

G. S. KIMBALL.  
PIPE JOINT DELINEATOR.

No. 397,132.

Patented Feb. 5, 1889.

Fig. 1.

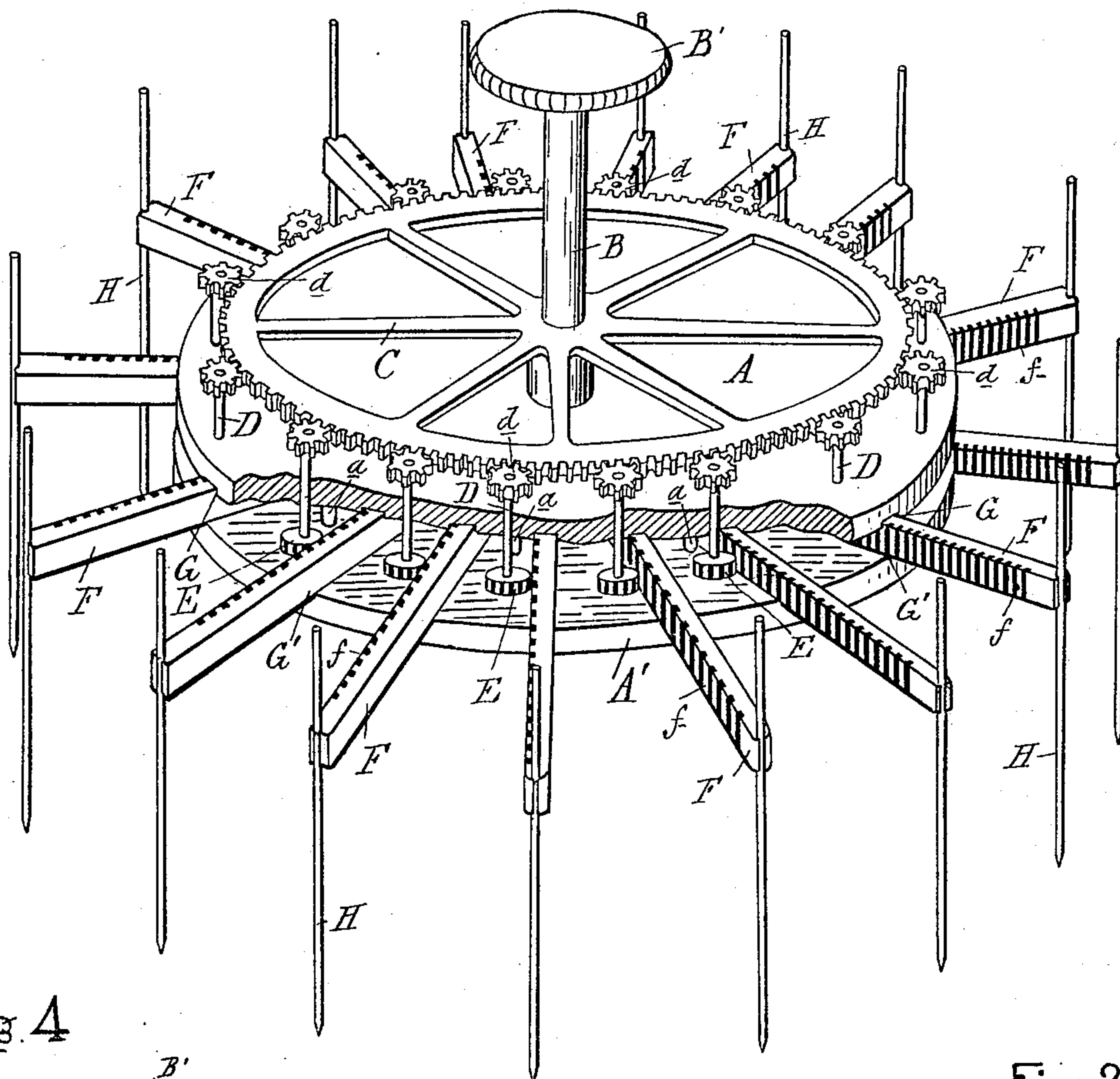


Fig. 4

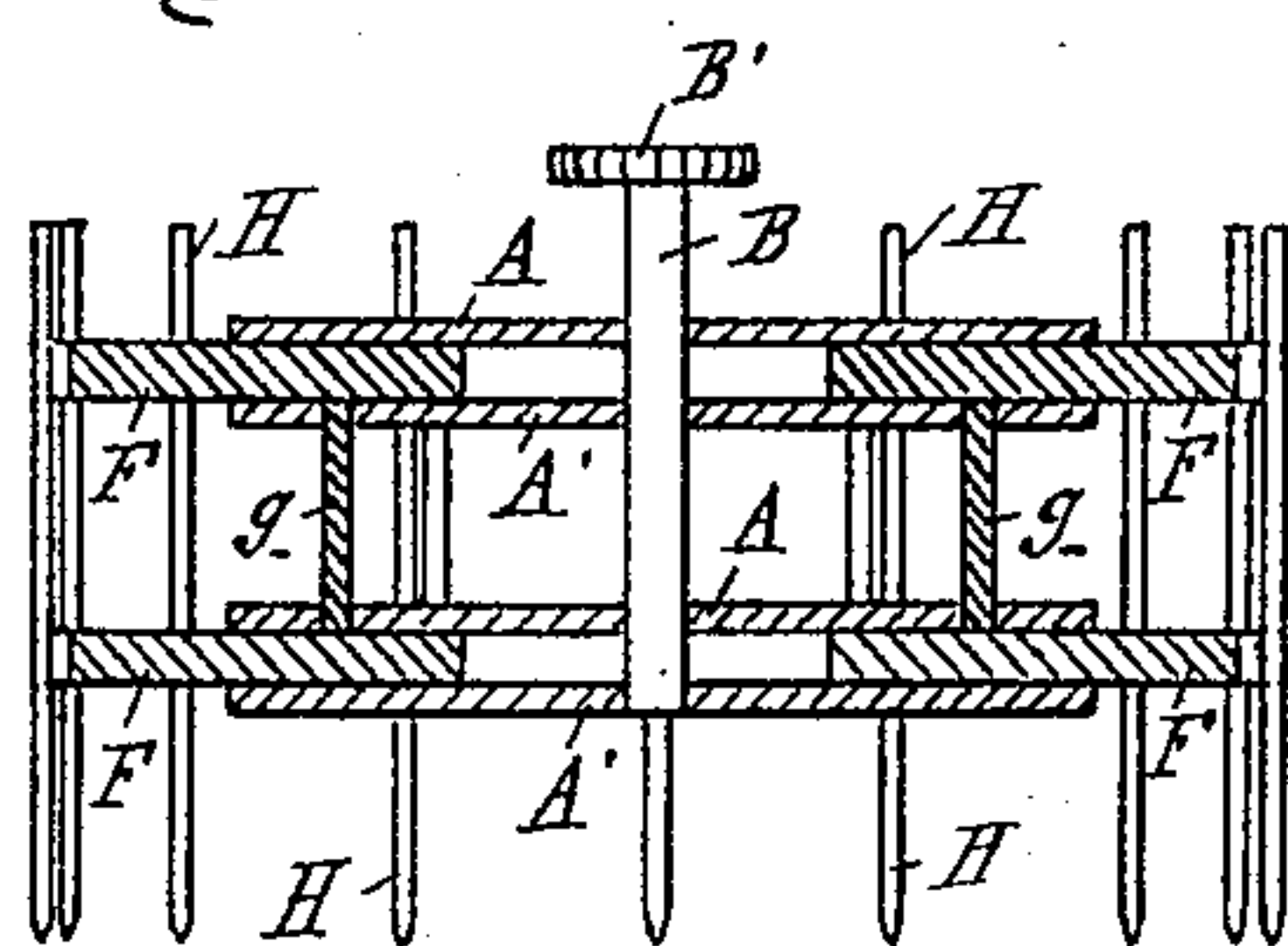
