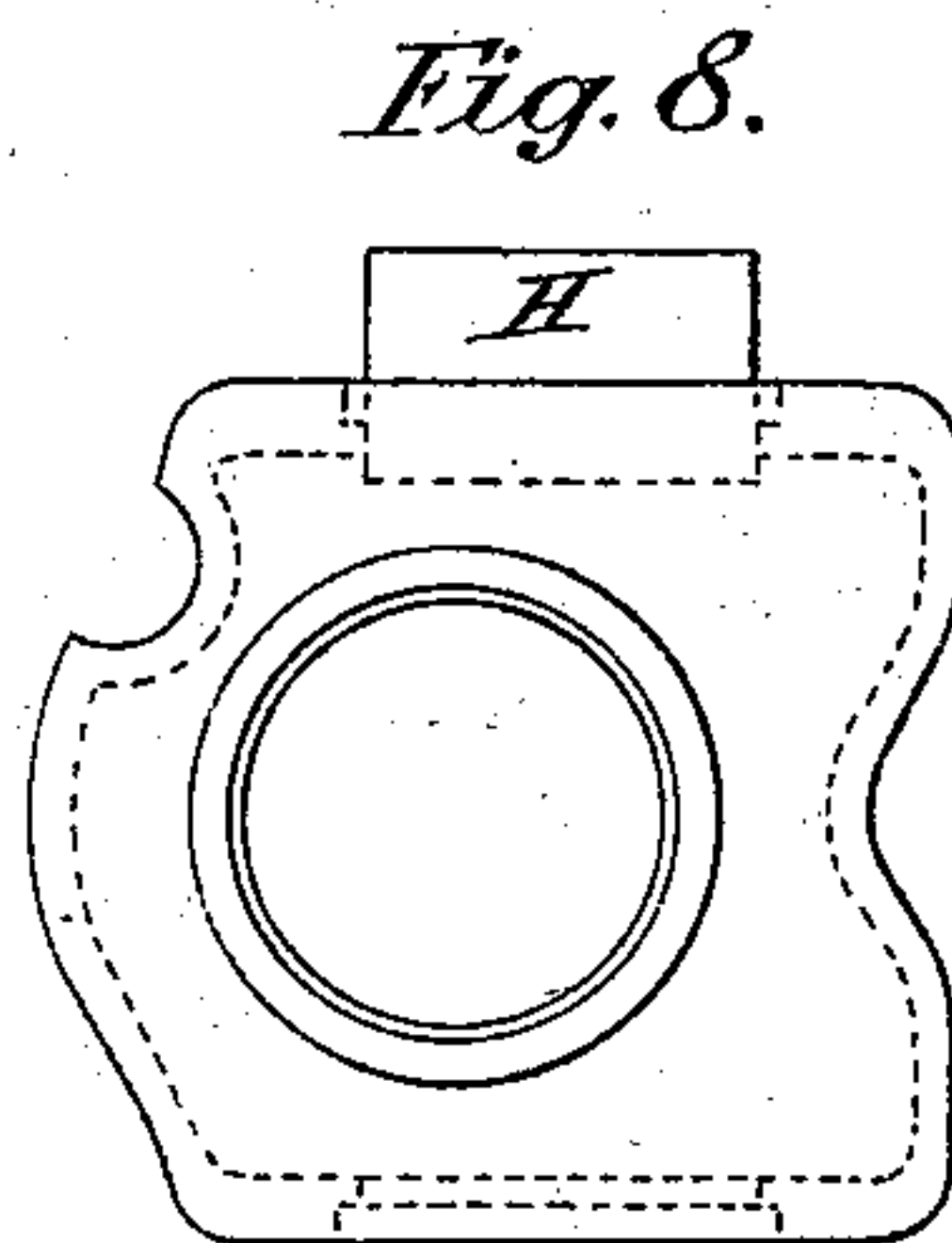
