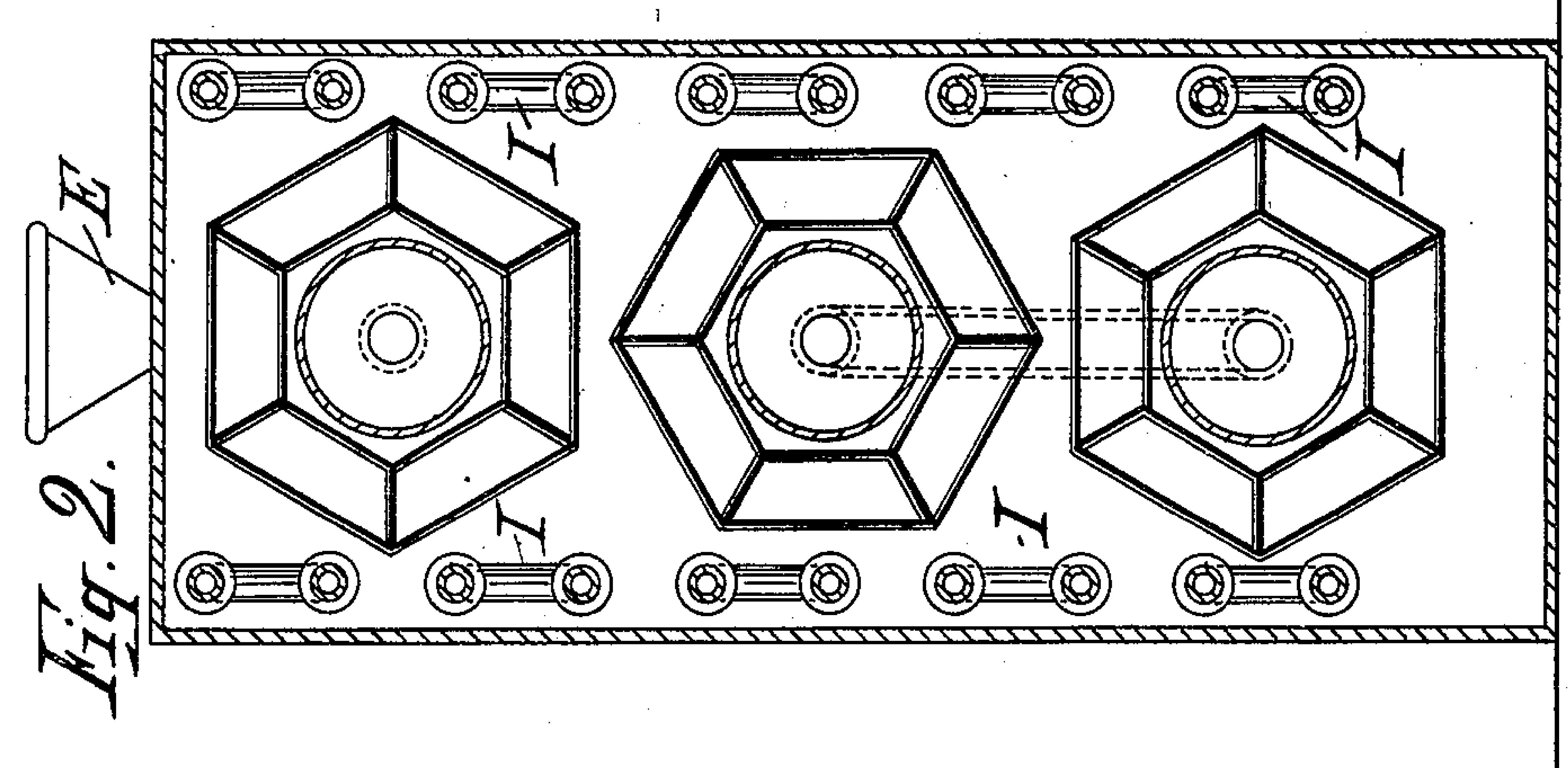
