

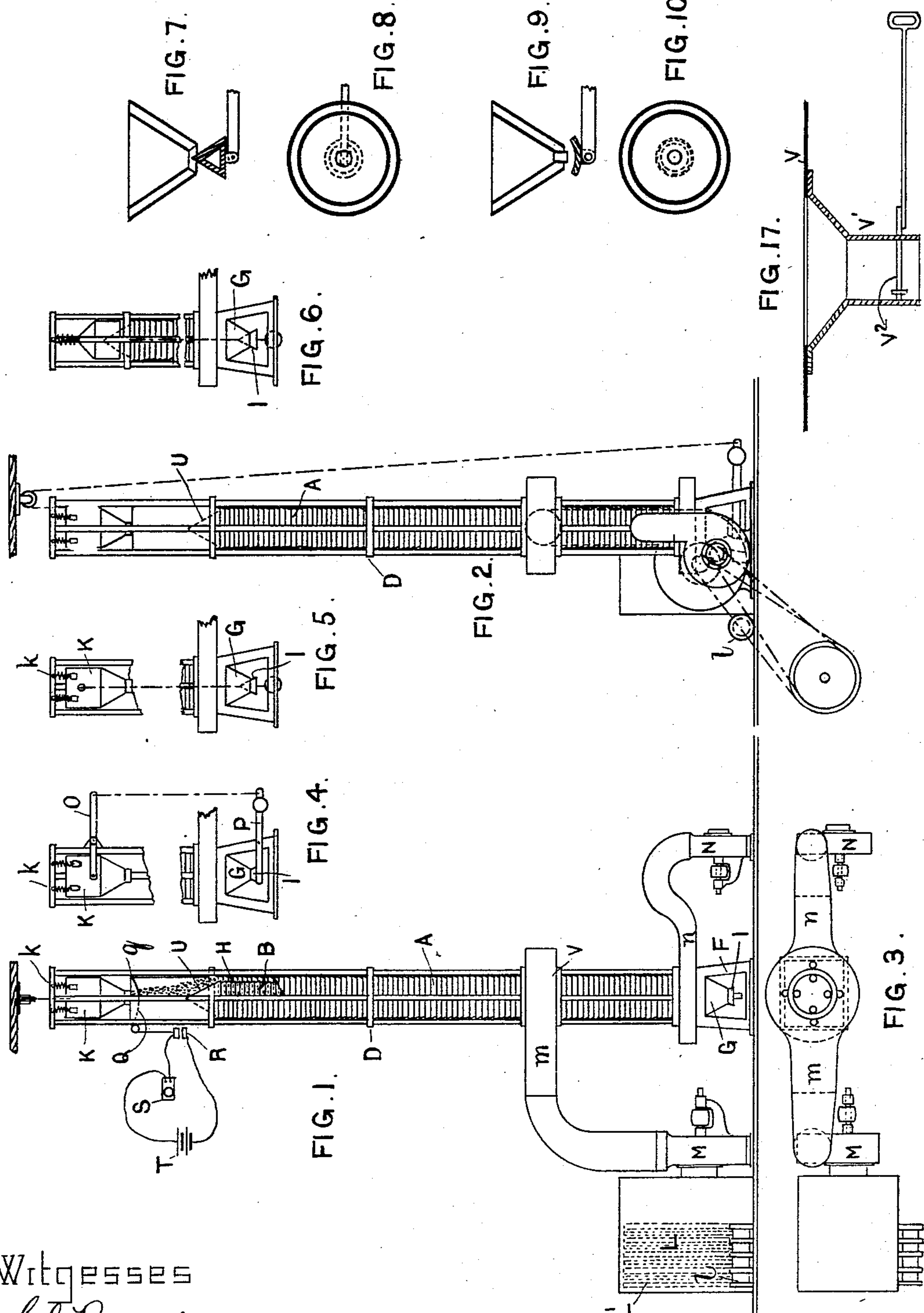
(No Model.)

2 Sheets—Sheet 1.

J. BACKHOUSE, Jr.  
GRAIN DRIER.

No. 570,783.

Patented Nov. 3, 1896.



Witnesses

Chas. Burdine  
Julius M. Pond.

John Backhouse, Jr., Inventor  
by Dodger & Sons, Attys.