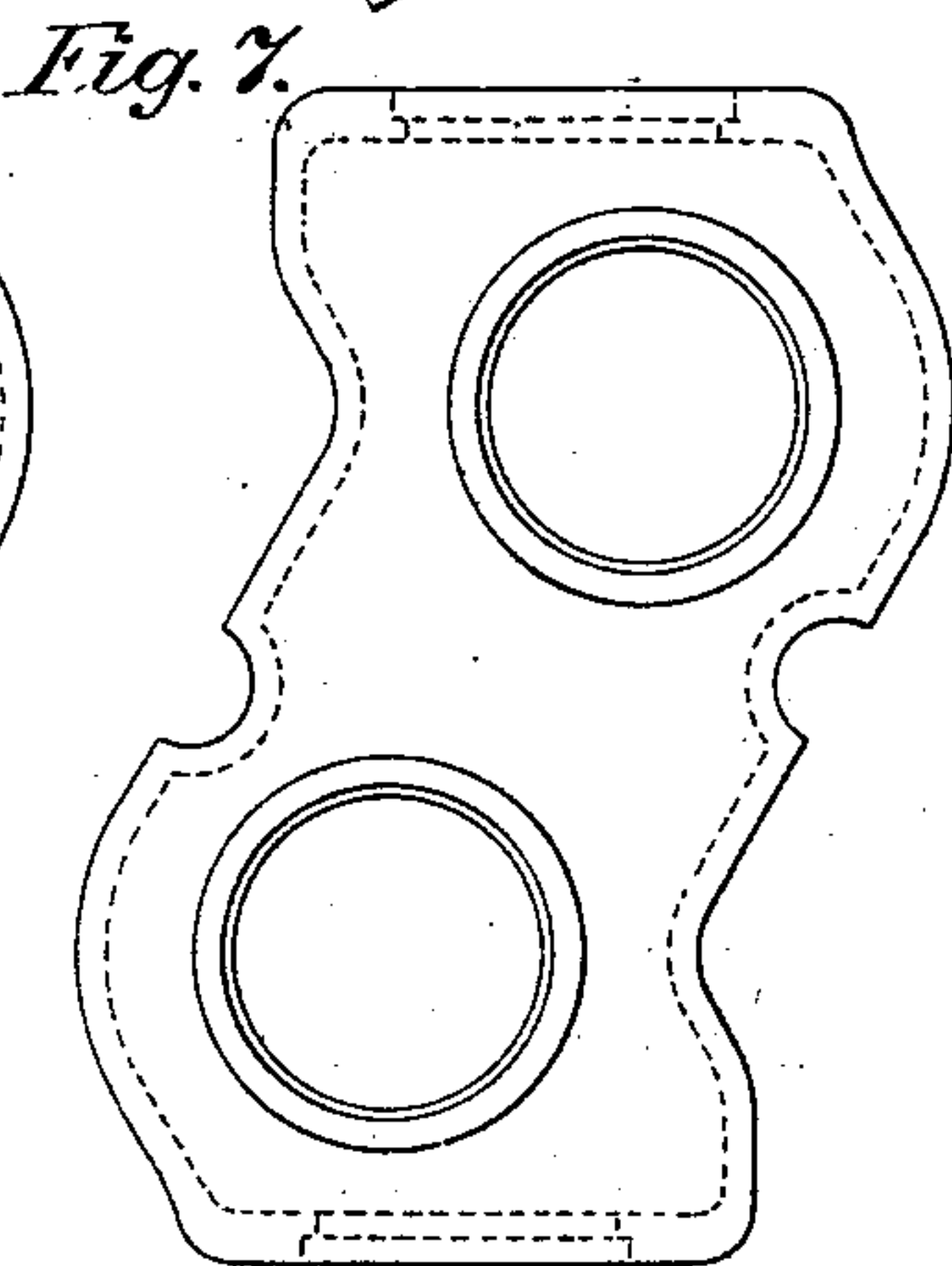
