

No. 817,620.

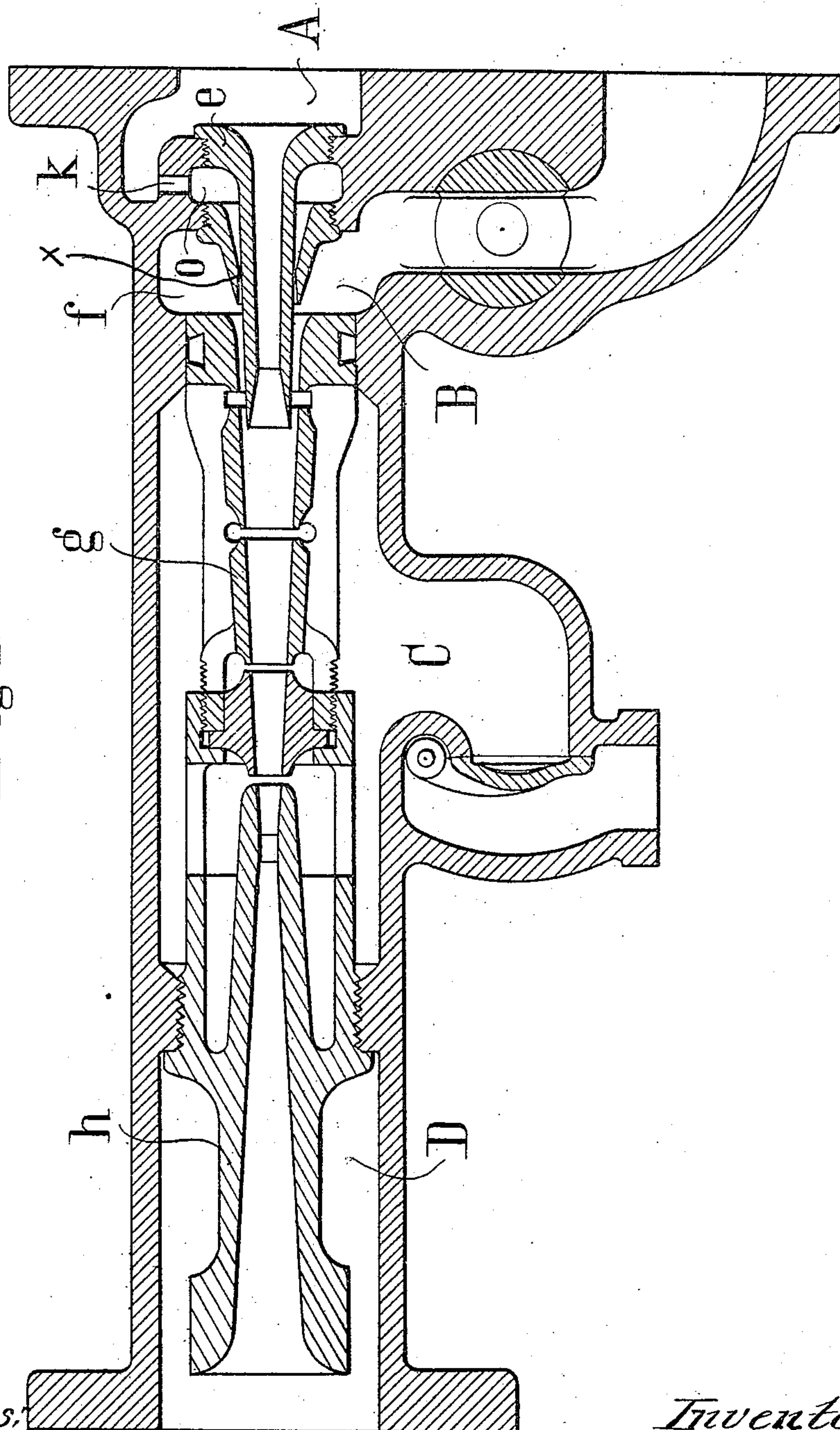
PATENTED APR. 10, 1906.

