

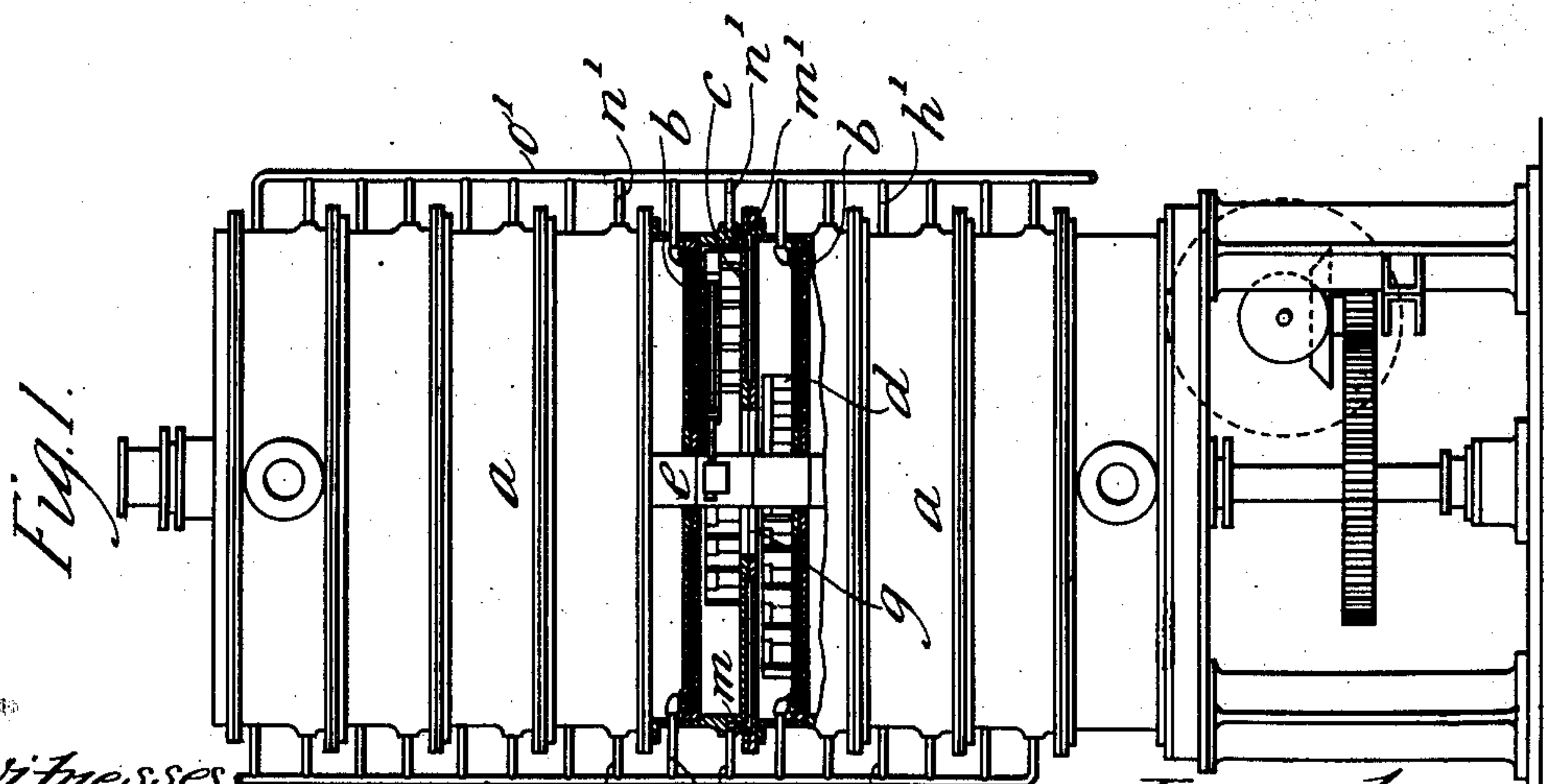
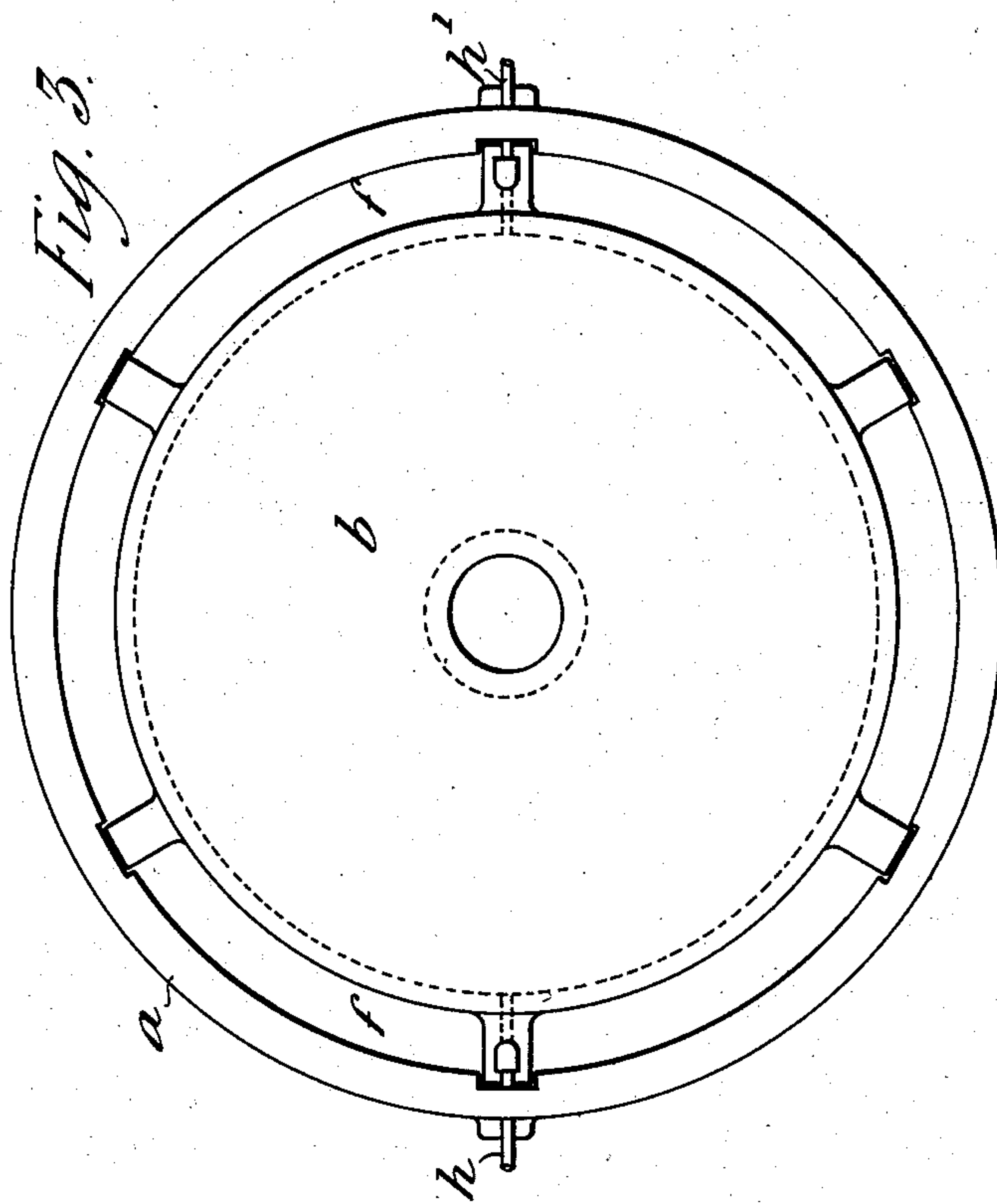