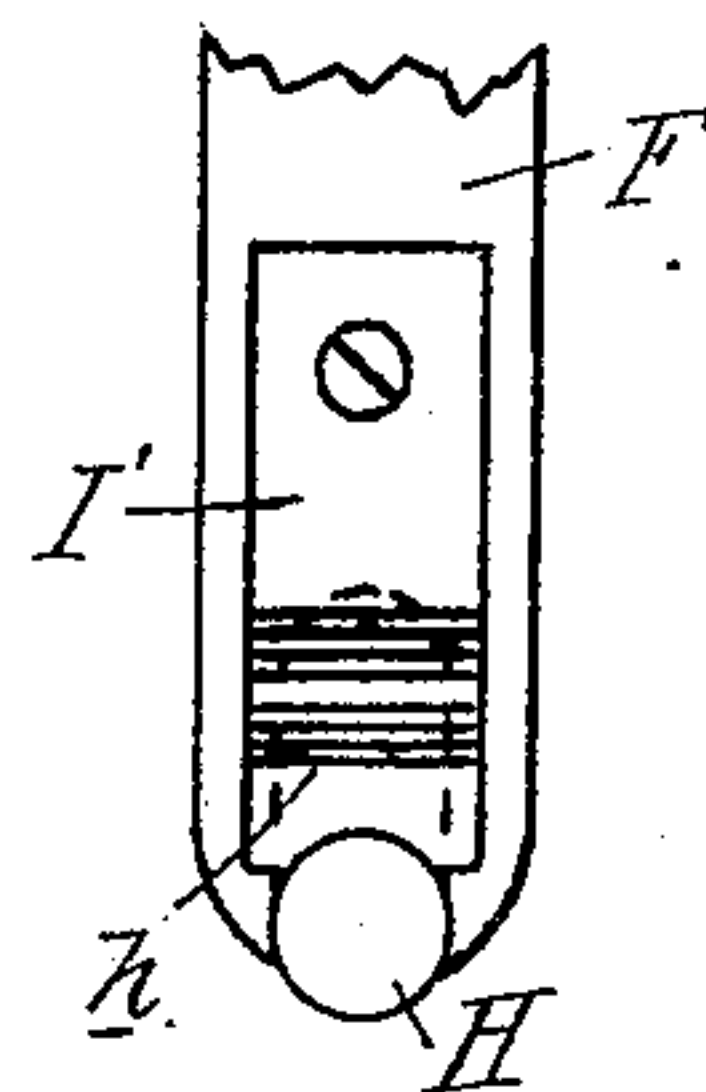
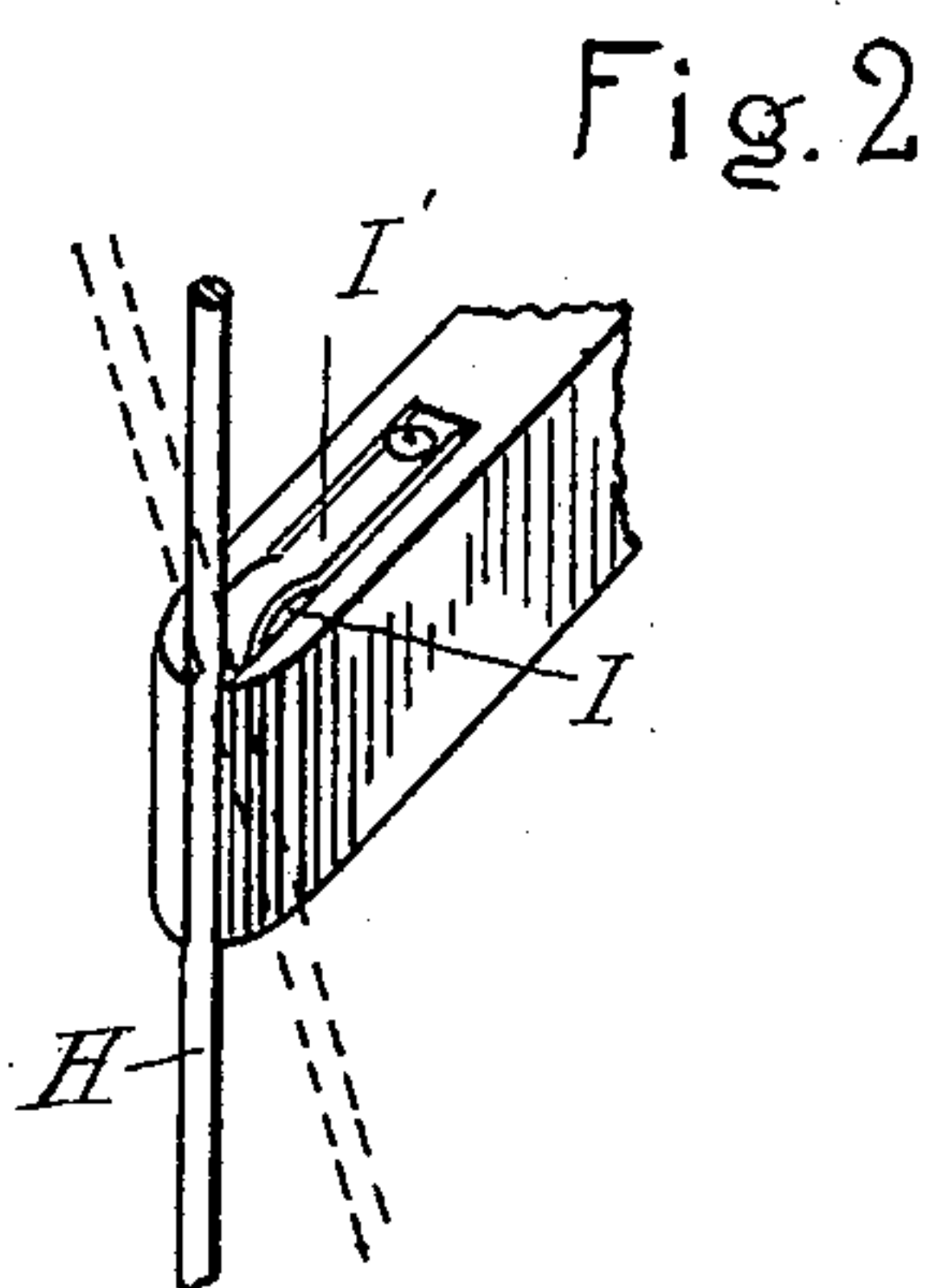