E. BLAUHORN.  
INJECTOR.

APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses,

*James L. Norris, Jr.*  
*C. D. Kesler*

Inventor

*Emanuel Blauhorn*

*By James L. Norris.*

*Att'y*

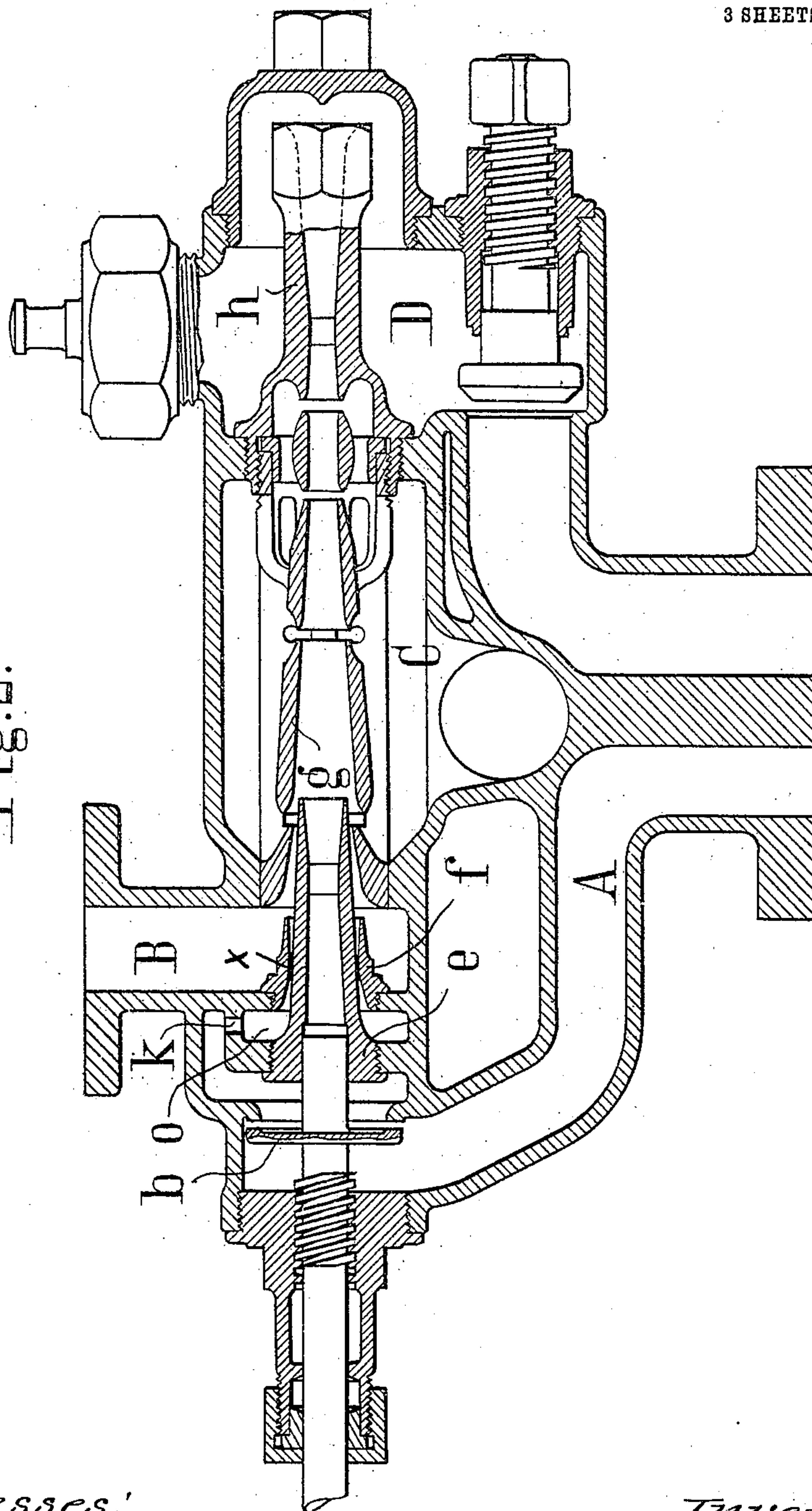
No. 817,620.

PATENTED APR. 10, 1906.

E. BLAUHORN.  
INJECTOR.

APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 2.



Witnesses,

Amos A. Morris, Jr.  
Care of Sister

Inventor  
Emanuel Blauhorn  
By James L. Norris.  
Atty.



No. 817,620.

