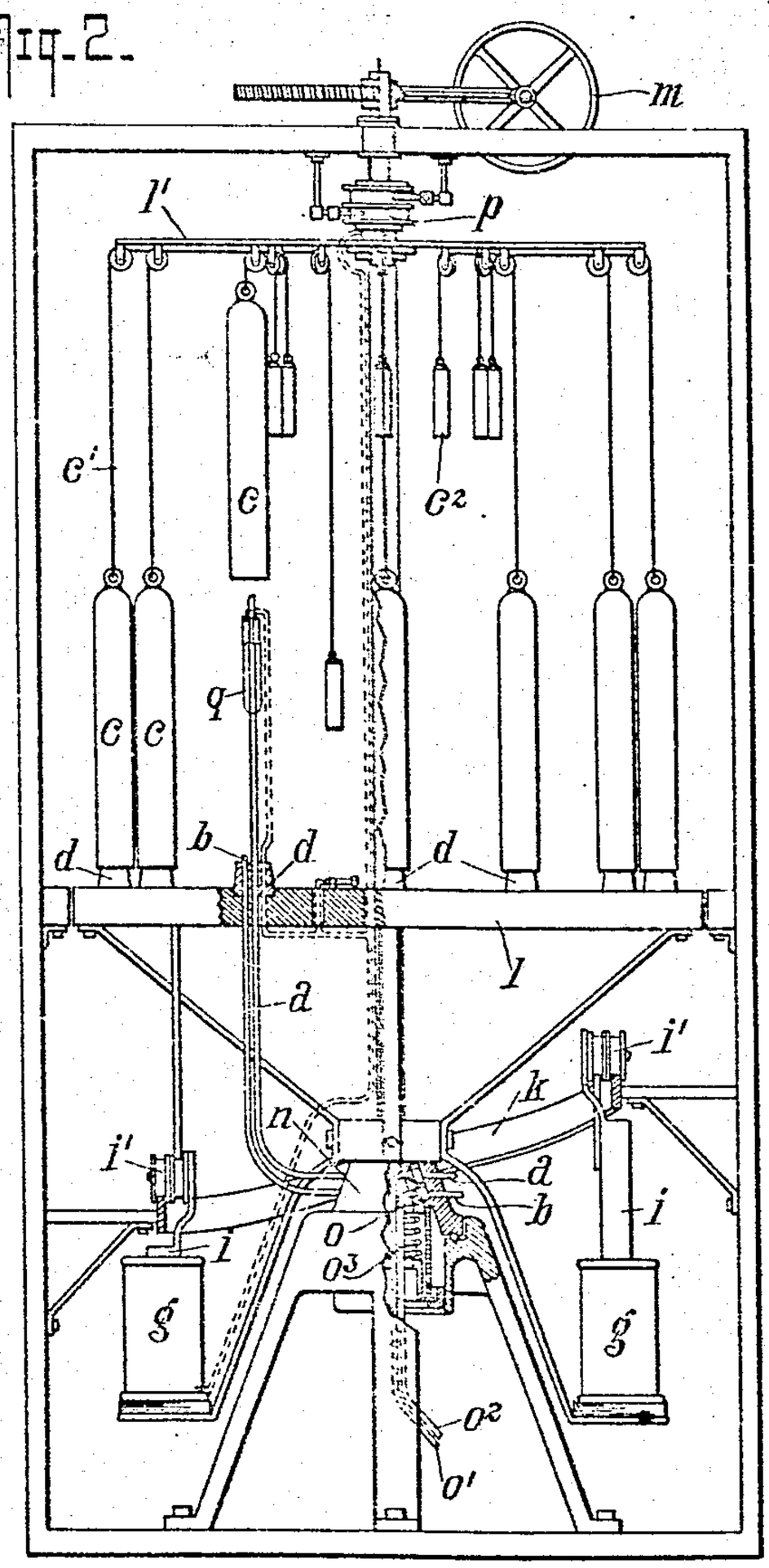
APPARATUS FOR MAKING METALLIC FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS.