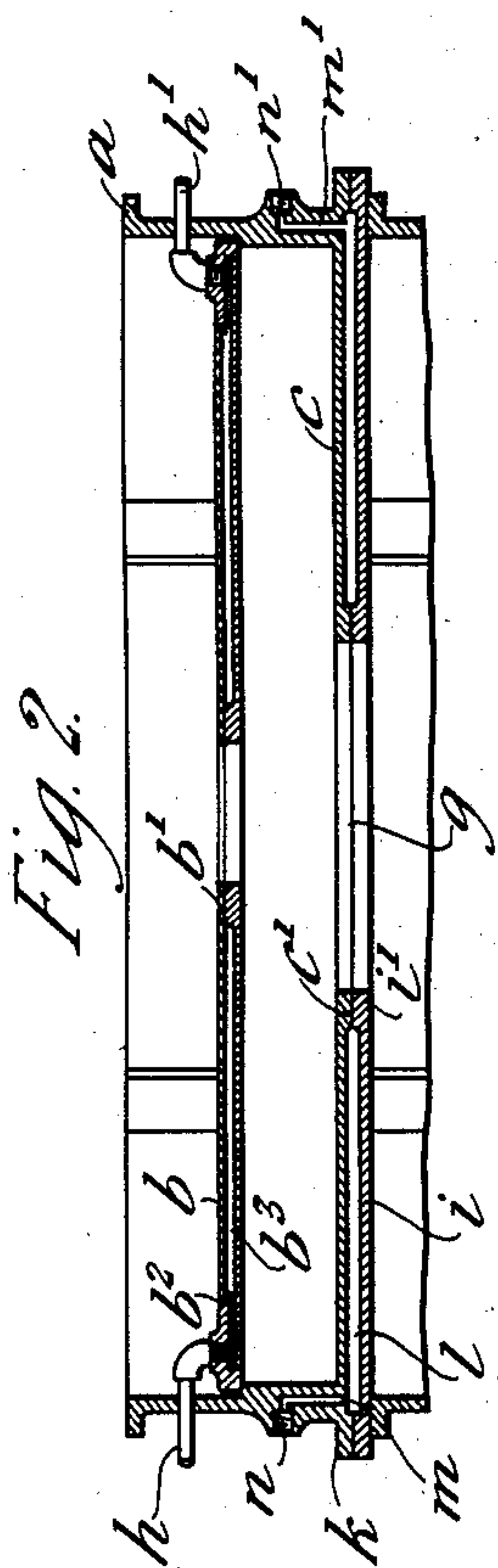
No. 865,969.

