

No. 865,382.

W. HALL.

PATENTED SEPT. 10, 1907.

INVERT OR BLOCK FOR SEWERS AND PIPES.

APPLICATION FILED FEB. 26, 1906.

4 SHEETS—SHEET 1.

FIG.2.

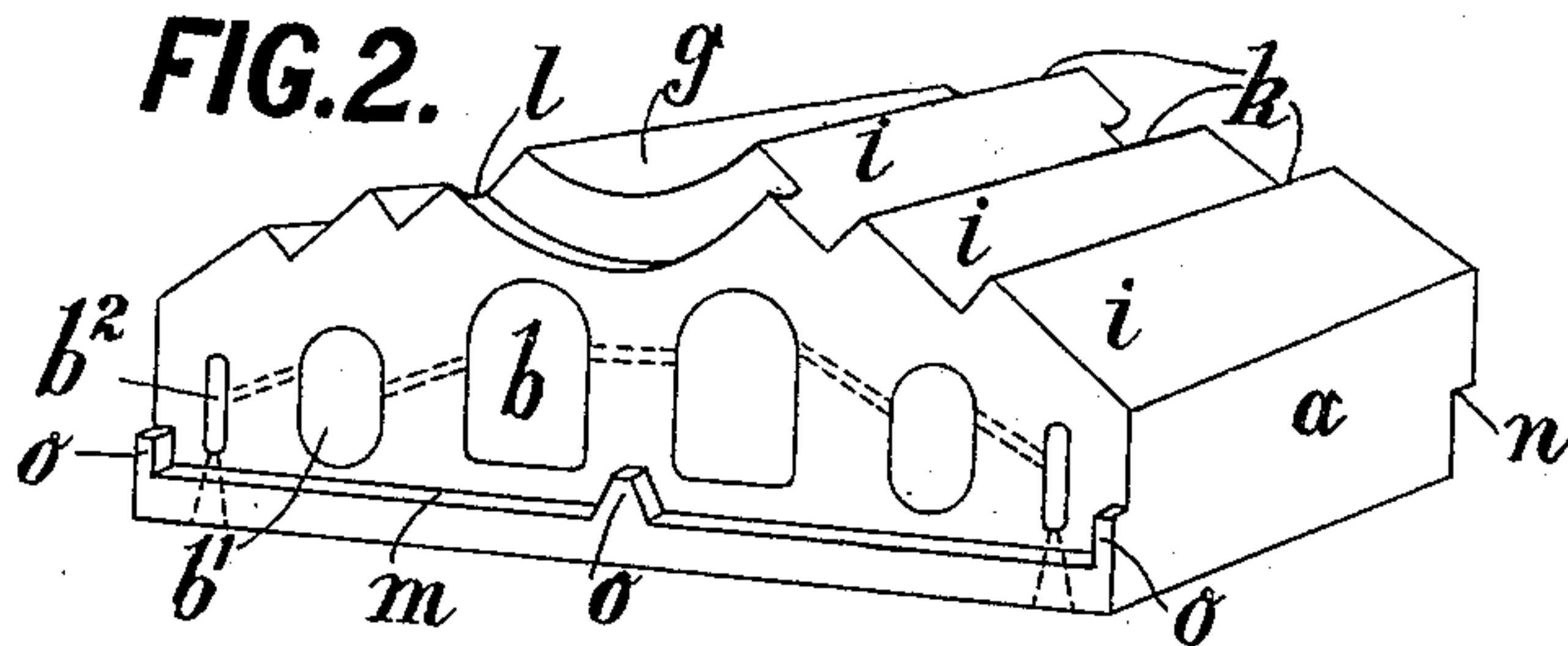


FIG.1.

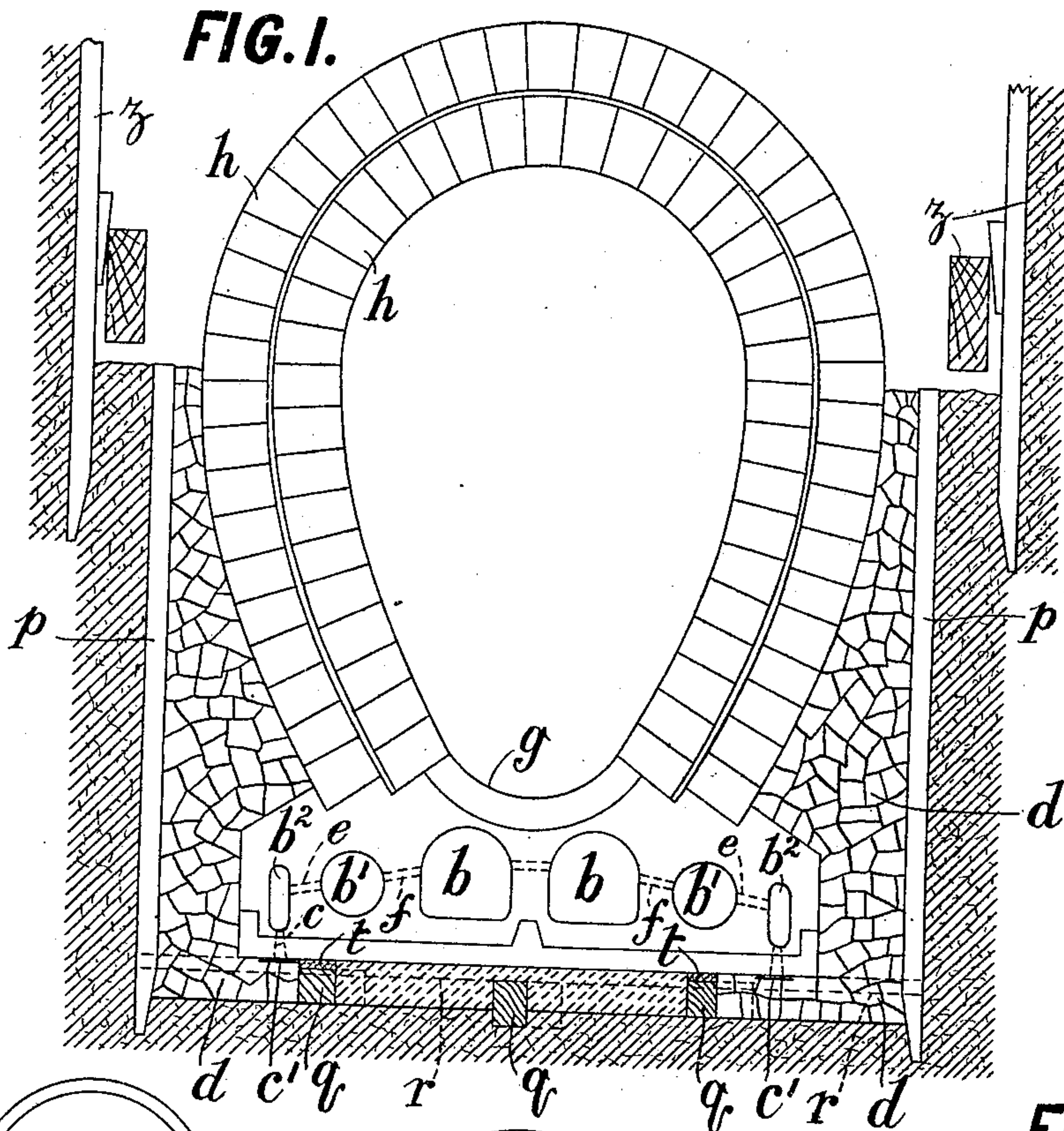


FIG.3.