APPLICATION FILED FEB. 17, 1908.

985,502. Patented Feb. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 2.



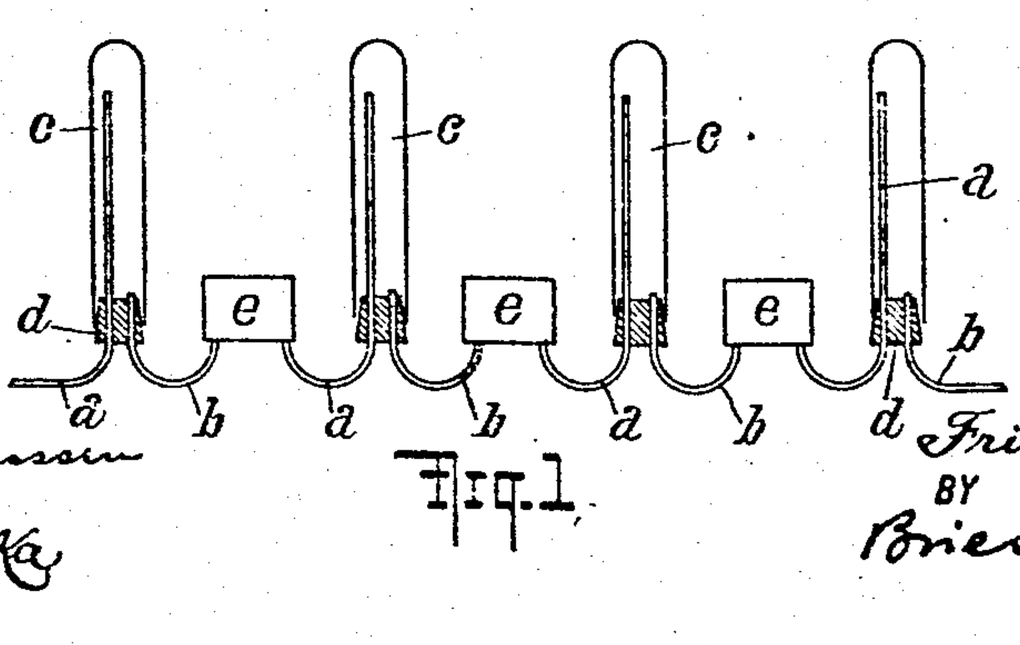