PATENTED SEPT. 10, 1907.

C. LANGER.

APPARATUS FOR TREATING WITH CARBONIC OXID NICKEL ORES OR OTHER
MATERIAL CONTAINING NICKEL.

APPLICATION FILED APR. 16, 1906.



Witnesses

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UNITED STATES PATENT OFFICE.

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No. 865,969.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CARL LANGER, residing at Ynyspenllwch, Clydach, in the county of Glamorgan, Great Britain, manufacturing chemist, have invented certain new and useful Improvements in Apparatus for Treating with Carbonic Oxid Nickel Ores or other Material Containing Nickel, of which the following is a specification.

This invention relates to apparatus for treating with carbonic oxid nickel ores or other material containing nickel which was originally incorporated in my application filed 5th July 1905 Serial No. 268859, of which this is a division.

In specification to U. S. Patent No. 551220 dated 10th December 1895 is described the now well-known process for obtaining nickel which consists in heating oxid of nickel, or material containing that oxid, in a reducing gas at a temperature between 350°C and 500°C , allowing the material to cool and subjecting it to the action of a stream of carbonic oxid gas whereby the nickel is volatilized in the form of nickel carbonyl. Now it is stated in the said specification that 50°C is the temperature preferred by the inventor as that at which the treatment with carbonic oxid should occur, but that if the operator prefers to allow the reduced material to cool to ordinary atmospheric temperature, he can do so, inasmuch as it is possible to work at temperatures from 0°C , to 150°C .

In practicing the process on a manufacturing scale varying and low yields of nickel carbonyl have been obtained, and as a result I have discovered that this is because the aforesaid statement as to the permissible range of temperature is very much too wide when working at atmospheric pressure. So far from its being possible to work at any temperature within the range of 0°C to 150°C at atmospheric pressure, my experiments have proved that it is essential to keep the temperature of the material between 40°C and 50°C at atmospheric pressure, in order to obtain the best extraction of nickel, or indeed such an extraction as will make the process commercially successful. Moreover, merely allowing the material under treatment to cool to 50°C , is quite useless in practice, for the reaction between nickel and carbonic oxid evolves heat, so that the temperature of the material rapidly rises again. My experiments have shown that the heat evolved by the reaction raises the temperature of the material locally, so that for maintaining the temperature between the limits stated it is impossible to rely only upon natural radiation of this heat from the apparatus.