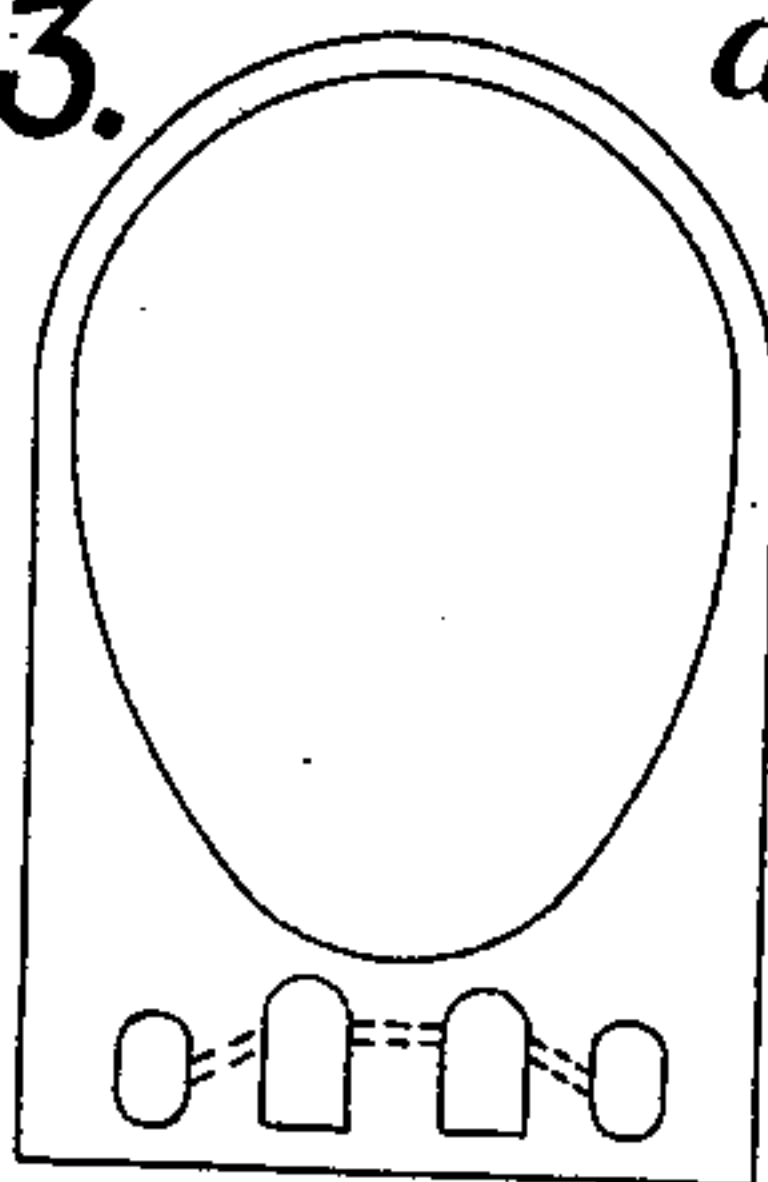


FIG.4.

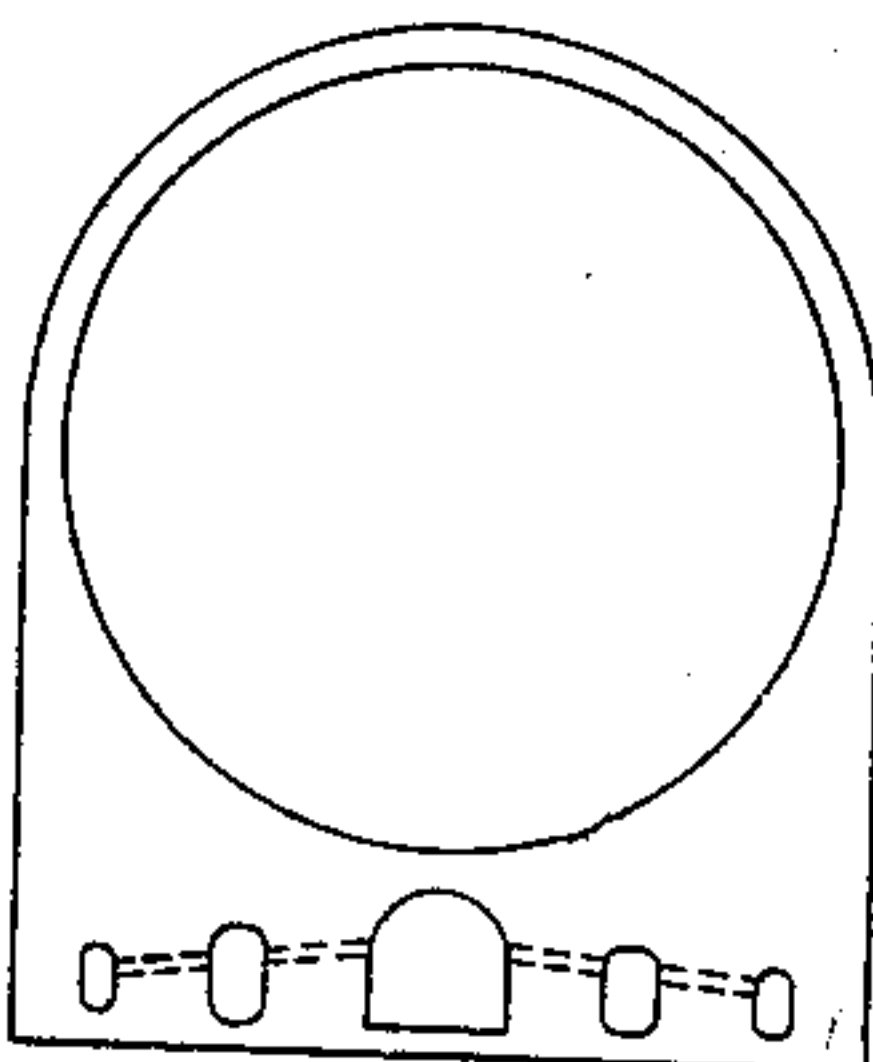
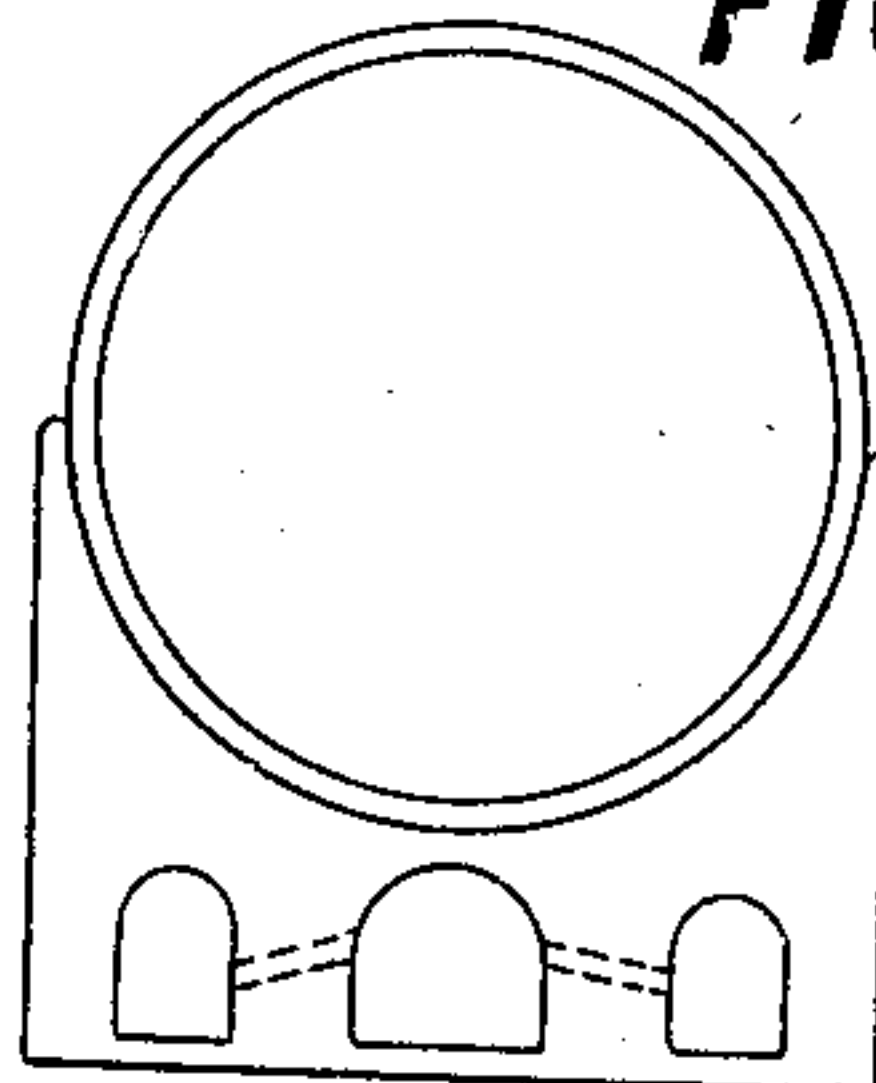