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3

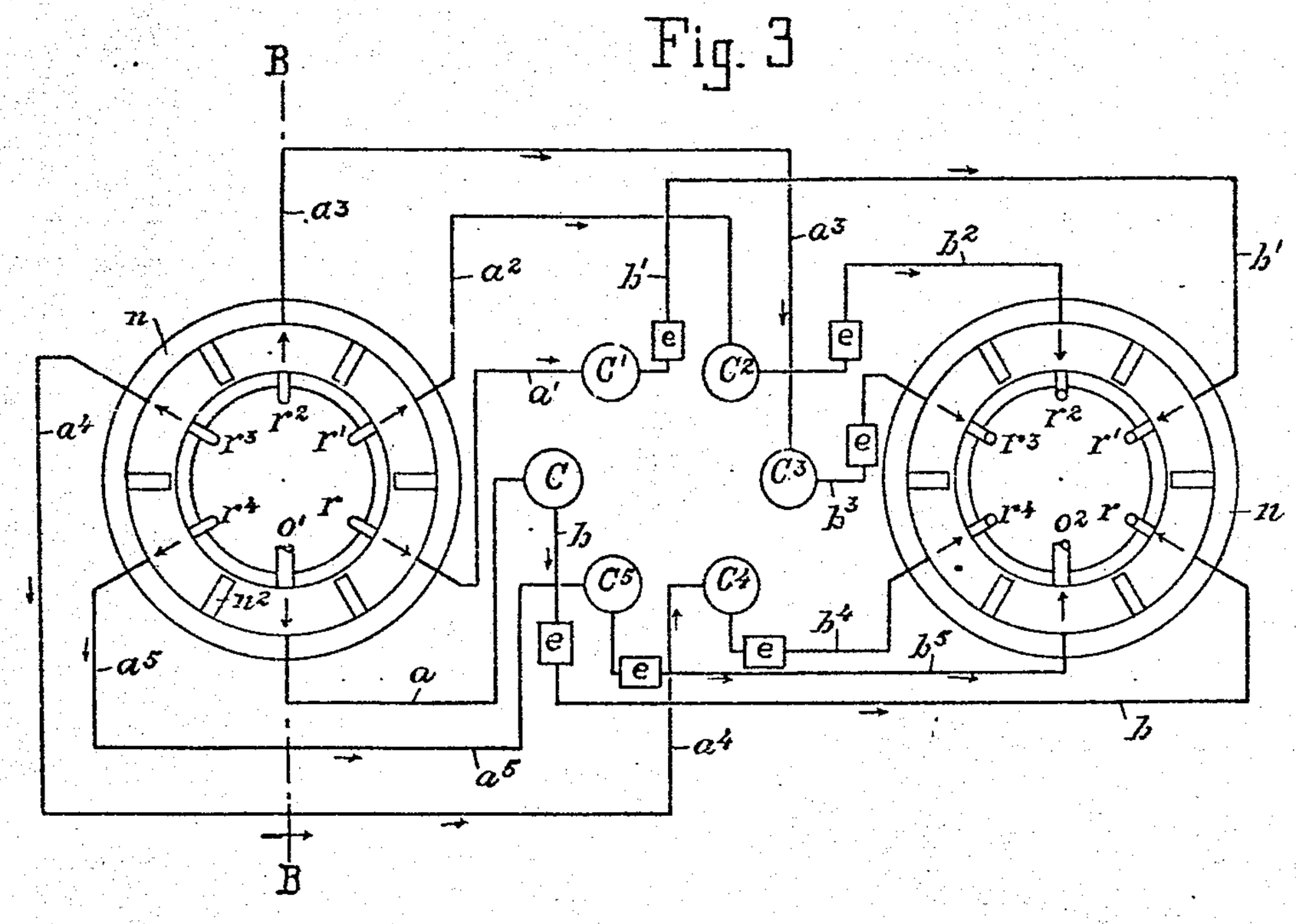
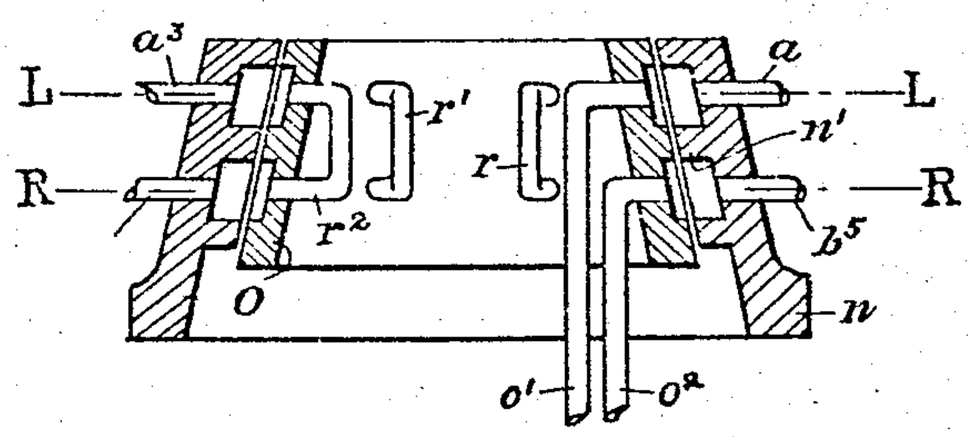


Fig. 4.