(No Model.)

2 Sheets—Sheet 2.

J. BACKHOUSE, Jr.  
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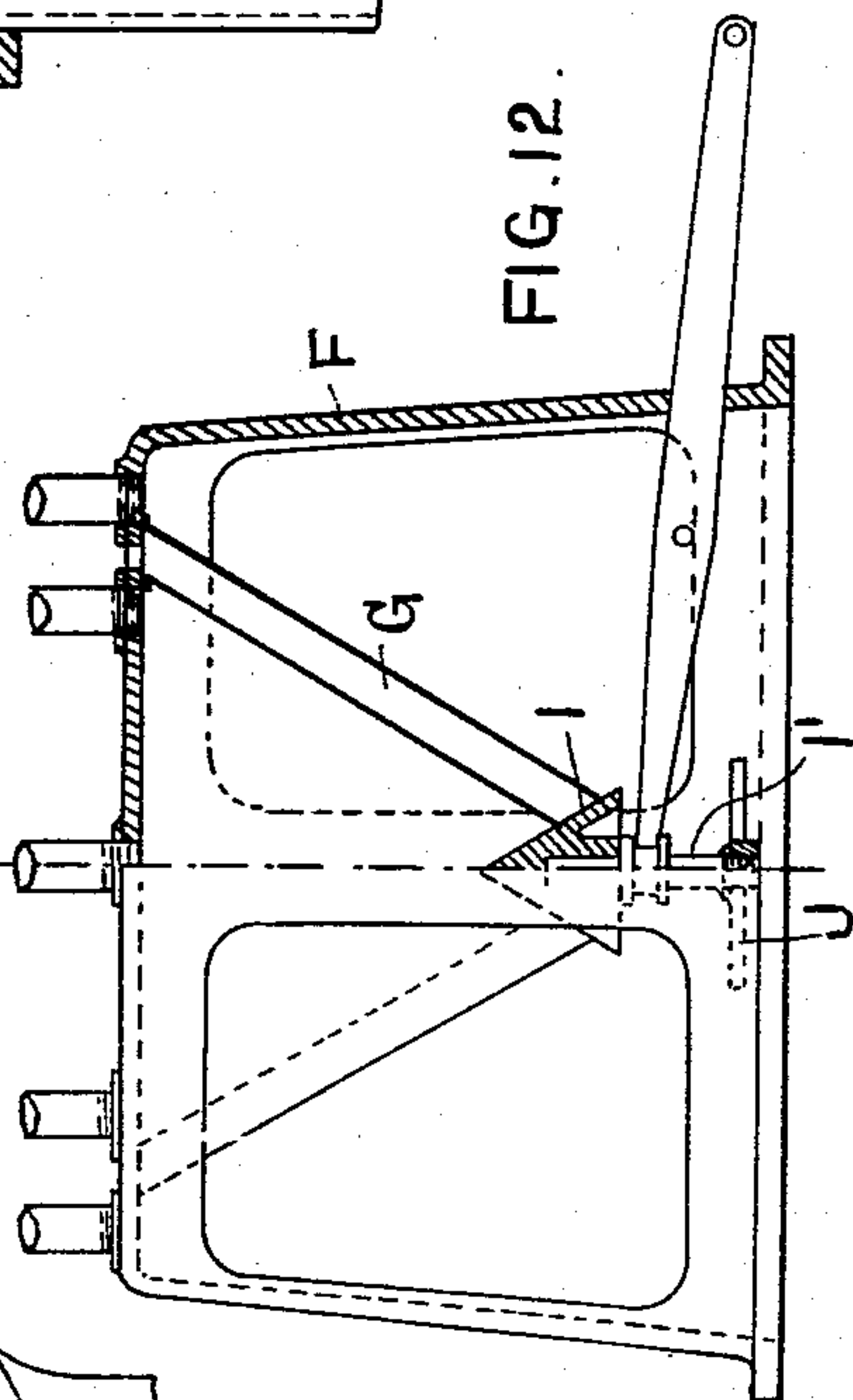