FIG.5.



Witnesses

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4 SHEETS—SHEET 2.

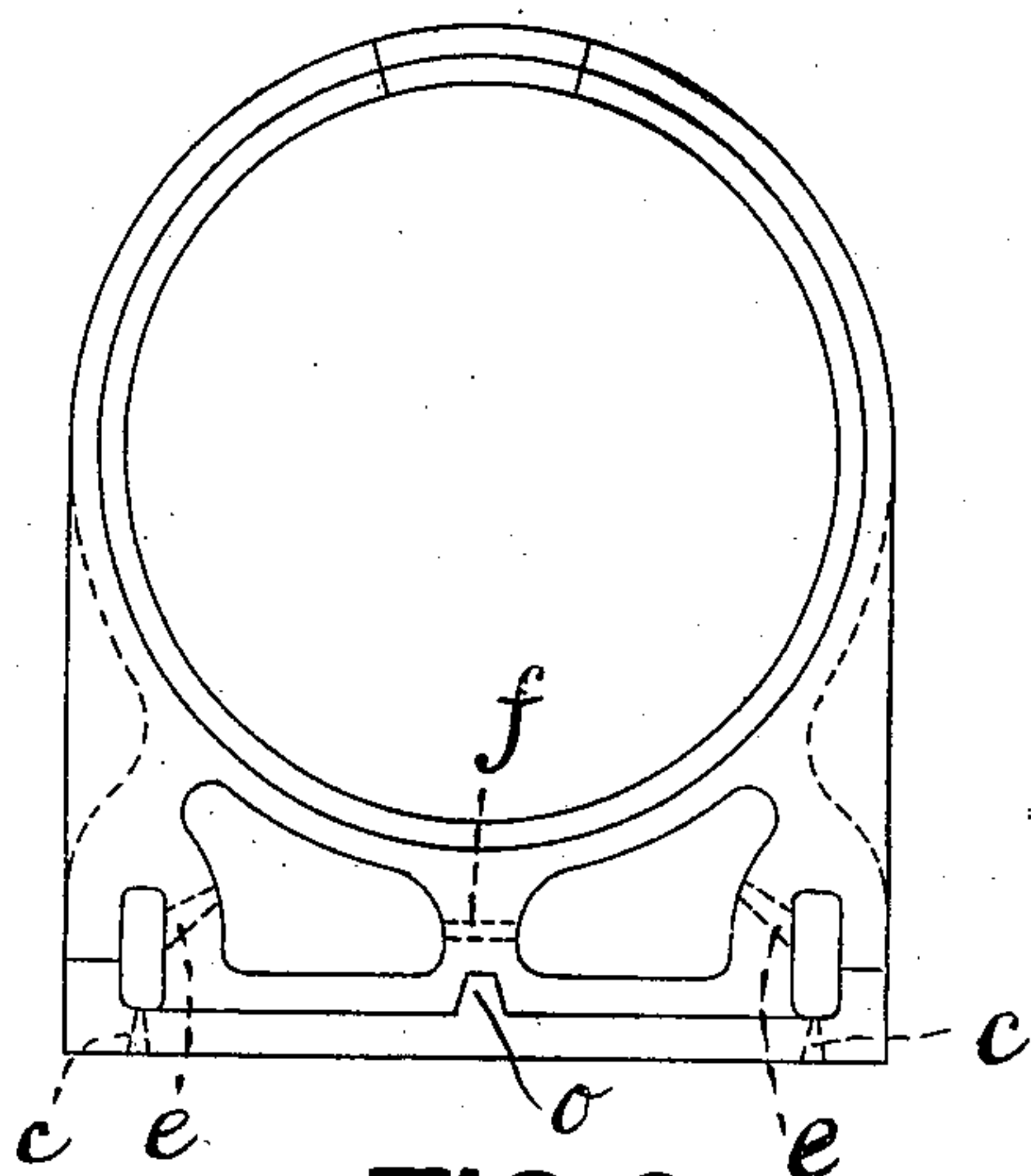


FIG. 6.