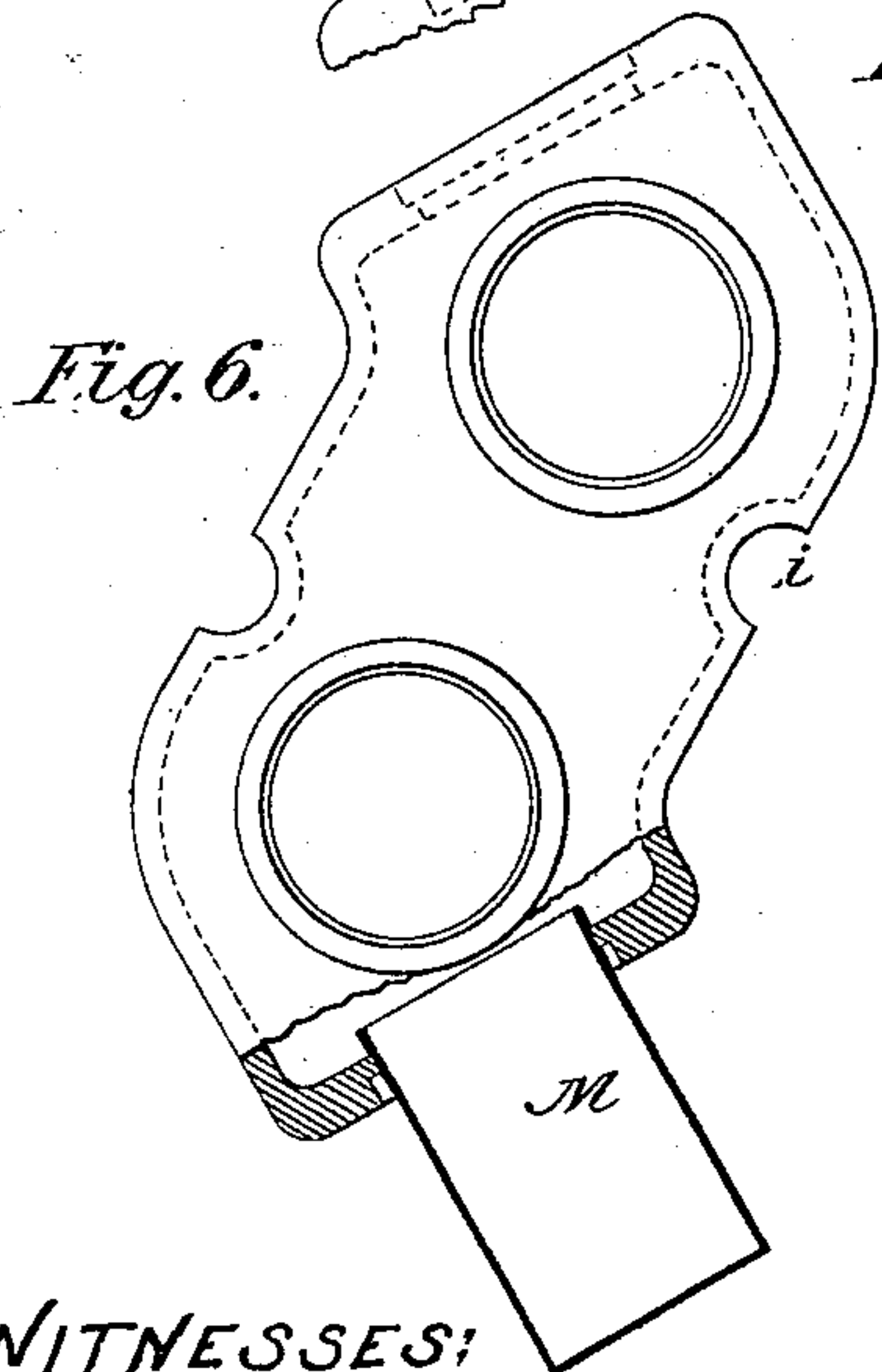