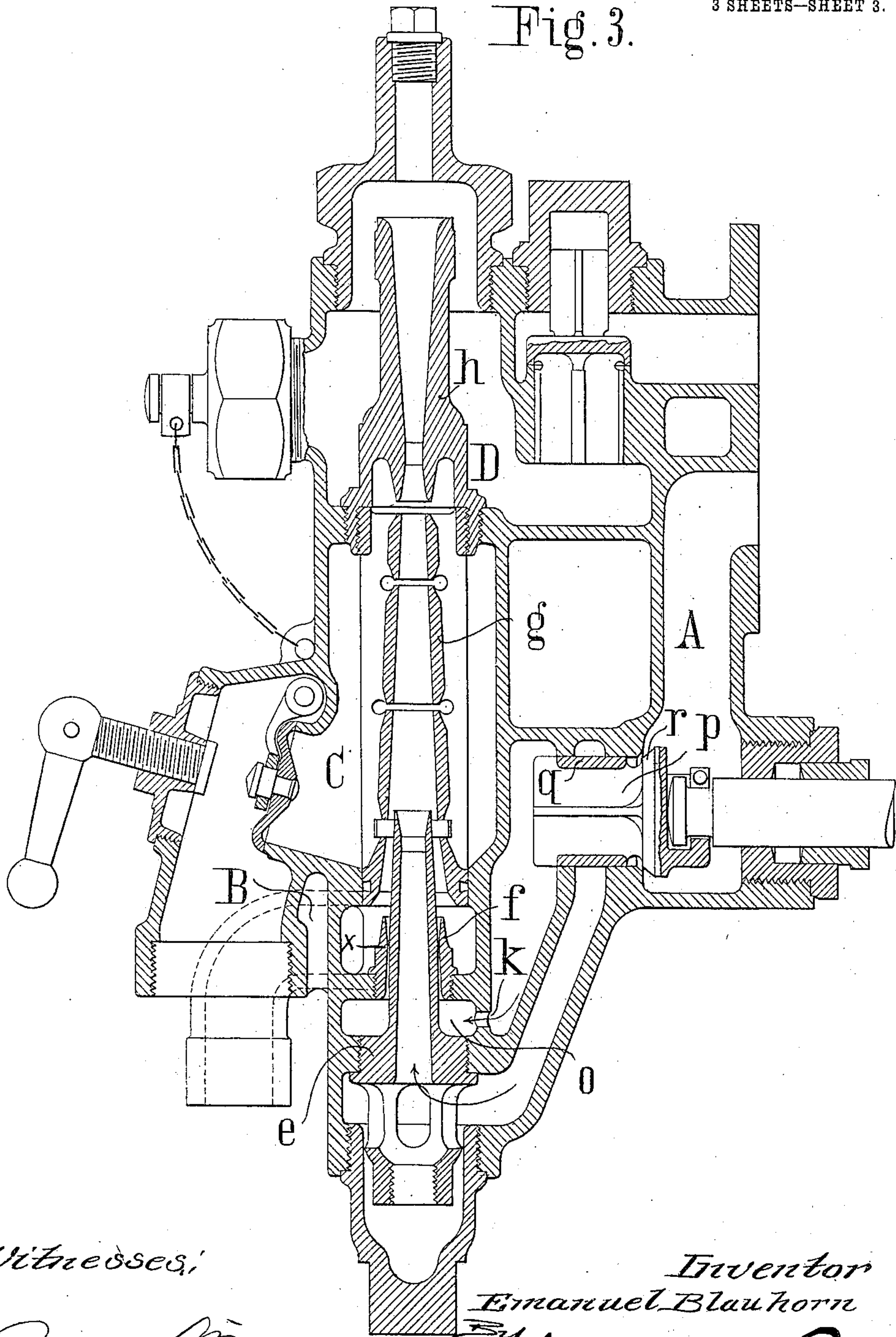
PATENTED APR. 10, 1906.

E. BLAUHORN.  
INJECTOR.

APPLICATION FILED JUNE 5, 1905.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

*James L. Morris, Jr.*  
*Chas. Kesler*

Inventor

*Emanuel Blauhorn*

*By James L. Norris*

*Att'y*



# UNITED STATES PATENT OFFICE.

EMANUEL BLAUHORN, OF VIENNA, AUSTRIA-HUNGARY.

## INJECTOR.

No. 817,620.

Specification of Letters Patent.

Patented April 10, 1906.

Application filed June 5, 1905. Serial No. 263,840.

*To all whom it may concern:*

Be it known that I, EMANUEL BLAUHORN, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Injectors, of which the following is a specification.