Fig. 3



Witnesses:  
*William R. Howe.*  
*M. E. Hunt*

Inventor:  
*George S. Kimball*  
by *Charles J. Hunt.*  
*Att'y*

(No Model.)

2 Sheets—Sheet 2.

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Fig. 6

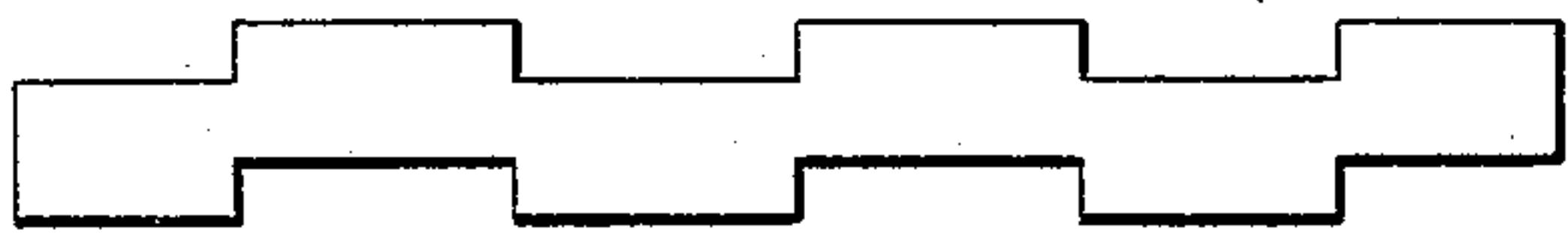


Fig. 5

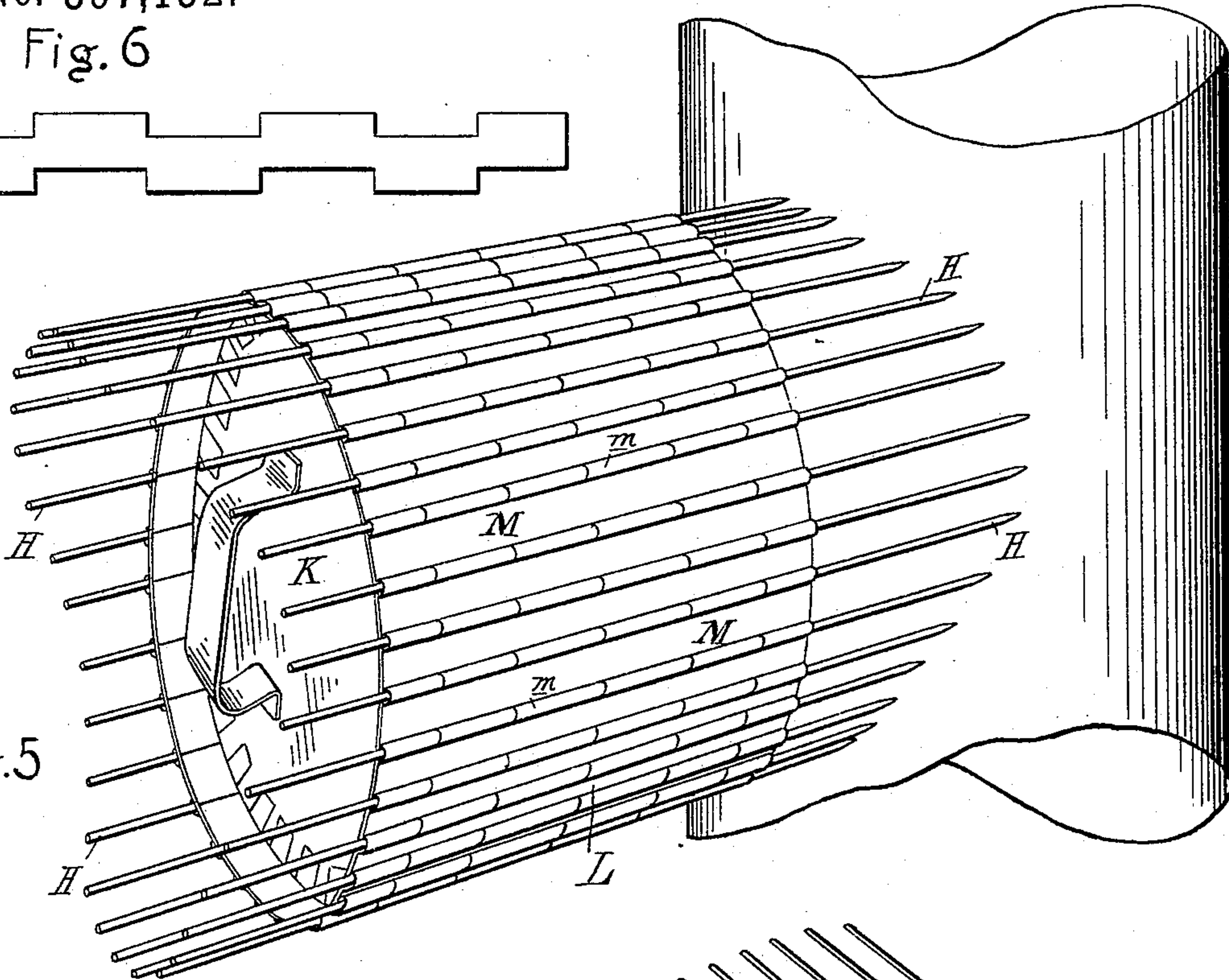