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APPARATUS FOR MAKING METALLIC FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS.

985,502. Specification of Letters Patent. Patented Feb. 28, 1911.

Original application filed September 14, 1906, Serial No. 334,563. Divided and this application filed February 17, 1908. Serial No. 416,249.

To all whom it may concern:

Be it known that I, FRITZ BLAU, a subject of the Emperor of Austria-Hungary, and resident of Berlin, Germany, have invented certain new and useful Improvements in Apparatus for Making Metallic Filaments for Incandescent Electric Lamps, of which the following is a specification.

My invention relates to an apparatus for manufacturing metallic filaments for incandescent electric lamps, and has for its object to enable crude filaments to be treated economically with gas for the purpose of converting the crude filament into one ready for use.

This application is a division of another application for a patent filed by me in the United States Patent Office September 14, 1906, Serial No. 334,563.

An apparatus embodying my invention is shown in the accompanying drawing, in which—

Figure 1 is a diagram showing the general arrangement of the apparatus, and Fig. 2 is an elevation, with parts in section, illustrating a specific form of the apparatus.

In the treatment of crude metallic filaments by means of reducing gases for the purpose of producing a finished metallic filament, it is necessary, as I have found, to use a very large amount of gas in order to get the best results, since a pretty strong or rapid current of gas is required for this purpose. In order to utilize the gas economically, I have devised the expedient of passing it successively in contact with a number of crude filaments, it being understood that such filaments are heated by the passage of an electric current through them while subjected to the action of the gas current. It has also been found that the gas will take up water vapor (steam) from the crude filaments, and that this steam interferes with the thoroughness of results; for this reason I prefer to provide drying chambers in the path of the gas from one filament chamber to the next, so that the steam may be removed from the gas partly or entirely before the gas is admitted to the next filament.

In the diagram Fig. 1 *c* designates a series of chambers adapted to contain the filaments under treatment, and provided with inlet pipes *a* and outlet pipes *b* for the gas, which pipes pass through the stoppers *d* on which the chambers are supported. For the sake of clearness, no filaments have been shown in said chambers. Between each two filament chambers *c* I have indicated a drying chamber *e*, the outlet pipe *b* of a filament chamber forming the inlet pipe to the adjacent drying chamber, and the outlet pipe of the drying chamber being identical with the inlet pipe *a* of the next filament chamber.

In Fig. 2, the mechanical and electrical details are shown. On the support *l* I secure a series of stoppers *d* with their inlet and outlet pipes *a* and *b* respectively. For the sake of clearness, these pipes are shown only on one of the stoppers. The receptacles or filament chambers *c* in the nature of bells or cups closed at the top, may be moved up and down toward and from the stoppers *d*, being suspended by means of wires or other flexible connections *c'* passing over pulleys and connected with counterbalancing weights c^2. The pulleys are carried by a member *l'* rigidly connected with the support *l* which is capable of being rotated about a vertical axis by means of the wheel *m* driven by a suitable motor. With the support *l* is rigidly connected a valve casing *n* (resting on a ball-bearing) the several pipes *a* and *b* leading to separate chambers in said casing, as shown at the right of Fig. 2. Within the casing *n* is arranged the stationary valve plug *o* pressed upward by a spring o^3 and having channels to connect with the chambers of the valve casing *n*. The plug further has a pipe *o'* for the admission of the gas and a pipe o^2 for its final discharge. The various chambers or channels are so disposed that the gas from the pipe *o'* will enter one of the pipes *a* and reach one of the chambers *c* from which it returns to the valve casing *n* by the corresponding pipe *b*, to pass to the next pipe *a* and filament chamber *c*, and so on from one chamber *c* to the next, until the gas escapes through the pipe o^2. When the support *l* rotates, the pipe connections

are cut off momentarily, and immediately thereafter connections are reëstablished, but this time the gas from the pipe o' enters first into the filament chamber c which was second in the previous stage of connections. Thus as the support l rotates, each filament chamber c in turn becomes the first and the last of the series through which the gas current streams.