My invention relates to apparatus wherein the material under treatment with carbonic oxid is kept at a temperature between 40° and 50°C , by means of arti-

ficial cooling. This may be done in a variety of ways. Seeing, however, that the adjustment of temperature is chiefly required locally in the apparatus, I prefer to pass or allow to pass a fluid, the function of which will generally be to cool the material so as to counteract the heat evolved by the reaction, through passages in the apparatus, around or over which passages the material under treatment is moved.

To illustrate the preferred form of my invention I will describe an apparatus which is an adaptation for the purposes of my invention of the volatilizer described in specification No. 551220.

In the accompanying drawings Figure 1 is an elevation of the volatilizer, partly in section, Fig. 2 is a vertical section and Fig. 3 a plan of one chamber, drawn to an enlarged scale.

The general construction of the volatilizer is similar to that described in the said specification, that is to say it consists of a number of short vessels *a* preferably cylinders superimposed on each other and constituting a number of chambers divided by a partition *b* and having a bottom *c*. The material is caused by stirrers *d* carried by a rotating shaft *e* to travel over the partition *b* from the center to the circumference whence it falls through openings *f* on to the chamber bottom *c*, where it is made to travel by the stirrers from the circumference to the center, whence it falls through the openings *g* on to the partition of the next lower chamber.

According to this invention the partitions *b* are made hollow, in the instance shown they are made of two plates making joint at *b'* and *b''*, with the aid of suitable packing, and having a space *b³* between them into which water or other suitable liquid or gas may pass through a pipe *h* flowing out again through a pipe *h'*.

To provide a space in the bottom of the chamber, the bottom *c* has a rim *c'* on its under surface which rests on a similar rim *i'* on the upper surface of a plate *i* supported on the top of the next lower cylinder; the lower flange *k* of the cylinder *a* rests on the edge of the plate *i* and a suitable packing makes a tight joint between the rims *c'* and *i'* and between the flange *k* and the plate *i*. A space *l* is thus formed below the bottom *c* into which water or other suitable liquid or gas may pass through a pipe *n* (Fig. 1) and a channel *m* to flow out again through a channel *m'* and a pipe *n'* (Fig. 1). All the inlet pipes *h* and *n* are connected with the main *o*, while all the outlet pipes *h'* and *n'* are connected with the main *o'*.

The foregoing construction, and particularly the organization of the partitions *b*, permits the structure to be easily taken down for cleaning and the parts to be exchanged for new ones, or interchanged.

In working the volatilizer, water, air, or other suitable cooling medium is passed through the pipes and

spaces in such quantity that the material under treatment is maintained at the most suitable temperature.

The partitions *b* and the bottoms *c* being made up of separable members, as shown in Figs. 1 and 2, are easily cleared of any deposit that may occur from time to time in the passages formed therein.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim:—

- 10 1. An apparatus for treating with carbonic oxid finely divided nickel or material containing finely divided nickel, comprising superimposed chambers each divided by a partition and having a bottom, the partitions of the several chambers being composed of two plates having a space between them for the reception of liquid or gas, and the bottoms also being hollow and the passages therein having communicating means with the exterior of the apparatus, the partitions and bottoms being made up of separable members to permit cleaning of the passages
20 therein.

2. Apparatus for treating with carbonic oxid finely divided nickel or material containing finely divided nickel, comprising superimposed chambers, a bottom to each chamber, an annular flange on the under surface of the said bottom, a plate between each chamber and that next below it, an annular flange on the upper surface of the said plate in contact with the flange on the under surface of the bottom of the chamber next above the said plate, passages leading through the wall of each chamber to the space between the bottom of the chamber and the plate next below it, a shelf in each chamber, concentric annular flanges on the upper surface of said shelf, a plate resting on the said annular flanges of the shelf in each chamber, and passages leading through the wall of each chamber to the space between the said shelf and the plate resting thereon. 25 30 35

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL LANGER.

Witnesses:

JOHN WILLIAM PACKE,

GEORGE ROWLAND SAUNDERS.