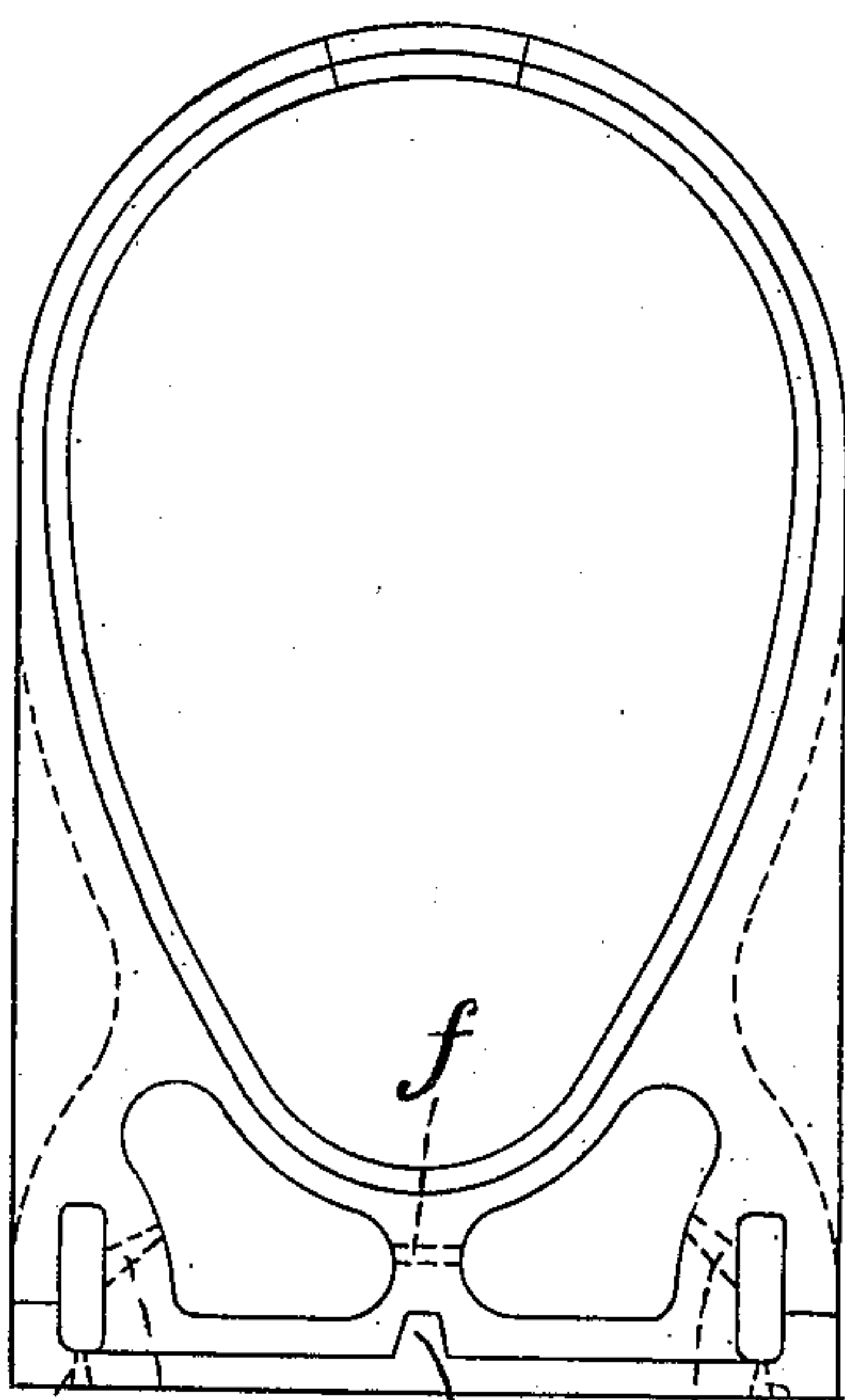


FIG. 7.

Witnesses

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4 SHEETS—SHEET 3.

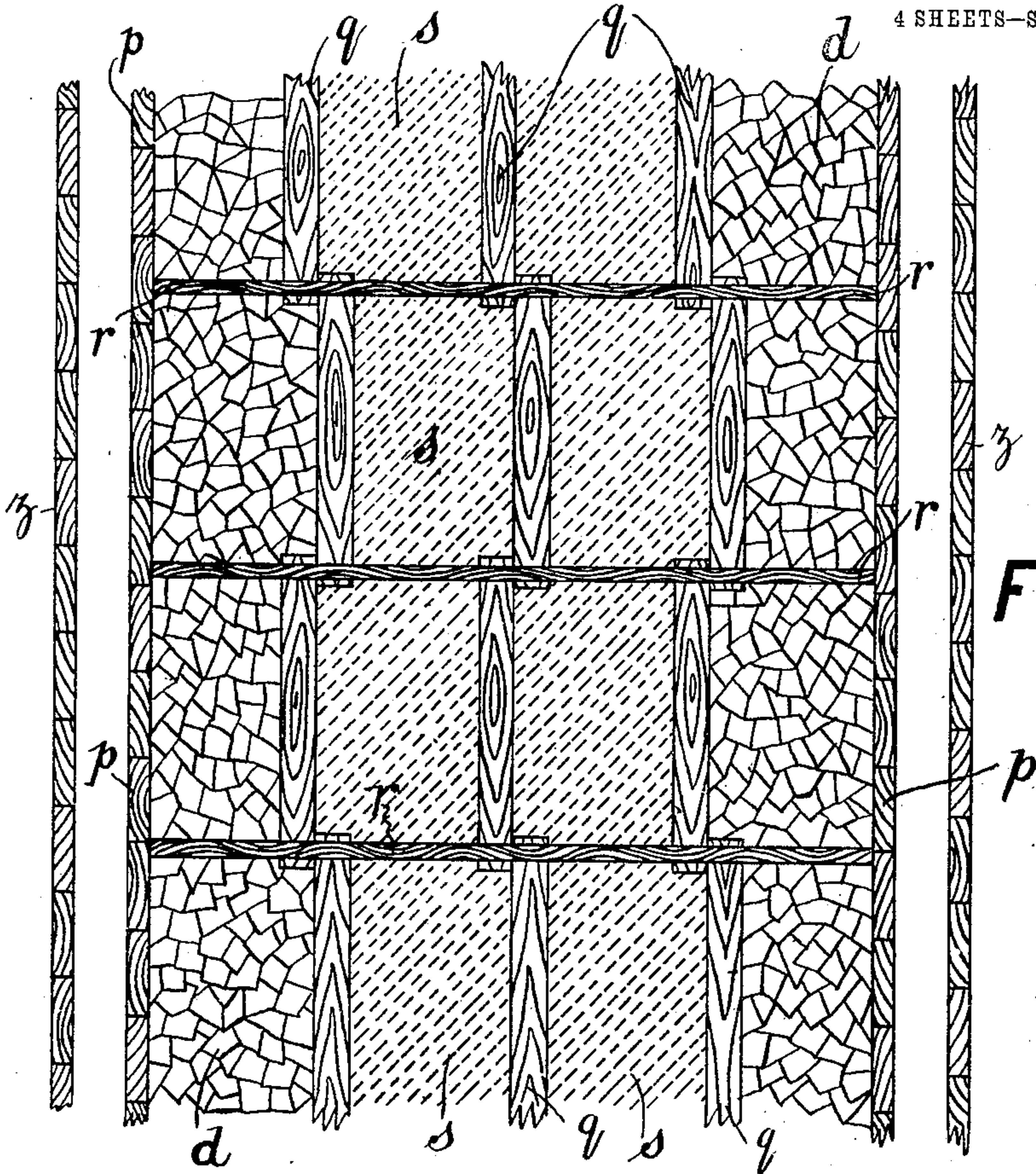


FIG. 9.