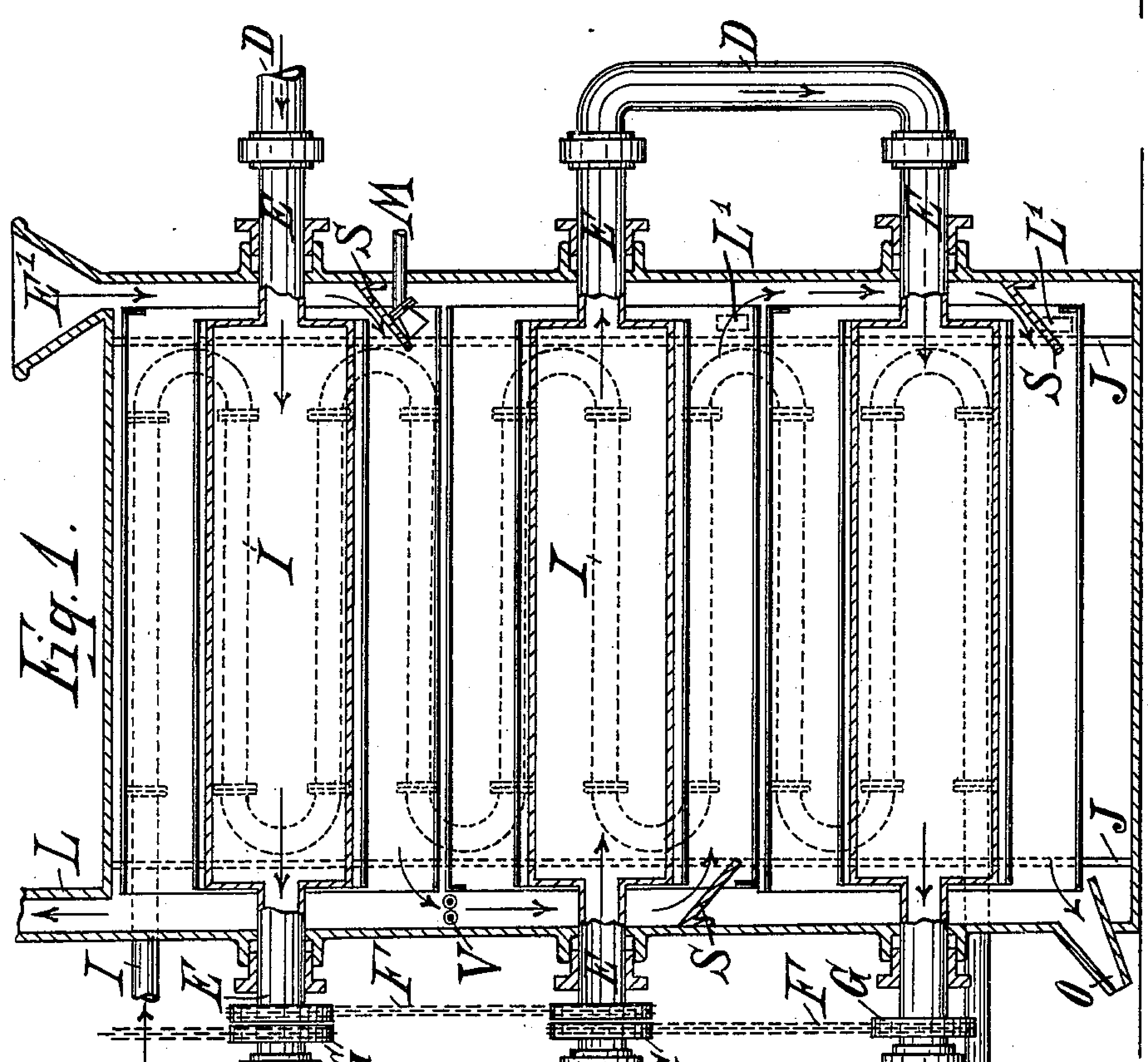
(No Model.) 2 Sheets—Sheet 1.