In injectors with two concentric steam-nozzles the steam issuing from the annular orifice has, as is known, the purpose of propelling the water-jet toward the central steam-jet with increased energy. With injectors having a sucking action this annular steam-jet must in addition effect the raising of the water in the first instance for starting the apparatus. This steam-jet must, however, only amount to a fraction of that issuing through the central nozzle, as otherwise the latter would be supplied with too much water, in which case the injector would only work with greater or less waste of water. As the annular nozzle must necessarily have a rather large inner diameter, the width of the annular orifice must consequently be very narrow, and in ordinary-sized injectors it amounts only to a fraction of a millimeter. In consequence of the great velocity of the issuing steam a wearing away of both nozzles easily takes place, thereby increasing the area of the annular nozzle-orifice, and consequently causing a deterioration of the injector's action. Also the narrow annular orifice easily becomes obstructed with solid impurities, whereby the action of the injector also becomes impaired.

The present invention has for its object to obviate these disadvantages. It consists, mainly, in throttling the steam-supply to the annular nozzle to the requisite degree before its entrance into the latter, instead of, as heretofore, at its issue from the nozzle, so that the quantity of steam issuing from the nozzle is determined by the suitable dimensioning of the supply-channel, and thus an enlargement of the annular issue-orifice will not cause any increase of the issuing quantity of steam.

The accompanying drawings show three arrangements of the injector for carrying the said invention into effect.

Figure 1 shows a longitudinal section of an injector that is supplied with water without suction action. Fig. 2 shows a horizontal injector with suction action, and Fig. 3 shows a vertical injector with suction action.

In Fig. 1, A is the steam-space; B, the water-space; C, the waste-water space; D, the

pressure-chamber; *h*, the receiving-nozzle of the injector, and *k* the inlet-channel for the annular steam-nozzle. This inlet channel or portion is so proportioned that the free sectional area thereof for the entrance of the steam into the annular space *o* is not greater than the smallest sectional area of the annular space between the two steam-nozzles *e* and *f*. Instead of a single channel *k* there may be two or more, in which case they constitute collectively a steam-inlet portion; but in this case the sum of the inlet sectional areas for the annular steam-jet must not be greater than the smallest area of the annular issue-passage.

In order to insure a uniform issue of the annular steam-jet through the narrow nozzle-orifice, the space *o*, situated between the narrowest supply-section *k* and the narrowest area of the issue-passage *x*, must be made sufficiently large to serve as receiver or steam-buffer. In order to enable this to be done, the largest sectional area of the annular space surrounding the central steam-nozzle, measured in the direction at right angles to the axis of such nozzle, must be considerably greater than the narrowest sectional area on the issue side. The smallest free passage for the inlet of the steam into the annular space between the two steam-nozzles must not amount to more than seven-tenths of the narrowest inner passage of the receiving-nozzle *h*.

Fig. 2 shows a similar arrangement for an injector with suction action. This only differs from the first arrangement by the addition of the steam-valve *b* of known arrangement, by the opening of which the steam-passage for the annular steam-jet is first opened, so as to effect the suction of the water, after which the steam-passage to the central nozzle is opened for putting the injector in action.

Fig. 3 shows the same arrangement for a vertical injector. This only differs in the arrangement of the steam-inlet device *p*, which is not arranged in the mouthpiece of the nozzle, but in a separate space in the injector-casing. It consists of a hollow piston *q*, having on the steam-inlet side the valve *r*, by the opening of which steam first passes to the annular steam-nozzle, while on the further motion the piston *q* uncovers the annular channel surrounding it, leading to the central steam-passage.

In the different forms of the invention the sectional area of the steam-inlet portion is



fixedly not greater than the smallest sectional area of the annular steam-passage of the injector, by reason of which I can secure the advantages pointed out.

5 I claim—

1. An injector having two concentric steam-nozzles separated to provide an annular steam-passage, a steam-inlet portion, and an annular space communicating with the steam-inlet portion and steam-passage respectively, the sectional area of said steam-inlet being fixedly not greater than the smallest sectional area of said annular steam-passage.

15 2. An injector having two concentric steam-nozzles separated to provide an annular steam-passage, a steam-inlet portion, and

an annular space communicating with the steam-inlet portion and steam-passage respectively, the sectional area of said steam-inlet being fixedly not greater than the smallest sectional area of said steam-passage, the greatest sectional area of said annular space being considerably greater than the sectional area of the delivery end of said annular steam-passage. 20 25

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EMANUEL BLAUHORN.

Witnesses:

JOSEF RUBRESCH,  
ALVESTO S. HOGUE.