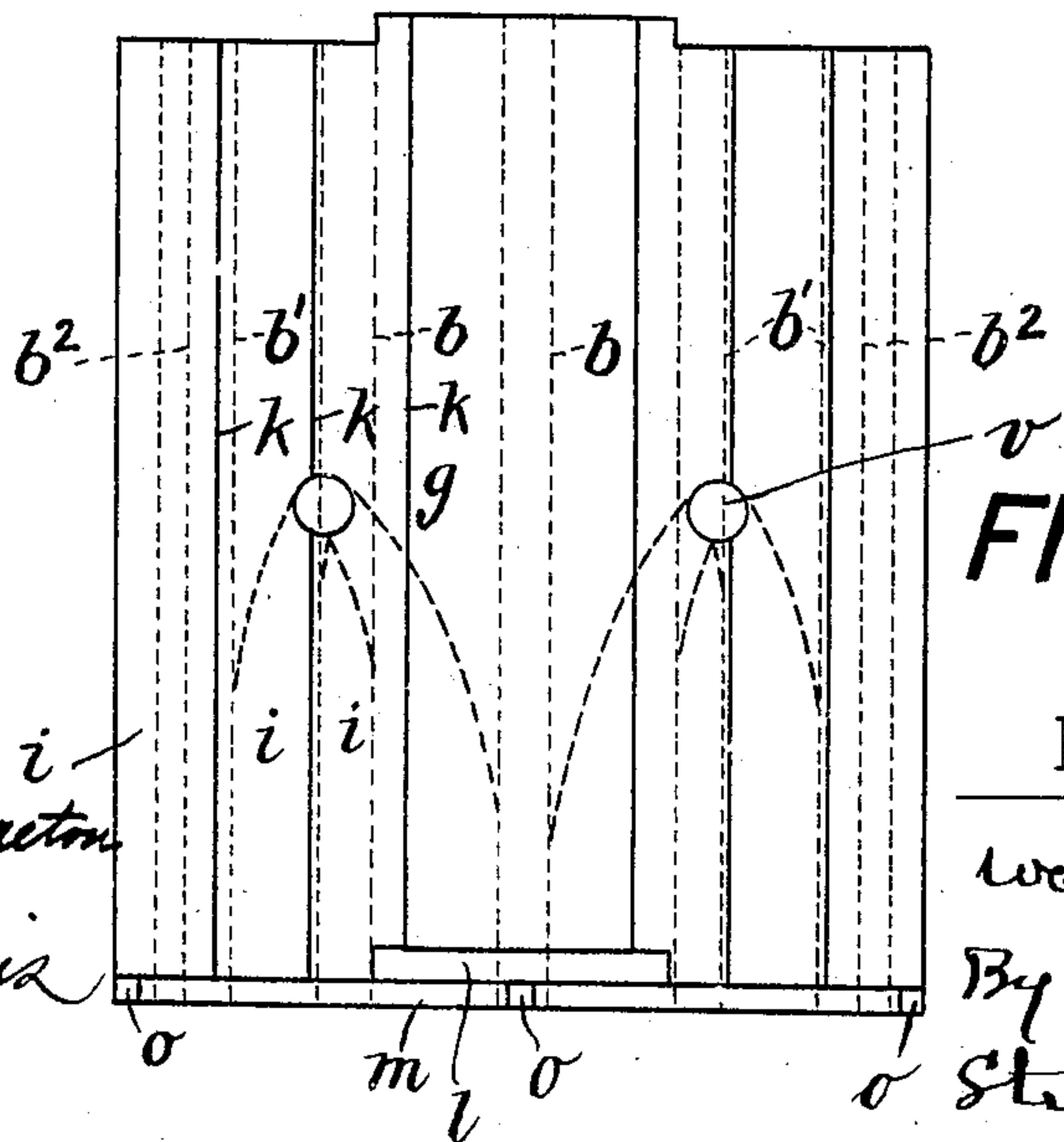


FIG. 8.

Witnesses  
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4 SHEETS—SHEET 4.