In Fig. 2 I have shown at q one of the filaments and at p a commutator or switch controlling the electric circuit (indicated by dotted lines) in such a manner that the current will pass through the filament only when the pipe connections are established for the flow of the gas. Only one of the circuits is shown, but it will be understood that there are as many of them as there are receptacles or chambers c, and these several circuits are connected in parallel. If an alternating current is used, a choke coil g, held to rotate with the support l, is included in each circuit, the cores i of these coils being movable vertically through the action of a stationary cam k on which travel rollers i'' connected with the cores. If continuous current is used, resistances are switched into and out of circuit by similar means.

If drying chambers such as c of Fig. 1 are to be used, they would be carried so as to rotate with the support l and each of these drying chambers would be so connected that the gas would pass through it on its way from a filament chamber c to the valve casing n.

Fig. 3 is a diagrammatic view showing at the left substantially a horizontal section on line L—L of Fig. 4 and at the right substantially a horizontal section on line R—R of Fig. 4 and in the center a diagram of the chambers C.

Fig. 4 shows the stationary plug n and the rotary valve o upon an enlarged scale in central section. In Figs. 3 and 4 the plug o has secured to it the upper ends of the pipe o', o^2, one above the other, and is provided at uniform distances with connecting pipes or channels r, r' which have their ends at about the same levels as the upper end of the pipes o', o^2. The rotary valve n is provided with a partition n' at a level intermediate between those of the upper ends of the pipes o', o^2, and is further provided above and below said partitions with radial vertical partitions, but one of the annular chambers formed above and below the horizontal partitions n' is subdivided into as many sectors or compartments as there are vessels c.

Figs. 3 and 4 show six vessels c but it will be understood that the same principle could be applied to any number of vessels. The path of the gases is clearly indicated in Fig. 3 which also indicates at s the drying vessels interposed in each of the pipes b', b^2, b^3, b^4, b^5.

I claim as my invention:

1. The combination of a plurality of filament chambers and means for supplying an electrical current to the filaments in said chambers, with means for connecting said chambers so that a current of gas may be passed through them successively.

2. The combination of a plurality of filament chambers and means for supplying an electrical current to the filaments in said chambers, with means for connecting said chambers so that a current of gas may be passed through them successively, and movable means for varying the flow of gas through said chambers.

3. The combination of a plurality of filament chambers and means for supplying an electrical current to the filaments in said chambers, with means for connecting said chambers so that a current of gas may be passed through them successively, and a single rotatable means controlling the connections of all of said chambers, to cause each of said chambers to become successively the first in the path of the gas.

4. The combination of a plurality of filament chambers and means for supplying an electrical current to the filaments in said chambers, with means for connecting said chambers so that a current of gas may be passed through them successively, and drying chambers interposed in the connection between successive filament chambers.

5. The combination of a plurality of filament chambers, with means for connecting them so that a current of gas may be passed through them successively, a movable member controlling the gas connections of said chambers, circuits for supplying an electrical current to the filaments in said chambers, and a switch controlling said circuits and connected to move in unison with said controlling member.

6. The combination of a rotary support, a plurality of filament chambers carried thereby, means for connecting said chambers so that a current of gas may be passed therethrough successively, and a valve operated by the rotation of said support, to vary the connection of said chambers.

7. The combination of a rotary support, a plurality of filament chambers carried thereby, means for connecting said chambers so that a current of gas may be passed therethrough successively, a valve operated by the rotation of the support, to vary the connection of said chambers, circuits for supplying an electrical current to the filaments in said chambers, and a switch controlling said circuits and operated by the rotation of the support.

8. The combination of the rotary support,

filament chambers carried thereby, a valve casing rigidly connected with said support, a stationary plug on which said casing rotates, and means whereby the rotation of the support controls the supply of electrical current to the filaments within said chambers.