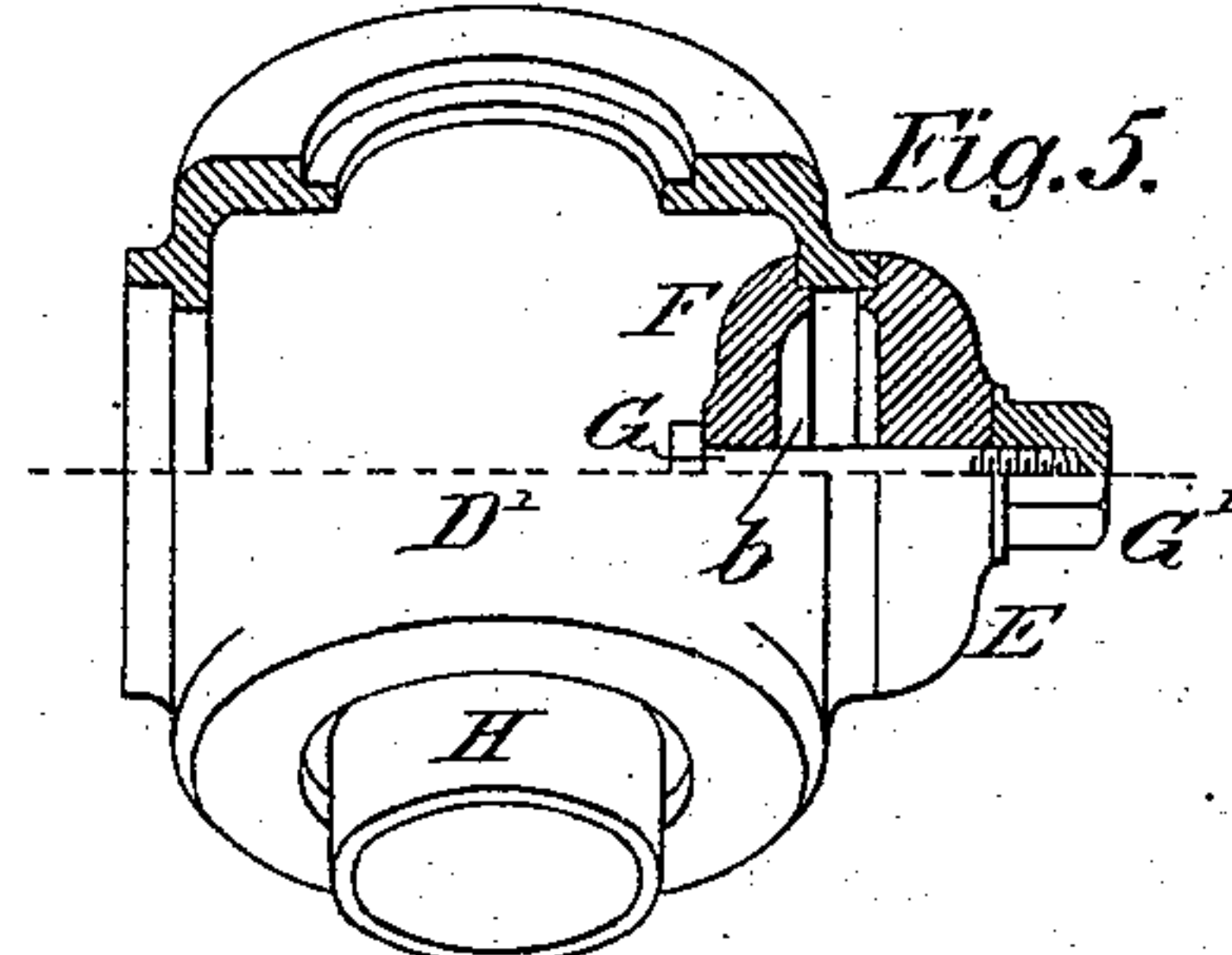