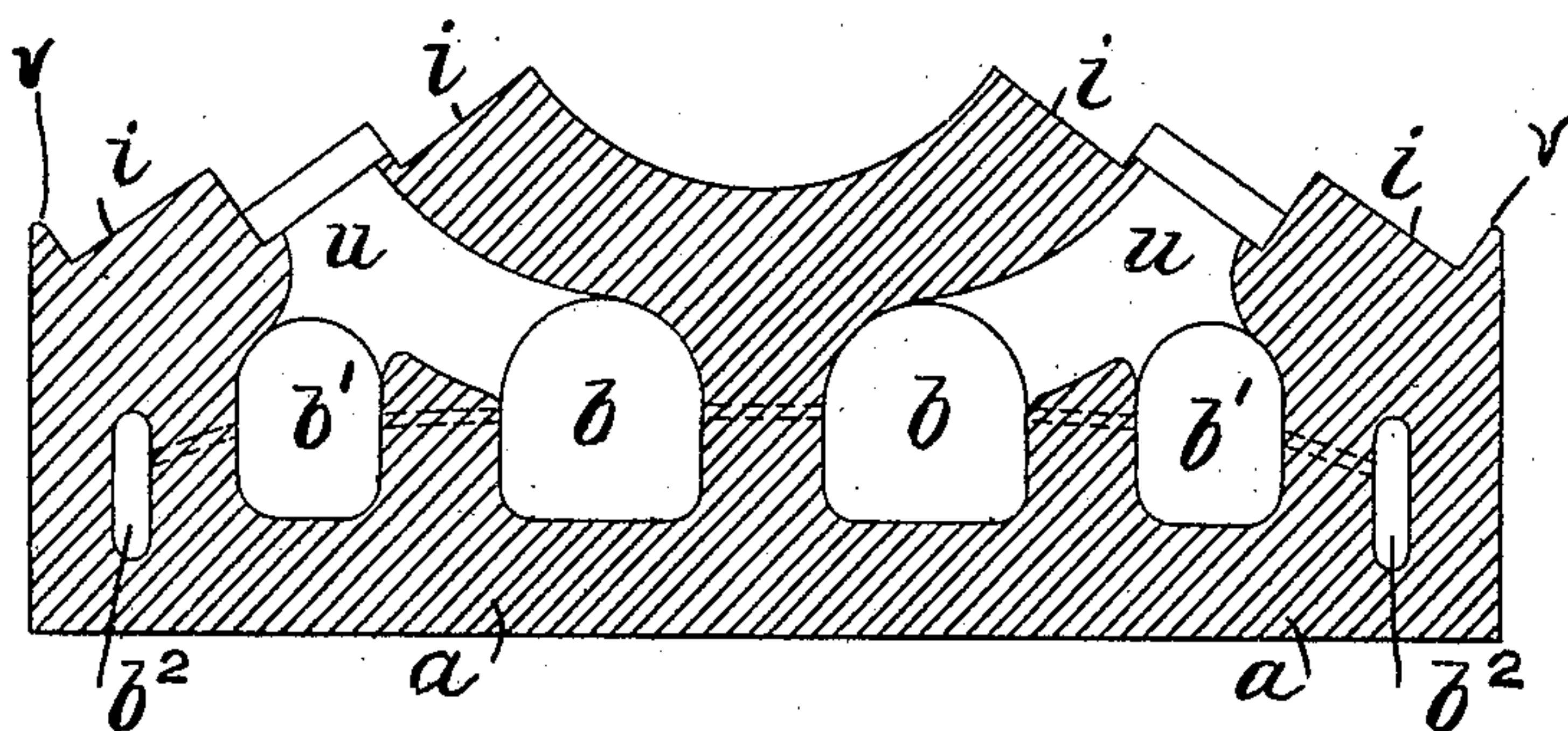


FIG. 10.

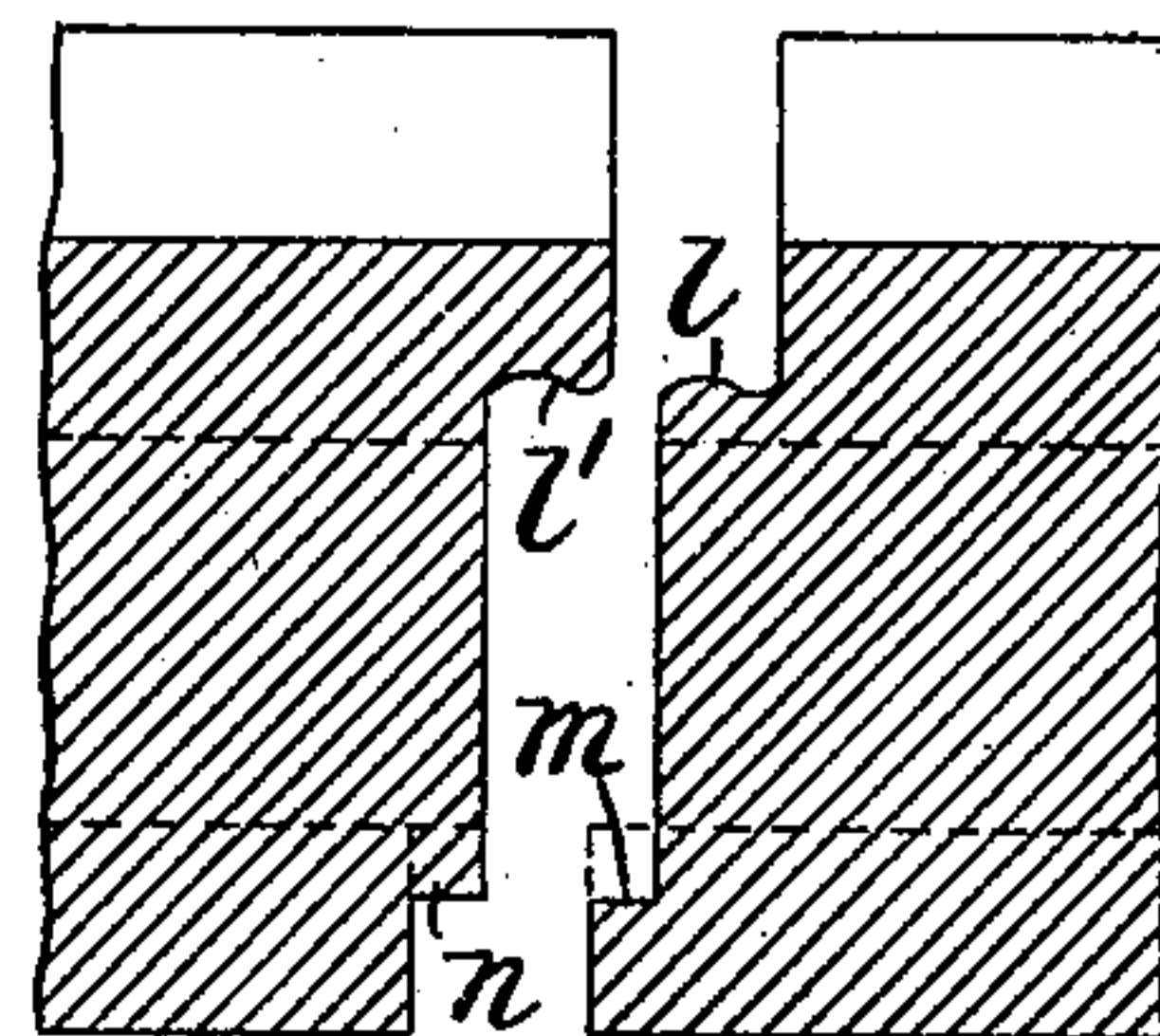


FIG. 11.