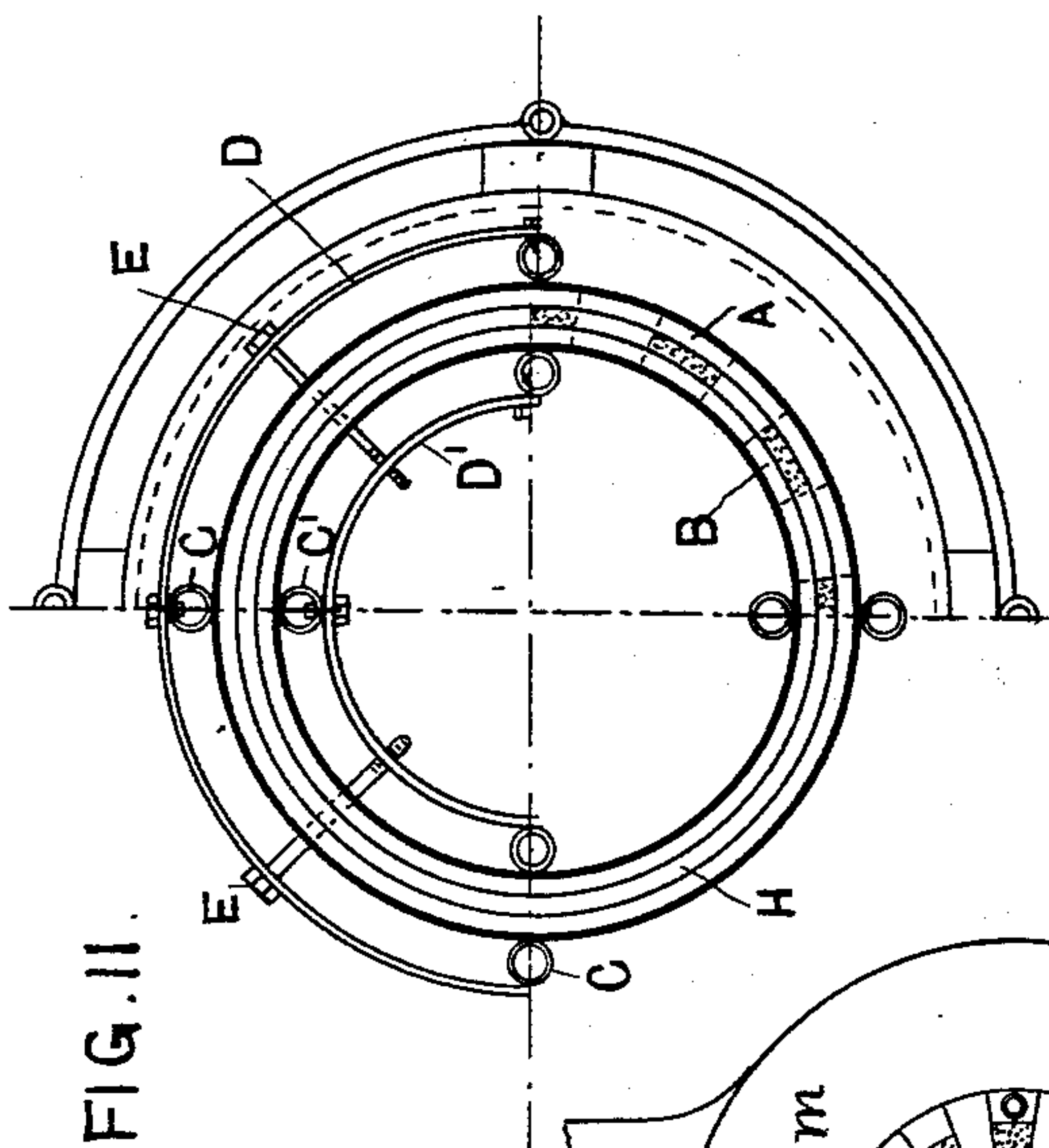