Fig. 7

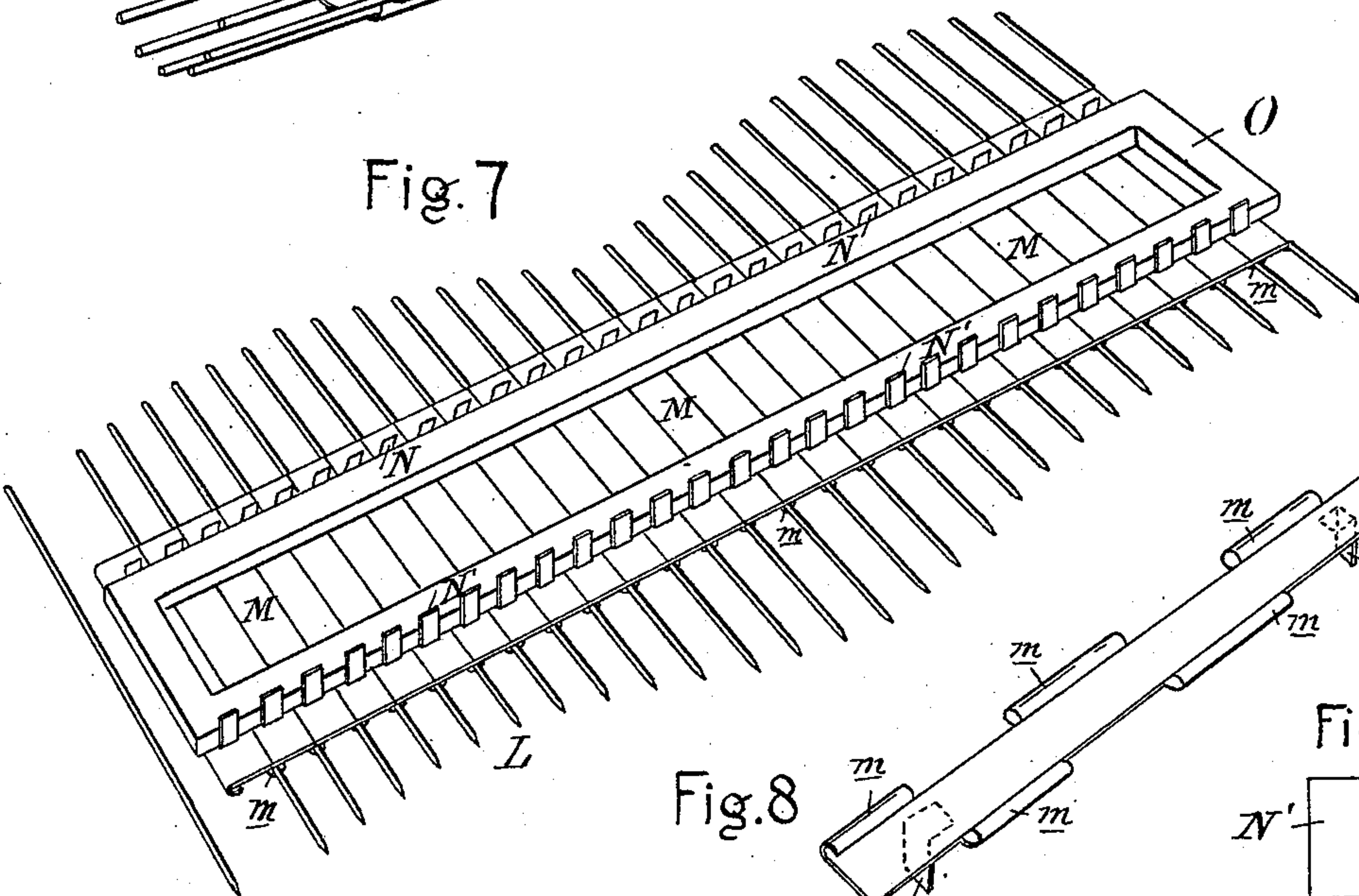


Fig. 8

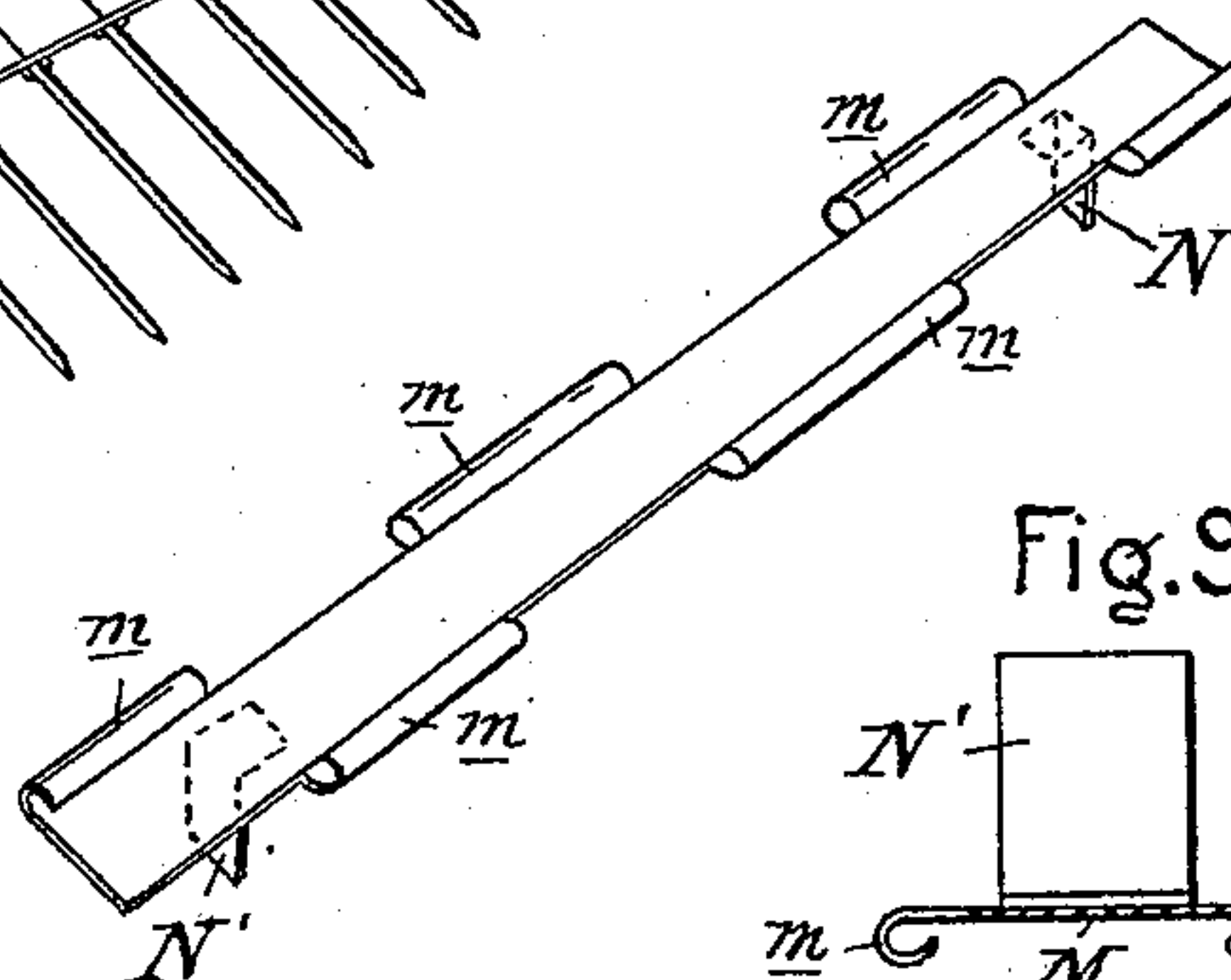
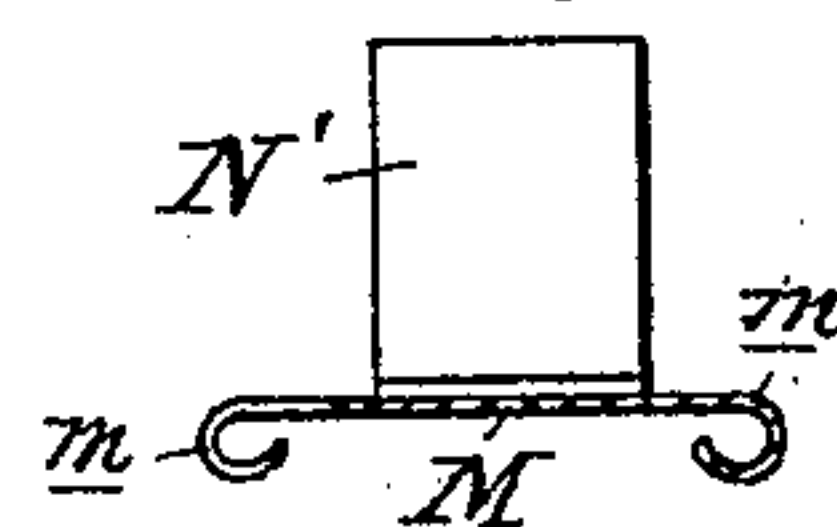