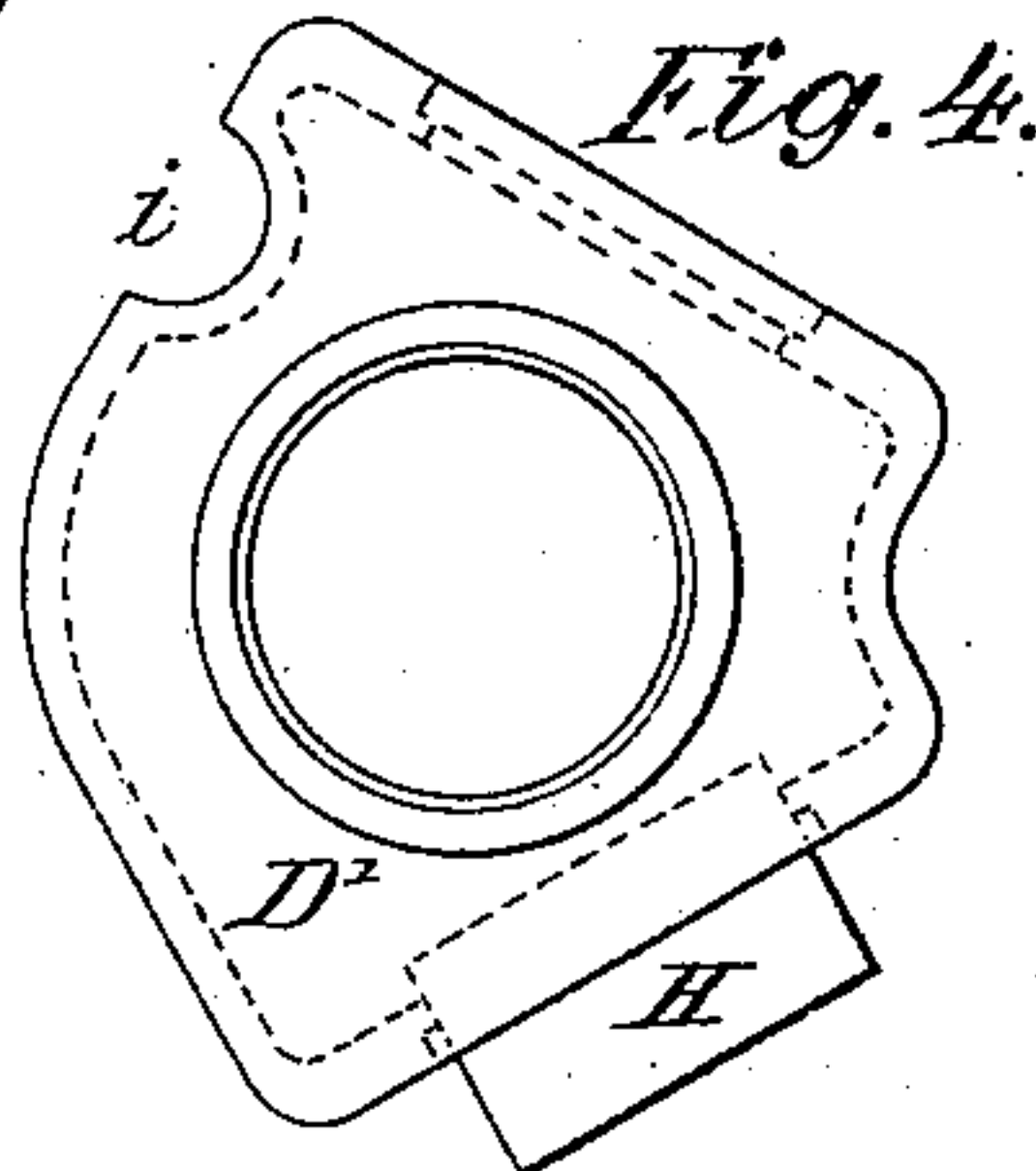