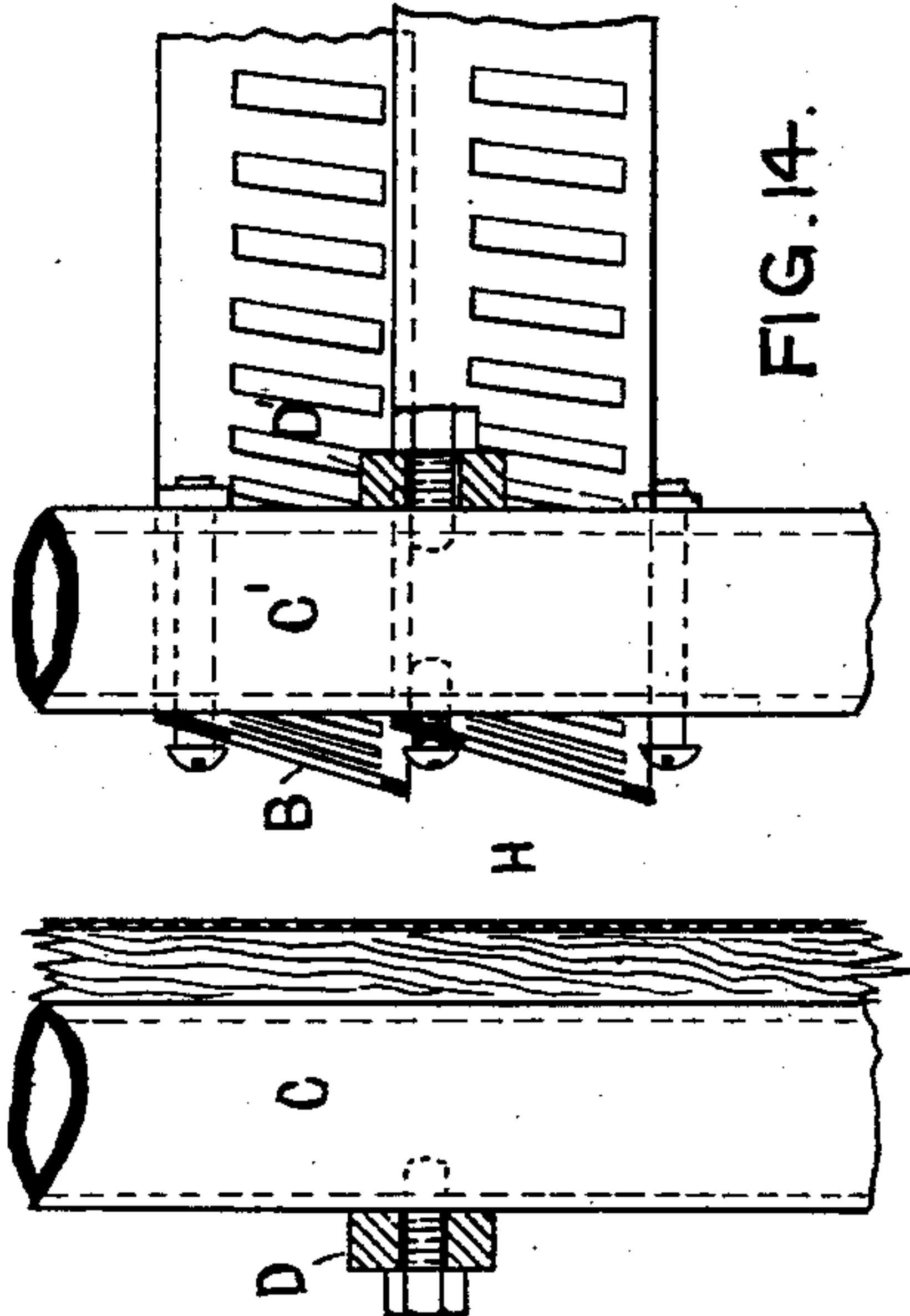
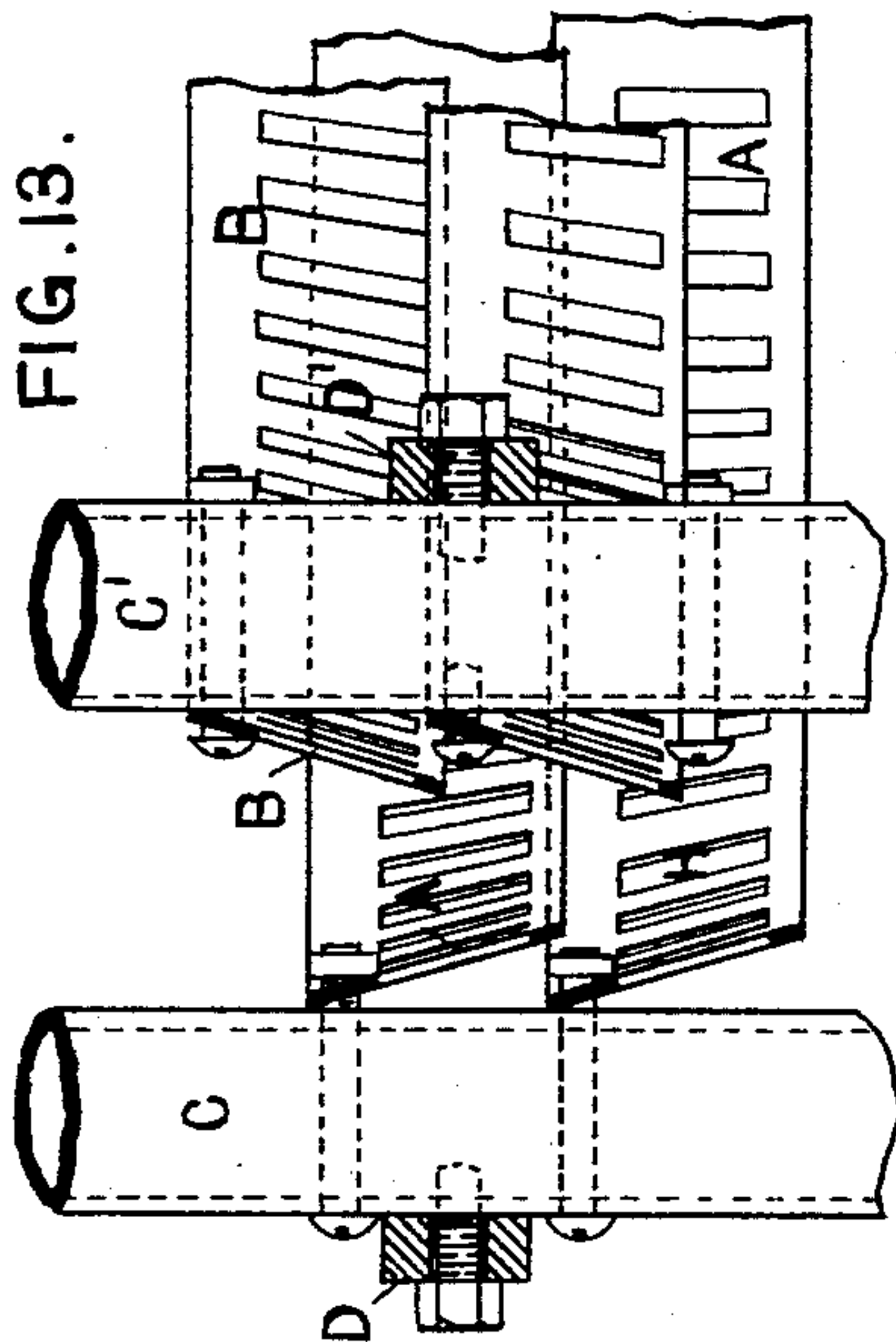