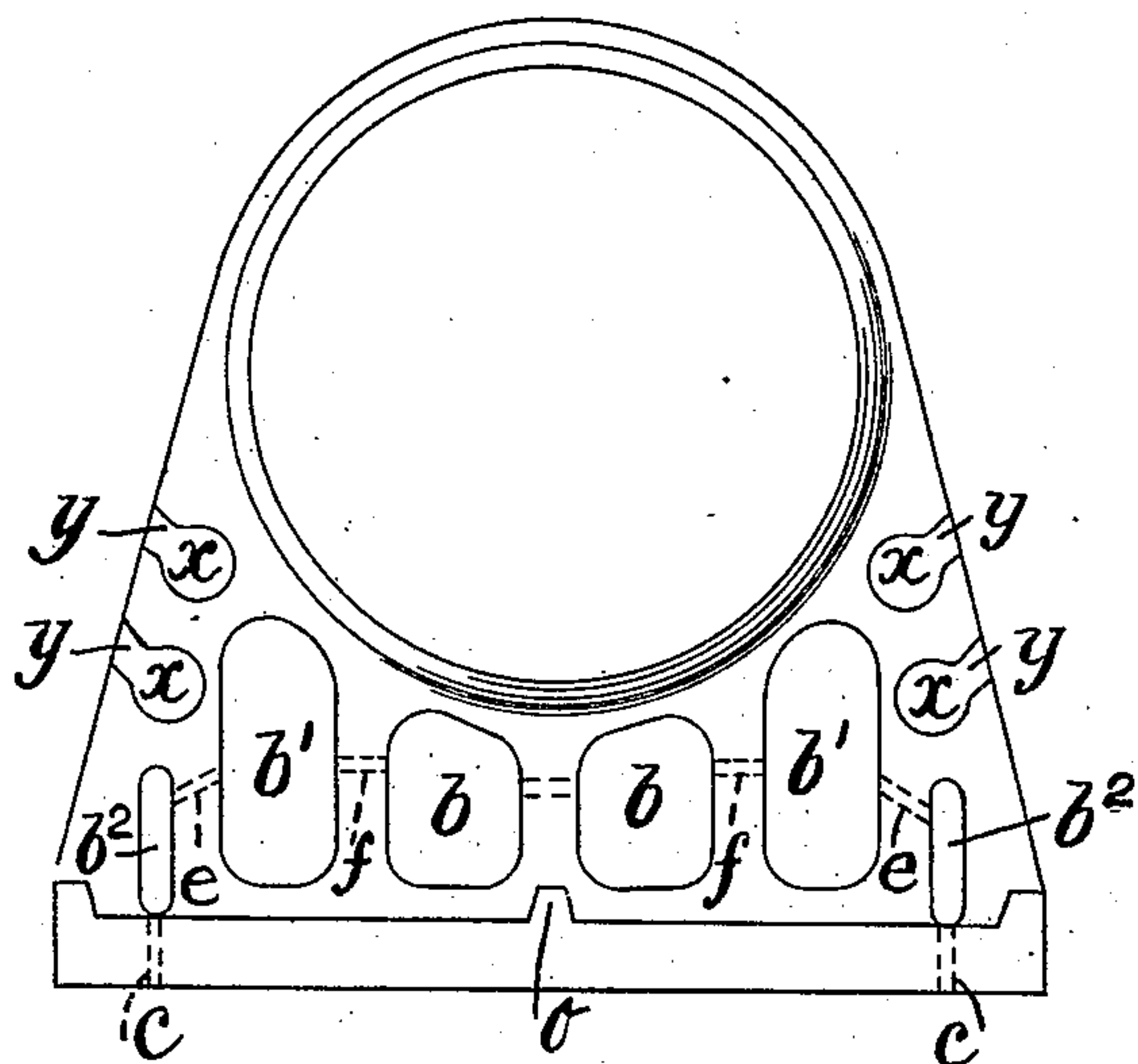


FIG. 12.

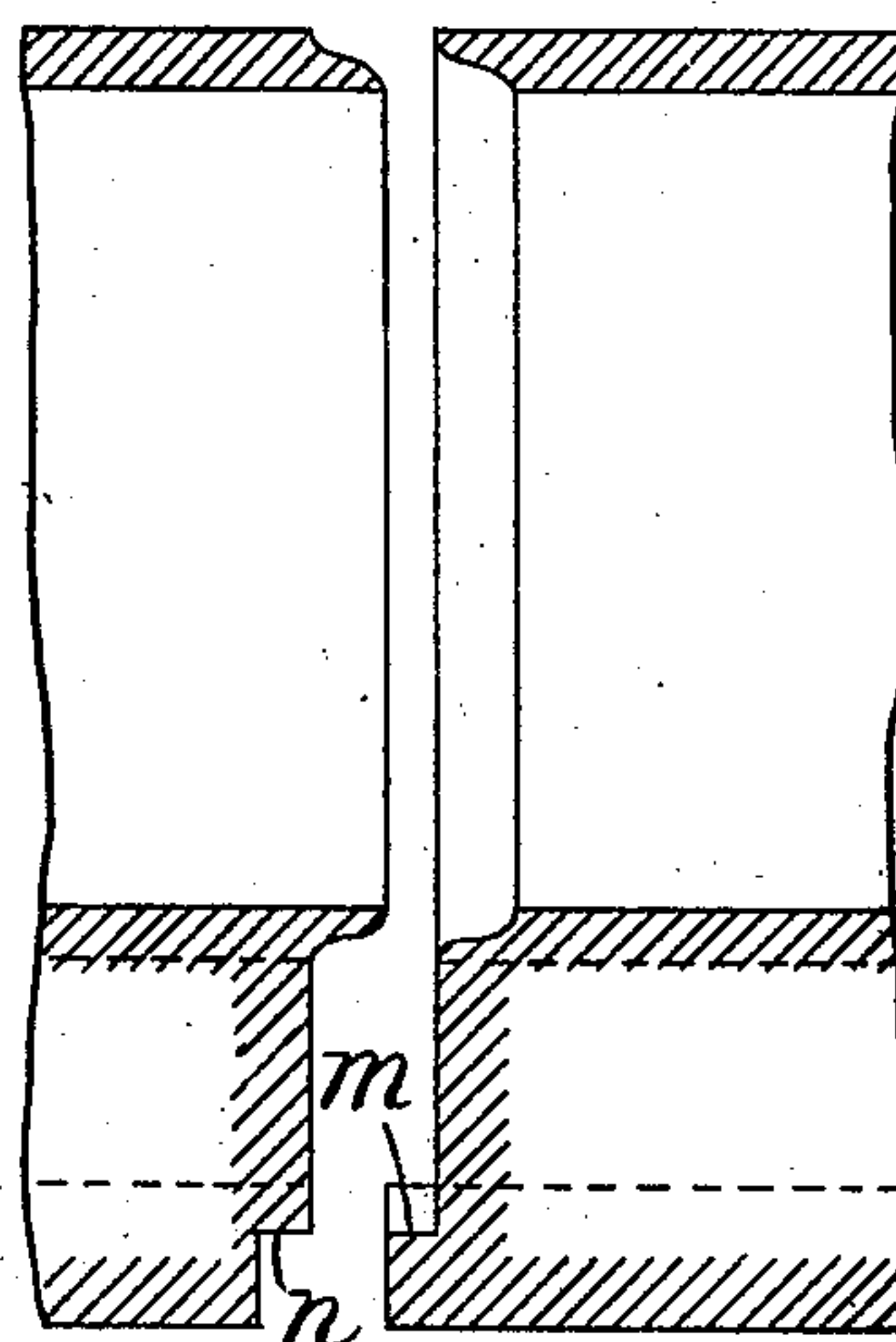


FIG. 13.

Witnesses

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# UNITED STATES PATENT OFFICE.

WATKIN HALL, OF GREAT CROSBY, NEAR LIVERPOOL, ENGLAND.

## INVERT OR BLOCK FOR SEWERS AND PIPES.

No. 865,382.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed February 26, 1906. Serial No. 303,097.

*To all whom it may concern:*

Be it known that I, WATKIN HALL, a subject of the King of Great Britain, residing in Great Crosby, near Liverpool, in the county of Lancaster, in the Kingdom  
5 of England, civil engineer, have invented certain new and useful Improvements in Inverts or Blocks for Sewers and Pipes, for which application has been made in Great Britain, No. 4,296, dated the 1st March, 1905.