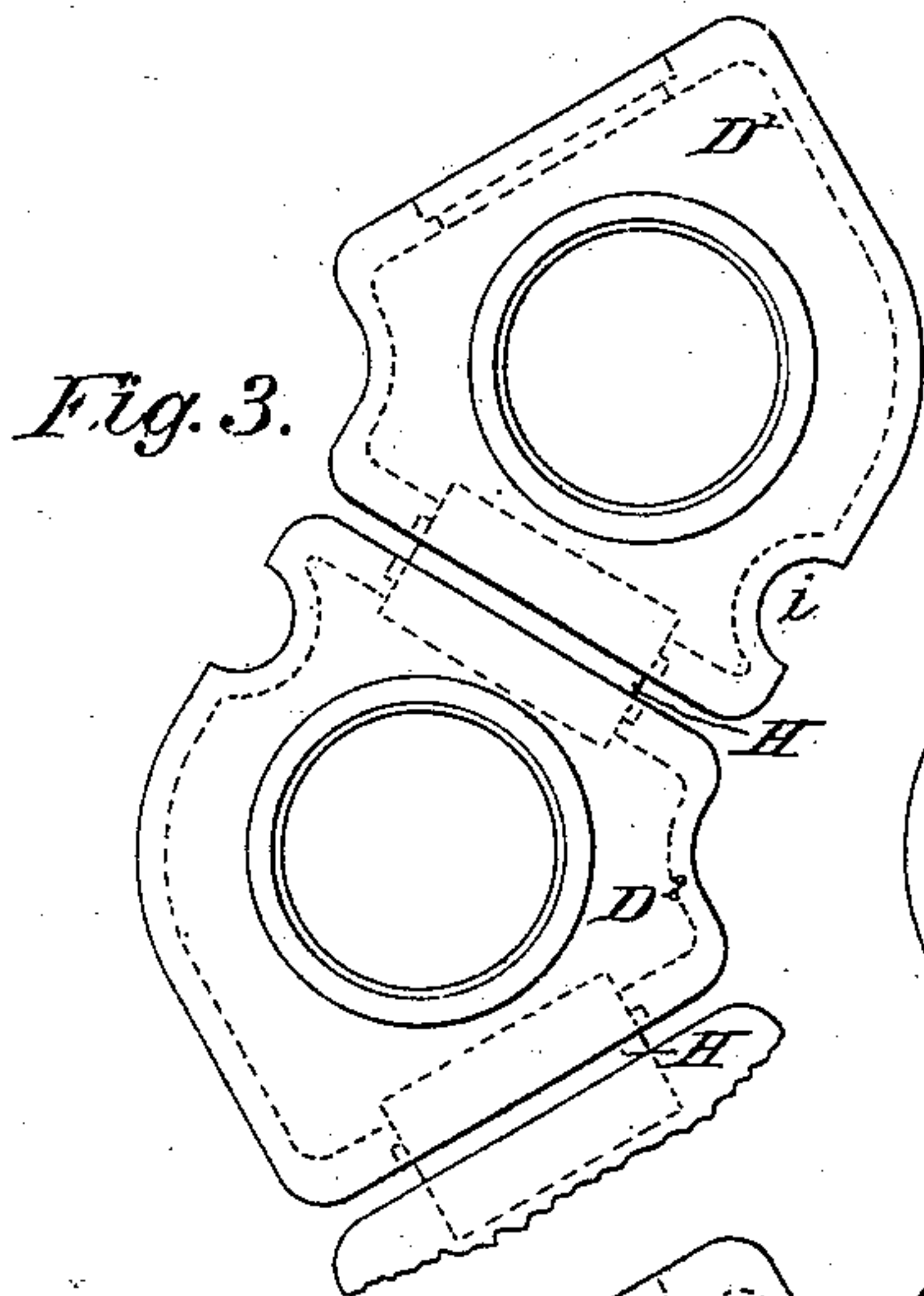