FIG. 15.

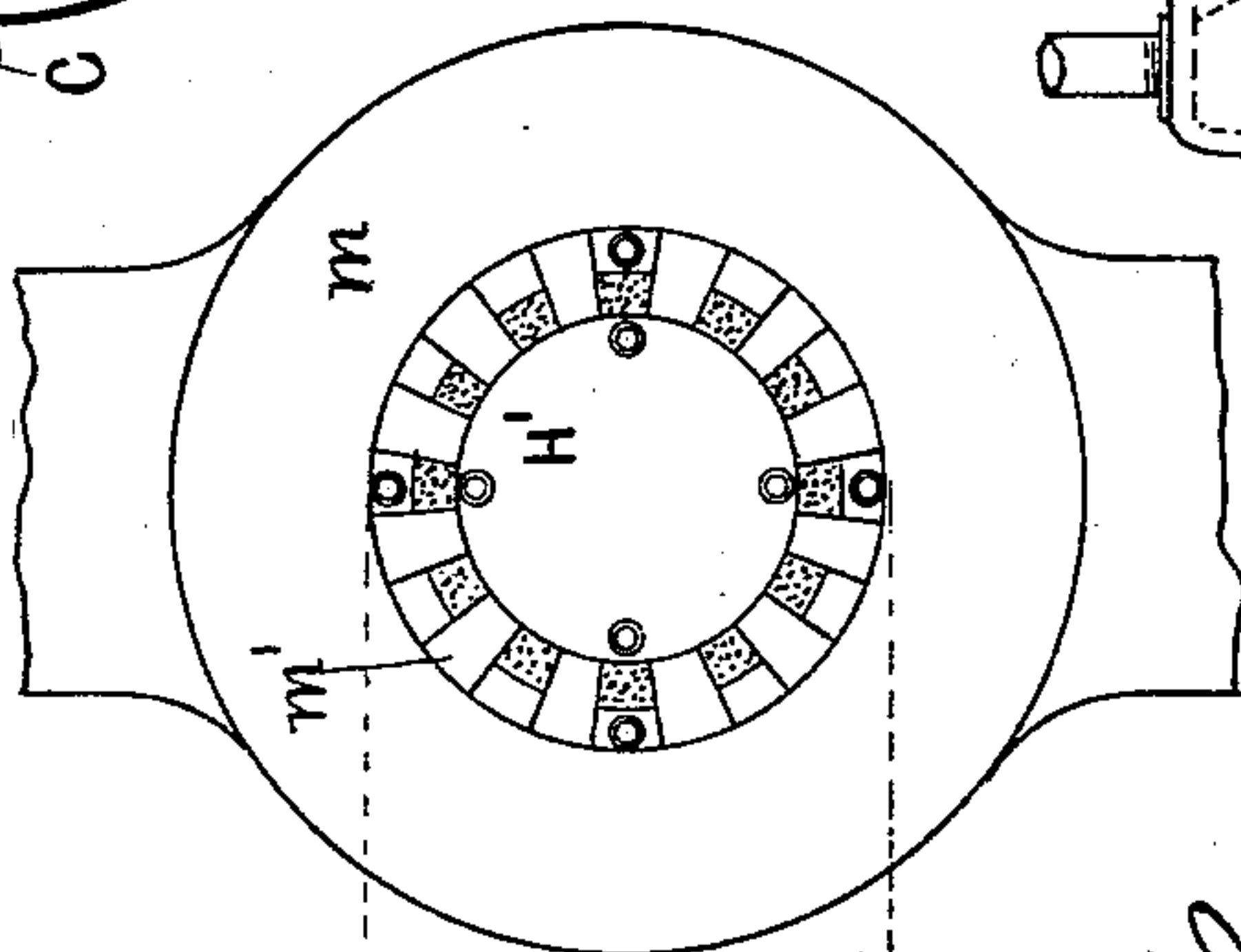
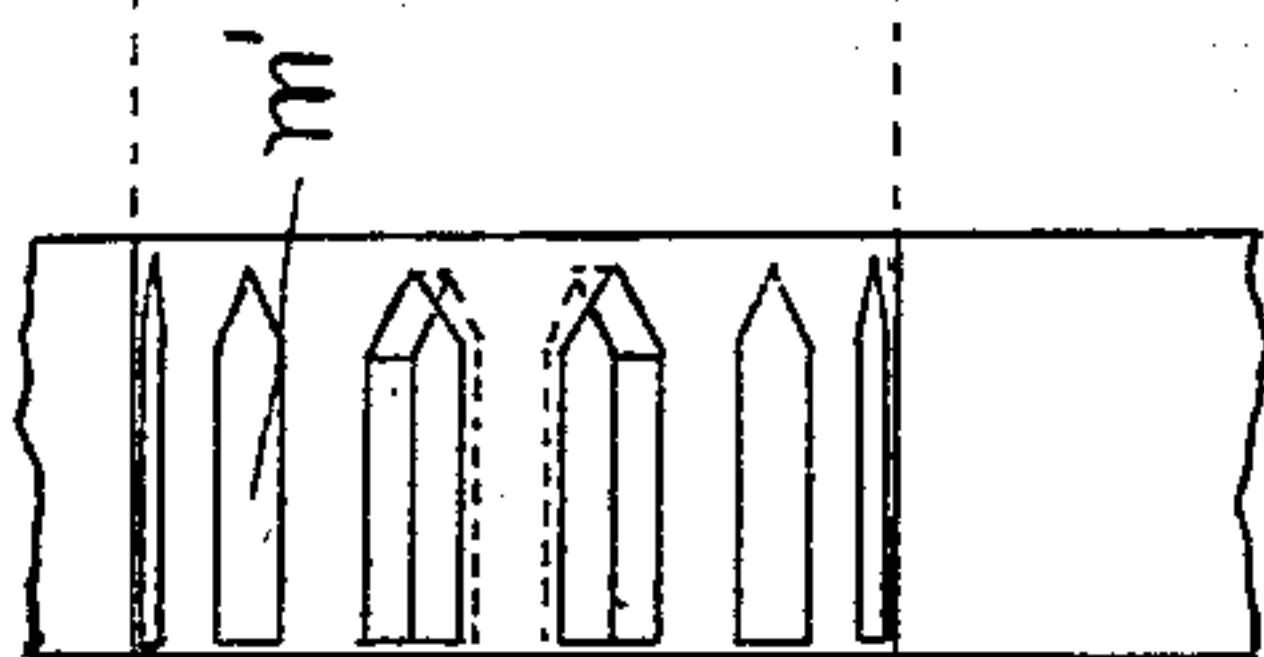