J. HUNDHAUSEN.

CYLINDER DRIER.

No. 589,352. Patented Aug. 31, 1897.





Witnesses
H. van Oldenneel
E. A. Scott.

Inventor
Johannes Hundhausen
by [signature]
Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. HUNDHAUSEN.

CYLINDER DRIER.

No. 589,352. Patented Aug. 31, 1897.

Fig. 3.

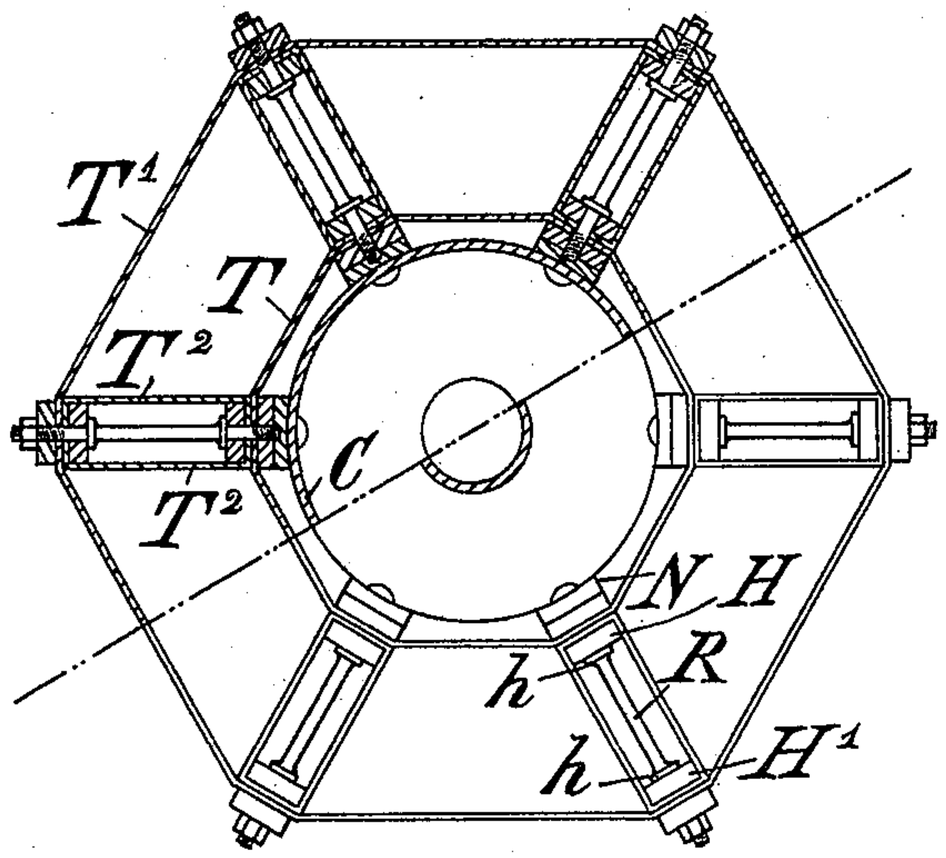
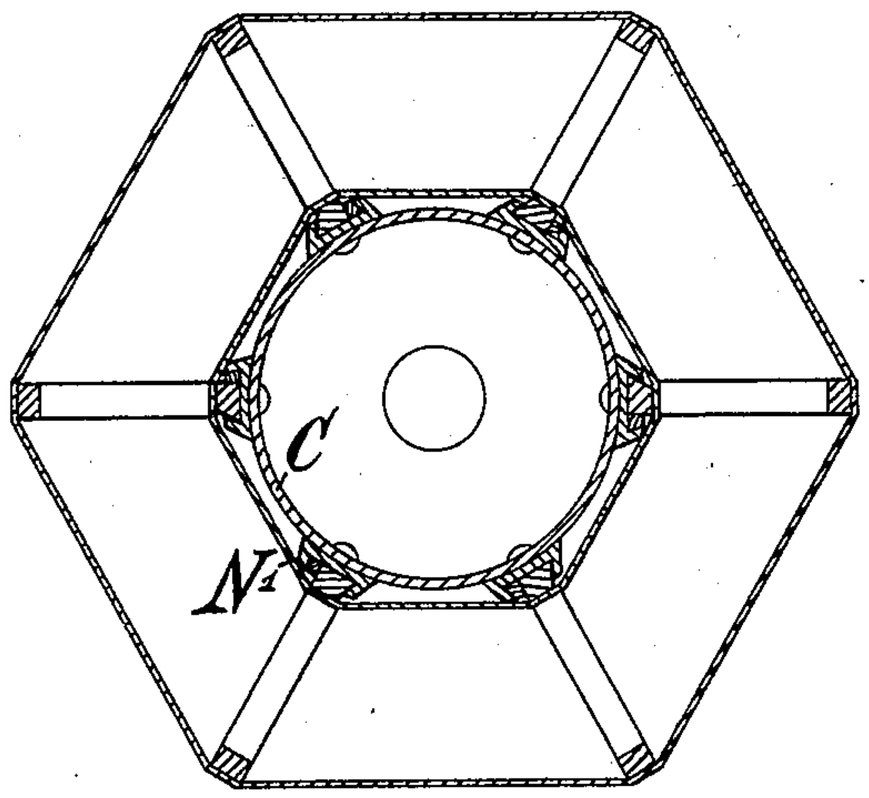