9. An apparatus comprising a group of chambers for the treatment of filaments with suitable connections for passing fluid through such chambers in series and means interposed between successive chambers for rendering the fluid fit for reuse.

10. An apparatus comprising in combination a plurality of treating devices in which filaments may be subjected to successive stages of a multi-stage treatment and suitable connections for passing fluid over the filaments in such devices in series.

11. An apparatus for the treatment of filaments comprising in combination suitable devices for subjecting a plurality of filaments to successive stages of a multi-stage treatment and means for passing fluid over the filaments in series in the inverse order of their stages of treatment.

12. An apparatus for use in filament manufacture comprising a plurality of movable devices for subjecting filaments to treatment combined with means for passing treating fluid over the filaments in series, the order of the filaments in the flow of fluid changing as the said devices are moved.

13. An apparatus for use in filament manufacture comprising a plurality of movable devices in which filaments may be subjected to successive stages of a multi-stage treatment and means coacting therewith in the subjection of the filaments to treatment in such a manner that the treatment is advanced from one stage to another during the movement of such devices.

14. An apparatus comprising a plurality of revolubly mounted devices for the treatment of filaments combined with suitable connections for passing gas over the filaments in such devices in series and control means by which each device is successively made the first in the path of the gases as the said devices are revolved.

15. An apparatus comprising a plurality of devices for subjecting filaments to successive stages of a multi-stage treatment combined with means for passing treating fluid over them in series and for simultaneously advancing the treatment of a filament from one stage to another and altering its order as regards passage of treating fluid.

16. An apparatus comprising a plurality of revolubly mounted treating devices for filaments, a filament in any device passing successively through the stages of a multi-stage treatment as the said devices are revolved, combined with means for passing fluid over the filaments in the said devices in series by which their order in the flow of fluid is altered during revolution.

17. An apparatus for the treatment of filaments comprising a plurality of chambers mounted for revolution about a common axis and each adapted for operation in a cycle during one portion of which it may be opened for filament removal and insertion and during other portions of which a filament in it is subjected to successive stages of a multi-stage treatment and suitable connections for passing fluid through a plurality of chambers in series by the action of which the order of a chamber in the flow of fluid is advanced when a filament in it advances from one stage of treatment to another.

18. An apparatus for the treatment of filaments comprising a plurality of treating chambers adapted for movement in a cycle, inlet and outlet means for each of said chambers moving therewith, and a plurality of stationary inlet and outlet means, the moving inlet and outlet means for each device coming into communication with each of said stationary inlet and outlet means respectively as said chambers move through the cycle.

19. An apparatus for use in filament manufacture comprising a plurality of revoluble chambers each adapted for operation in a cycle during one portion of which it may be opened for filament removal and insertion combined with means for subjecting a filament in such chamber to successive stages of a multi-stage treatment during other portions of the cycle.

20. An apparatus for use in filament manufacture comprising a plurality of movable chambers each adapted for operation in a cycle during one portion of which it may be opened for filament removal and insertion and during other portions of which a filament in it is subjected to the successive stages of a multi-stage treatment, fluid passage means for each of said chambers moving therewith, and stationary fluid passage means with which said moving passage means come into communication in their movement.

21. An apparatus for use in filament manufacture comprising a plurality of movable chambers each adapted for operation in a cycle during a portion of which it may be opened for filament removal and insertion and during another portion of which a filament in it is subjected to treatment, inlet means for each of said chambers moving therewith, and a plurality of stationary fluid supply means with which said moving passage means successively come into communication as said chambers move.

22. The combination of a plurality of filament treating chambers, means for heating

filaments in said chambers, means connecting said chambers so that fluid may be passed through them in series, and means interposed in the connection between successive chambers for removing from the fluid products of the treatment in the chambers.

In witness whereof I have hereunto set my hand in the presence of two witnesses, this 22nd day of January, 1908.

FRITZ BLAU.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.