Fig. 9



Witnesses:

William R. Howe,  
M. E. Hunt.

Inventor

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Charles J. Hunt.  
Att'y



# UNITED STATES PATENT OFFICE.

GEORGE S. KIMBALL, OF DETROIT, MICHIGAN.

## PIPE-JOINT DELINEATOR.

SPECIFICATION forming part of Letters Patent No. 397,132, dated February 5, 1889.

Application filed October 9, 1888. Serial No. 287,770. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE S. KIMBALL, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Pipe-Joint Delineators; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of conformators or delineators which show the shape and position of the orifice it is necessary to cut in one pipe to admit another, and at the same time delineates the templet by which to cut the sheet metal in order to form a pipe with its end so shaped that it will fit in the orifice cut for it and form a joint.

The object of my invention is to provide means for delineating on the surface of one pipe the shape of the orifice necessary to admit another pipe, and also at the same time give the form of the templet by which to cut a sheet of metal, so that when formed into a pipe its end will be of such a configuration as to fit into the orifice cut in the other pipe and form a joint.

The ordinary method of determining the shape of the orifice to be cut in one pipe and the form to be given to the end of the other pipe to fit in such orifice is to take the branch pipe, apply its end to the pipe to which it is to be joined, and then cut out a small segment on the end, then try it, and cut out another piece, and so on, cutting out piece after piece until the end is finally fitted to the main pipe. The orifice to be cut in the main pipe is marked out by the branch pipe thus fitted on. This process is used whenever the pipe is made of thin sheet metal. Where the pipe is of heavy metal it is necessary to resort to the geometrical problem of how to determine the curve made by the intersection of two cylinders and then transfer it to the pipes.

Figure 1 is a perspective view of the delineator with a part of the upper plate cut away. Fig. 2 is a detail perspective view of one of the arms. Fig. 3 is an enlarged plan view of the upper side of one of the arms. Fig. 4 is a vertical section of my device, showing two connected together. Fig. 5 is a perspective view of another form of my device. Fig. 6 is

a view of one of the sections of the flexible jacket detached. Fig. 7 is a view of the flexible jacket unrolled with frame. Fig. 8 is a view of one of the sections of the jacket. Fig. 9 is an end view of a section.

A represents the upper plate of my delineator.

A' represents the lower plate. These plates should be circular in form, and are connected by the standards *a a a*, which may be fastened in any convenient way.

B is the main driving-shaft, which is operated by the milled head B', or any other suitable means. This shaft passes through the upper plate at its center and is suitably journaled therein, and is stepped in suitable journal-bearings at the center of the lower plate. To this shaft and above the upper plate is keyed the geared wheel C. This geared wheel meshes into the pinions *d d*, which are keyed onto the upper end of the shafts D D. The shafts D D are journaled in the upper and lower plates. To these shafts, between the upper and lower plates, are keyed the pinions E E. These pinions actuate the extension-arms F F by means of the racks *f f* on the sides of the arms.

G G are slides cut in the upper plate, and G' G' are slides cut in the lower plate, in which the extension-arms F F reciprocate. The outer extremities of the extension-arms should be rounded slightly, so as not to project beyond a circle circumscribed around the outer sides of the needles or pins H H. The extension-arms are recessed on their outer ends, *h h*, for the purpose of receiving the delineating-needles, the recess *h* being in horizontal section on the upper surface of the arm circular in outline, so that when the needles or pins H H are inserted in these recesses they project beyond the arm about one-third of their diameter. These recesses on the inner side are beveled from the top downward and inwardly, so that the horizontal section on the lower surface of the arm is an elongated oval.

I I are slots cut in the upper sides of the extension-arms.

I' I' are springs fastened in the slots I I and impinge against the pins H H when they are inserted in the recesses *h h* in such a manner as to prevent their downward move-



ment, while the upward movement is unobstructed.