Fig. 4.



Witnesses
H. VanOldenneel
E. A. Scott

Inventor
Johannes Hundhausen
by Steinmetz & R
Attorneys

UNITED STATES PATENT OFFICE.

JOHANNES HUNDHAUSEN, OF HAMM, GERMANY.

CYLINDER DRIER.

SPECIFICATION forming part of Letters Patent No. 589,352, dated August 31, 1897.

Application filed June 10, 1896. Renewed July 10, 1897. Serial No. 644,121. (No model.)

To all whom it may concern:

Be it known that I, JOHANNES HUNDHAUSEN, a subject of the King of Prussia, Emperor of Germany, and a resident of Hamm, in Rhenish Prussia and Kingdom of Prussia, Germany, have invented certain new and useful Improvements in the Method of and Apparatus for Drying Sensitive Substances, of which the following is a specification.

This invention relates to the method of and apparatus for drying chemically and physically sensitive substances, such as starches and the like.

An apparatus constructed according to these improvements consists of one or more rotary cylinders which are continuously fed. They are preferably contained within a chamber and heated internally and externally. The surfaces which come into contact with the material to be dried are constructed or covered with a suitable material which will resist the heat employed and will not act upon or be acted on by the material. When more than one cylinder is employed, they are arranged in a vertical plane. The material is dried by being caused to pass in contact only with the covering material of the heated cylinder if only one be employed, or in other cases through the cylinders successively. A stirring or agitating appliance may be employed in combination with each cylinder. At the same time with the material there is caused to be passed through the cylinder a current of air which carries away the evaporated moisture. In the case of a single cylinder the material is supplied to one end and delivered from the other. In the case of a vertical series of cylinders the material is supplied to the highest and passes out of its opposite end through a chute or the like to the cylinder next below, and thus through the whole series to the delivery end of the lowest cylinder.

In the drawings, Figure 1 is a longitudinal section of the apparatus. Fig. 2 is an end view partly in section. Figs. 3 and 4 show end views in section of the cylinder.