FIG. 16.



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# UNITED STATES PATENT OFFICE.

JOHN BACKHOUSE, JR., OF LIVERPOOL, ENGLAND.

## GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 570,783, dated November 3, 1896.

Application filed June 15, 1896. Serial No. 595,594. (No model.) Patented in England July 19, 1894, No. 13,874.

*To all whom it may concern:*

Be it known that I, JOHN BACKHOUSE, JR., a subject of the Queen of Great Britain, residing at Liverpool, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Drying or Conditioning Grain, (patented in Great Britain, No. 13,874, dated July 19, 1894,) of which the following is a specification.

10 This invention has for its object an apparatus for drying or conditioning grain and other granular or like material.

It is best described by aid of the accompanying drawings, in which—

15 Figures 1 and 2 show vertical elevations at right angles to each other of the apparatus; Fig. 3, a plan of same; Fig. 4, vertical elevation of part, showing one form of automatic discharge; Figs. 5 and 6, two other forms; 20 Figs. 7 and 8, sectional elevation and plan of one form of valve; Figs. 9 and 10, similar views of another form of valve; Fig. 11, horizontal section at four points in the tower, namely, upper left-hand part through the 25 louvers, upper right-hand part, section also showing the base, lower right-hand part, section through the louvers, and the lower left-hand similar part, incomplete section, with rings and other parts omitted; Fig. 12, vertical elevation, partly in section, of base; Fig. 13, enlarged view of sectional elevation through 30 louvers; Fig. 14, a variation showing the outer louvers superseded by a perforated plate supported on vertical beams at intervals placed between it and the column; Fig. 15, section through the tower at the air-entrances; Fig. 16, projection from same, showing an elevation drawn on its side of the orifice; and Fig. 17, a detail view of the diaphragm and spout.

40 In the drawings, A and B are a series of concentric round louver-plates, which may be perforated with long narrow slits; C, four columns supporting louvers A; C', four similar columns supporting the louvers B; D, ring-plates placed at intervals round the columns C; D', similar rings inside the columns C'. These are held together at intervals by bolts E, which can be screwed up to any required 50 extent. F is a base supporting the said columns and having an annular conical chamber G opening out into the annular space H,

inclosed by the louvers; I, a conical or other valve regulating the opening from this space. This valve I slides on the pillar I', Fig. 12, 55 supported on base-plate J.

K is a hopper into which the grain is brought by any suitable spout. This hopper is supported on springs *k*, and is connected in any of the various ways hereinafter mentioned 60 with the valve I, so that whenever the hopper begins to get too heavy it descends and automatically opens the valve I.

L is a hot-air stove heated by heating devices *l*, from which a large number of pipes 65 L' rise up in the stove and thus heat the air. Other forms of air-heating devices, however, can be used instead. The air is propelled by a fan M through the passage *m* into a casing round the annular space H, which latter at 70 this particular point is cylindrical and not formed of louvers. It is provided with passages *m'*, Fig. 15, whereby the hot air can enter the central space H' and from there pass out through the louvers and the grain 75 between them.