II II are the delineating pins or needles inserted in the recesses *h h* in the ends of the extension-arms. The heads of the pins, when pins are used, should be flat on one side, so that the head of the pin should not project beyond the side of the pin. When in use, the points of these needles or pins are brought in contact with the sides of the main pipe and delineate the outline of the orifice to be cut to receive a pipe having the same diameter as the diameter of the circle circumscribed around the outer ends of the extension-arms. Instead of using these pins inserted in the arms, the jointed jacket L may be placed around the ends of the extension-arms.

M M are the jointed sections of the jacket. *m m* are the hinges of these sections, the pins or needles II II serving as the pintle of the hinges.

N N' are brackets on the sections, one being near the upper and one near the lower end.

O is a rectangular frame or block which is laid on the jacket when unrolled, and is brought in contact with the brackets *m m* in order to keep the sections M M in the same relative position they were in when on the extension-arms. The points of the needles will show the line by which to cut the sheet metal to form a pipe which will fit in the orifice in the main pipe.

To use my device easily and with accuracy, it will be necessary to have two securely joined together, as shown in Fig. 4, one above the other, in order to maintain the requisite direction and steadiness of the pins or needles. I connect the two together by means of nuts internally screw-threaded on the upper plate of the one and on the lower plate of the other, into which are screwed rods *g*, having right and left hand screws at opposite site ends; but this connection may be made in any other convenient way. When the two machines are thus connected, the needles or pins having two bearings are held firmly in line. If the flexible jacket is used, the bracket N should be above the upper arm and the bracket N' below the lower arm. The shaft B on the two should be rotated to extend or retract the arms until the extension of the arms is equal to the diameter of the branch pipe. Then the two pins on the opposite sides of the delineator and at the highest point of the curve of the main pipe are pushed out equally until they rest on the pipe. If the branch pipe enters the main pipe at an angle, the pins are unequally projected, the difference of the projection being determined by the angle at which the branch pipe enters the main pipe. The other needles are then pushed out successively until their points rest on the pipe. A line drawn through the points of the needles resting on the main pipe will show the conformation of the orifice to be cut

for the admission of the branch pipe. Then place the delineator on the sheet metal to be cut for the branch pipe. Mark on the sheet the position of one of the needles, then roll the delineator over until another needle comes in contact with the sheet and mark the position of its point, then roll the delineator over until a third needle comes in contact with the sheet and mark the position of its point, and so on until the position of the points of all the needles are designated on the sheet. Then a line drawn through these points on the sheet will delineate the conformation of the unrolled end of the branch pipe to be inserted in the orifice in the main pipe. Care must be taken to roll the delineator in a straight line and at a right angle with the length of the needles.

It is evident that in case only one size of pipe were used for the branch pipe the extensible arms, with the machinery to extend them, might be replaced by fixed arms without departing from the spirit of my invention. In the case of using only one size of pipe for the branch pipe a drum, K, Fig. 5, of the size of the branch pipe and long enough to fit between the brackets on the jointed jacket, can be employed to fill out the jacket and hold the sections in position, instead of the extensible arms.

If the branch pipe is tapering, then one of the sets of extension-arms must be of a greater diameter than the other, proportional to the different diameters of the tapering pipe.

What I claim as my invention is—

1. The combination of the upper and lower plates, the means for extending and retracting the extension-arms, the extensible arms, and the delineating-needles, substantially as described.

2. The combination of the upper and lower plates, the mechanism for simultaneously extending or retracting the extensible arms, the extensible arms, and the delineator-needles, substantially as described.

3. The combination of the upper and lower plates, the mechanism for extending and retracting the extensible arms, the extensible arms, the guides for the extensible arms, and the delineating-needles, substantially as described.

4. The combination of the upper and lower plates, the mechanism for extending and retracting the extensible arms, the guides for the extensible arms, the extensible arms, the spring on the arm to retain the needle, and the delineating-needle, substantially as described.

5. The combination of the upper and lower plates, the means for extending and retracting the extensible arms, the extensible arms, the flexible jacket, and the delineating-pins, substantially as described.

6. The combination of the upper and lower plates, the mechanism for extending and retracting the extensible arms, the guides for

the extensible arms, the extensible arms, the flexible jacket, and the delineating-pins, substantially as described.

5 7. The combination of the upper and lower plates, the arms, the flexible jacket, and the delineating - needles, substantially as described.

10 8. The combination of the flexible jacket, the delineating-needles, and the means for extending the flexible jacket to a circular form, and means for preserving the alignment of

the sections of the flexible jacket when in a circular form, substantially as described.

9. The combination of the flexible jacket, the delineating-needles, and the means for 15 preserving the alignment of the sections of the jacket when unrolled, substantially as described.

GEO. S. KIMBALL.

Witnesses:

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M. E. HUNT.