C is the hollow tubular center, upon which at opposite ends there are fixed metallic brackets N. Opposite brackets are connected by the clamps H, consisting of flat strips of wood. These clamps are secured to the brackets by means of the radial studs R, screwed at each end and having secured at their outer ends a pair of clamps H′ similar to and parallel with the clamps H. Two collars *h h* on the studs act as distance-pieces between the inner and the outer pairs of clamps. A ribbon or strip of cloth is secured in each pair of clamps, and to the projecting edges of this strip or ribbon on each side of the clamps strips of cloth T T′ or other suitable material are connected, thus producing a polygonal chamber forming the drying-space of the cylinder. This polygonal chamber may advantageously be divided up into longitudinal compartments, open at the ends, by means of radial partitions T², adjoining the clamps, and this prevents the occurrence of any nooks or obstructions which might impede the regular passage of the materials during drying.

In cases where it is desired to employ the same apparatus for successively drying different materials, as pigments, for example, and in which cases the strips T T′ would have to be changed the modified construction illustrated in cross-section by Fig. 4 may be employed. Dovetailed recesses N′ are formed upon the tubular center C, and the cloth or other material forming the polygonal chamber is stretched and secured upon a framing having dovetailed feet which fit into the dovetailed recesses, as indicated. With this construction the external part of the drying-cylinder can be removed and replaced at will in a very short time.

Figs. 1 and 2 illustrate in vertical section and end elevation, respectively, a drying system consisting of a series of three cylinders. Other numbers may be similarly arranged. These cylinders are arranged within a closed chamber adapted to conserve the heat therein and provided with suitable orifices for the admission and escape of the material to be dried and for air. Of course provision will be made in constructing the chamber to provide means of access and for the removing and replacement of the cylinders.

Steam may be admitted to the centers of the cylinders by means of the pipes D and trunnions E, and the rotation of the cylinders may be effected by an endless chain F and the chain-wheels G, one of which may be driven by any suitable means. On each side

of the cylinders there may be arranged a series of steam-heating tubes I, which are preferred not to extend to the ends of the cylinders, these being preferably separated from the heating-space by the vertical partitions J J, through which the ends of the cylinders pass, so that the chamber is divided into three rooms—the middle heating-room and the outer rooms for the inlet and outlet of air and of drying material. Air enters the chamber at L' L' on the same side as the material is fed and escapes on the opposite side by the flue L. The material is supplied to the top cylinder through the hopper E' and leaves it at the opposite end. To facilitate the passage of the material through the apparatus, each cylinder may have its axis inclined slightly downward in the direction of the travel, and in order to promote the drying in the first cylinder it is advantageous to arrange a special inlet of air under pressure in fine jets or streams through a pipe, such as M, these streams of air being directed, preferably, against the cloth.

If the material possesses a tendency to clog or ball when leaving the first cylinder, there may be provided a pair of rollers or crushers V, upon which the material is compelled to fall, as indicated by the arrow, if the material is amenable to such treatment.

The material is guided into the cylinders by means of chutes or inclined planes S, and its course through the apparatus from the hopper E to the outlet O is indicated by arrows, Fig. 1.

What I claim is—

1. A drying-cylinder for sensitive substances, comprising an imperforate tubular center, a fabric periphery, and intermediate supports for the fabric, substantially as described.

2. A drying-cylinder comprising the imperforate tubular center having steam-heating connections, the inner and outer clamps supported from said tubular center and the inner and outer fabrics carried by said clamps.

3. A drying system for sensitive substances comprising the closed chamber, the series of steam-cylinders arranged vertically in said chamber, the inner and outer fabrics supported by said cylinders and having a space between, means for continuously feeding the substances to be dried, in between the fabrics at one end of each cylinder and means for rotating the cylinders, substantially as described.

4. A drying system comprising the closed chamber having steam-heating pipes, the tubular steam-cylinders journaled therein, the inner and outer clamps supported by said cylinders, the inner and outer fabrics carried by said clamps, means for feeding the material to be dried continuously in at one end of each cylinder between the fabrics, and means for rotating the cylinders, substantially as described.

Signed at Cologne, in the county of Rhineland and Kingdom of Prussia, this 31st day of March, A. D. 1896.

JOHANNES HUNDHAUSEN.

Witnesses:
SOPHIE NAGEL,
WILLIAM H. MADDEN.