N is a second fan passing cold air through the passage *n* into a similar cylindrical casing near the bottom and thus admitting air 80 into the central space H'. A horizontal diaphragm V, through this central space H', separates the cold-air portion from the hot. The diaphragm V has a central hole in it, and its spout V' is fitted with a slide V<sup>2</sup>, whereby should any accumulation of grain occur in the 85 space H' the slide can be opened and the grain allowed to pass on to the valve I.

Referring now to Figs. 4, 5, and 6. Fig. 4 shows two levers O and P united by a chain or cord. As the hopper K gets heavy and 90 descends it oscillates lever O, and by this means raises up the outer end of the weighted lever P, and thus lowers the valve I at the bottom and allows more grain to escape. In Fig. 5 a slight modification is shown, where 95 the valve I is attached to the hopper K directly by a line, thus avoiding the necessity of using levers at all. Fig. 6 is a similar arrangement to Fig. 5, except a cone takes the place of the upper hopper. In Fig. 1 is shown 100 a device for automatically giving the alarm if the supply runs short. Q is a band fixed at one end *q* and passing over a pulley to a weight at the other end. This band passes



under the orifice of the hopper. As long as the grain falls onto the band the band is bellied out below the hopper. When the grain, however, ceases to fall onto it, the band  
 5 gets stretched tight by the weight, and the latter comes in contact with a fixed contact R, and thus completes the circuit which rings an electric bell S by means of battery T. U  
 10 is a cone formed by the uppermost inner louver continued to a point, which thus acts as a guide to guide the grain into the annulus H.

The mode of action is as follows: The grain being filled into the hopper K, it passes down  
 15 into the annular chamber H. Air or air and steam passing through the stove L is heated and dried by the heating device l, and, propelled by fan M, passes through passage m into the central space H', and, rising up in  
 20 this column H', escapes laterally through the column of the grain in the space H and dries it. As the grain after passing the chamber M is heated, cold air is allowed to pass from the fan N through the passage n into the bot-  
 25 tom of the column H', and thus cools this grain before it escapes. When the grain has to be moistened instead of cooled, wet steam instead of air is passed through one of the pas-  
 30 sages M or N. It will be obvious that exhaustion from an outer casing can take the place of blowing the air in by means of fans, but this system is not desirable. Further, that a square tower can take the place of a round one, and the number of supporting-columns  
 35 can be varied to any desired extent. Further, the positions of the hot and cold air entrances can be varied. The wall of grain is preferably from three-quarters to one and a half inches thick, and, lastly, heating-pipes  
 40 can be placed in this space if desired, but I do not recommend this.

I claim as my invention—

1. The device for automatically regulating the passage of material through grain-treat-  
 45 ing apparatus such as described, which con-

sists in the combination of the hopper receiving the grain from a spout, a valve below for regulating the exit and a line connecting the valve with the hopper in such manner that  
 50 when the hopper becomes too heavy and sinks the valve is caused to open wider and thus allow more to escape and vice versa, always keeping the column full of grain.

2. In an apparatus for treating grain, the combination of the spring-supported hopper  
 55 K, a device for admitting a current of grain thereto; a valve I located at the bottom of the apparatus; levers O O connected to the hopper and to the valve; and a connection between the outer ends of the levers.  
 60

3. The combination in an apparatus for treating grain, of a hopper K capable of limited vertical movement produced by the weight in the hopper; an electric contact R; a source of electricity T; an electric alarm  
 65 S; and a device Q connected to a second contact and placed immediately below the exit of the hopper, whereby as long as the grain falls on said device the two electric contacts are held apart, but the moment the grain  
 70 ceases to fall they touch and cause an alarm.

4. In an annular apparatus for treating grain with hot or cold air or steam, the combination with the annular chamber having perforated walls, of an annular passage for  
 75 the fluid round the said chamber and a series of long deep narrow passages connecting the annular passage with the interior of the perforated chamber, whereby the passage of the grain is impeded as little as possible and the  
 80 treating fluid is introduced equally to all parts of the circumference of the interior.

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

JOHN BACKHOUSE, JR.

Witnesses:

G. C. DYMOND,  
 W. H. BEESTON.