This invention relates to inverts or blocks for sewers,  
10 pipes and the like, and is best described with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of an invert with sewer built thereon, and a setting or foundation below; Fig. 2 a perspective view of the invert block; Figs. 3, 4  
15 and 5 diagrammatic end views of forms of invert blocks hereinafter described; Figs. 6 and 7, further views of invert blocks in one with the pipes; Fig. 8 a plan view of the invert block shown in Fig. 2; Fig. 9 a plan view of Fig. 1 with the invert removed; Fig. 10, a cross section of an invert; Fig. 11, a longitudinal section of two  
20 adjacent ends of inverts; Fig. 12, an end view of an invert and pipe; Fig. 13, a longitudinal section of two adjacent ends thereof.

In sewer invert blocks, holes or cavities are usually  
25 provided in the block for the purpose of lightening it, and effecting an economy in the amount of material used. By my present invention I greatly strengthen these blocks *a* by forming the cavities of which there may be any number in the blocks in the form of tunnels  
30 or arches *b* *b*<sup>1</sup> *b*<sup>2</sup> (Figs. 1, 2, 8, 10 and 11) in order to bear a greater weight or resist greater pressure than would otherwise be possible. The arches can be in the form shown, or in the segment of a circle, or they may be in the form of pointed arches formed of two arcs of circles  
35 described from different centers and meeting at the crown, or in fact the arches may be any suitable shape. I also propose to prepare or arrange these arched cavities *b* *b*<sup>1</sup> *b*<sup>2</sup>, so as to act as surface or drainage channels for land drainage.

At the bottom of the block are perforations *c* through  
40 which land water can percolate into the cavities *b*<sup>2</sup>. The perforations are covered with a suitable shield or filter *c*<sup>1</sup> to prevent earthy matters entering through the perforations. This shield or filter can be in one with  
45 the invert or block, or separate, in which latter case it is coupled thereto in any suitable manner, or simply be formed of brick bats or rubble *d*. There can be say six cavities or passages *b*<sup>2</sup> *b*<sup>1</sup> *b* *b* *b*<sup>1</sup> *b*<sup>2</sup> in each block. The outermost ones *b*<sup>2</sup> *b*<sup>2</sup> can be used as settling chambers  
50 for the land water entering through the perforations *c*. Through perforations *c*, water flows into the next cavities *b*<sup>1</sup> *b*<sup>1</sup>, which also act as settling chambers and then by passages *f* into the center chamber or chambers *b*,

and these when the blocks are placed in position form continuous passages, for leading the land water to the  
55 place of outlet. There is no danger of the land water gaining access to the sewer, as it can easily find an outlet through these auxiliary passages below.

An invert block made in the manner above described, will stand an enormous crushing test. The curved  
60 surface *g* of the invert block can be faced or formed with a coating of a fine vitreous nature, which will effectively prevent leakage of sewer water into the land drainage cavities below. In order to cause two concentric rows of bricks *h* of which the sewer or pipe is  
65 built to break joint, the block is made with three steps *i*, with a shoulder or abutment *k* between each step. With three rows of bricks four steps will be provided with an abutment between each and so on. There is  
70 always one more step on each side than the layers of bricks used so that the outer layer has an abutment to keep it in position without necessitating the use of concrete. The invert blocks are also provided with a  
75 cradle joint *l* *l*<sup>1</sup> best seen in Figs. 2, 11 and 13, consisting of an abutment *l*<sup>1</sup> at one end engaging in a cradle *l*  
at the end of the adjacent block. They are also provided with a lip *m* engaging a corresponding lip *n* in  
the adjacent block. The lip *m* has nogs *o* engaging corresponding depressions in the adjacent block.  
80 These are for preventing lateral movement of the blocks.

The method of laying these invert blocks in very bad ground will be best understood from Figs. 1 and 9. The usual trench is made, then two permanent rows of timber *p* *p* are placed in the trench and a special  
85 grid like framework of timber is provided which is nailed to the timbers *p*. This framework consists of the spars *q* and cross pieces *r* and the spaces between the spars are filled up level with dry concrete *s* the  
90 outside spaces being filled with dry rubble *d*. The blocks are laid on this bed, a small layer of clay *t* being placed on the outer of the spars *q*, as shown to keep cement away from the perforations *c* in the blocks *a*. The rubble or brick bats are filled to about the level  
95 shown, then the drain or sewer built up in the ordinary manner. *z* are the timbers which are removed from the trench when filling up takes place.

In thus describing my invention, I wish it to be understood that I do not confine my invention to using these invert blocks for sewers only, as they can be  
100 applied for supporting pipes, conduits, and the like, as shown in Figs. 3, 4, and 5, where strength is required, or where it is desirable to provide means below for carrying off the land drainage, they can be formed integral with pipes, as in Figs. 3 and 4, 6 and 7, 12 and 13, or  
105 separate as in Fig. 5. The block shown in Figs. 12 and 13 has a base considerably wider than the pipe.



$x$  are panels which are similar to ordinary panels, except that they are open at the sides  $y$ , so that cement can be inserted after the blocks are placed together in the trench, and so act as dowels.

- 5 The piers of the arches  $b$   $b^1$   $b^2$  are by preference vertical, to take direct thrust, though not absolutely necessarily so. Diagonal air shafts lead from each manhole to the tunnels  $b$   $b^1$  and are arranged to allow of "rodding" being passed down to remove obstructions and  
10 so prevent the drain being air bound.

- Figs. 10 and 11 show the form the blocks  $a$  assume where air shafts are provided.  $u$  are the air shafts in the block. The air shafts from each channel  $b$   $b^1$  converge in a single channel  $u$  one at each side. The  
15 outer course of brickwork is omitted from the second pair of steps  $i$  and a course of brickwork is built up on the third step  $i$  which in this case is provided with a rib  $v$ . Consequently a diagonal air passage from  $u$  to the manhole above is formed by the course of brick-  
20 work on the middle step  $i$  being left out.

- The small percolation holes  $c$  are arranged throughout the under face of the first or outer chambers  $b^2$ , and preferably taper upwards from the outside or even in the opposite direction. The connecting channels  $e$   
25 and  $f$  from the settling chambers to the inner water passages are preferably at a fairly high level sloping upwards, namely near the spring of the arches. Owing

to the strength of this invert or block no concrete reinforcement of the actual block is necessary.

I declare that what I claim is:—

30

1. An invert or sole block having continuous land drainage channels the upper portions only of such channels being in communication with each other to allow said channels to act as settling chambers, there being water entrance openings extending downward from certain of the  
35 channels to the base of the invert.

2. An invert or sole block having a series of continuous communicating land drainage channels connected in series, there being water entrance openings extending downward from the primary channel to the base of the invert.  
40

3. An invert or sole block having channels in its base to form continuous passages and clarifying chambers for land water, said channels being connected in series with the base by rising channels or openings.

4. The combination with inverts or blocks for pipes  
45 made with channels in the base, and perforations for admitting land water into said channels, of a bed or foundation for the block, consisting of a framework made of longitudinal bars and cross-pieces with a filling of cement, said framework being so made as to keep the cement away  
50 from the said perforations, and a filling of rubble at each side of the said framework.

In witness whereof, I have hereunto signed my name this 17th day of February 1906, in the presence of two subscribing witnesses.

WATKIN HALL.

Witnesses:

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