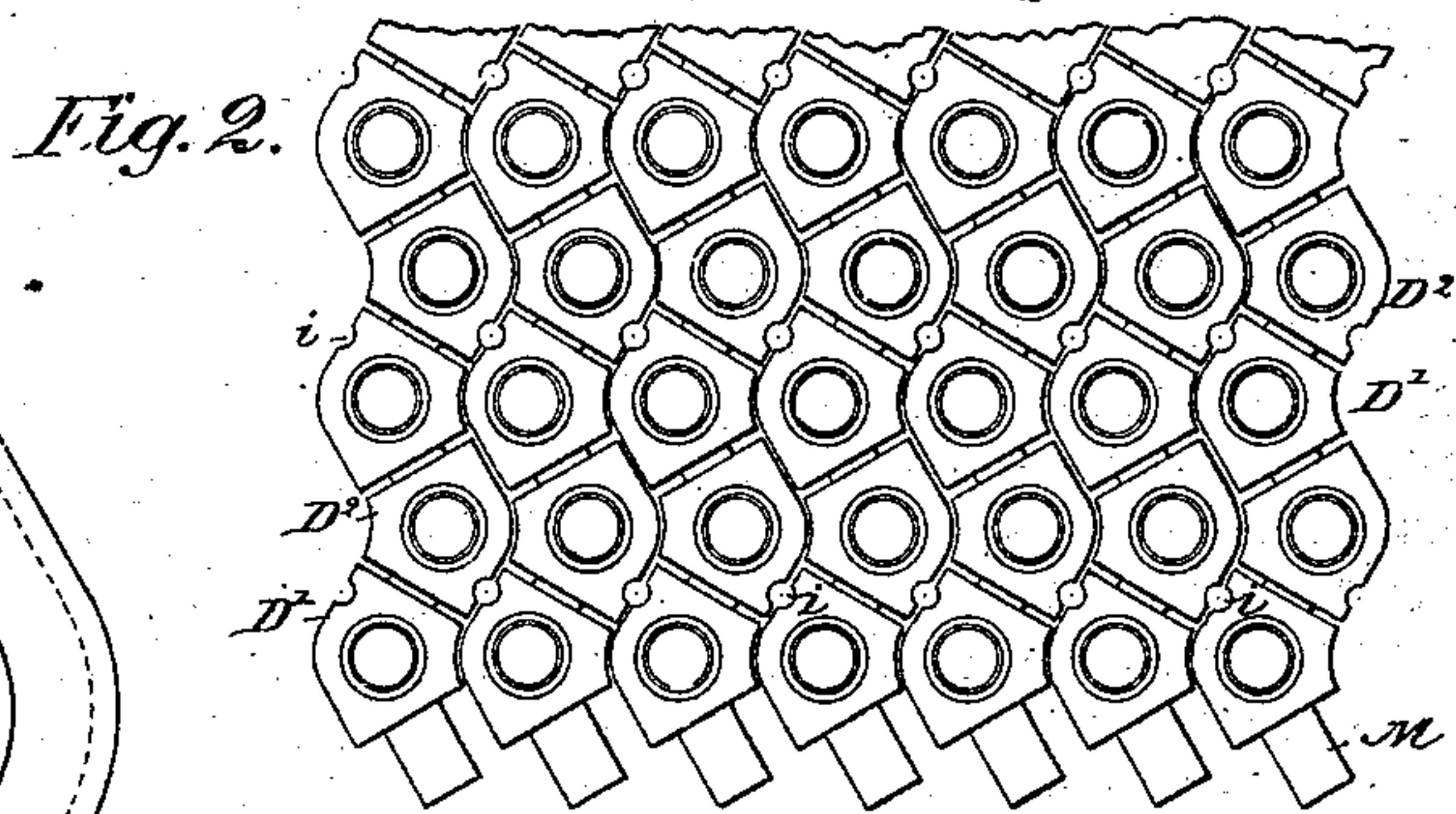
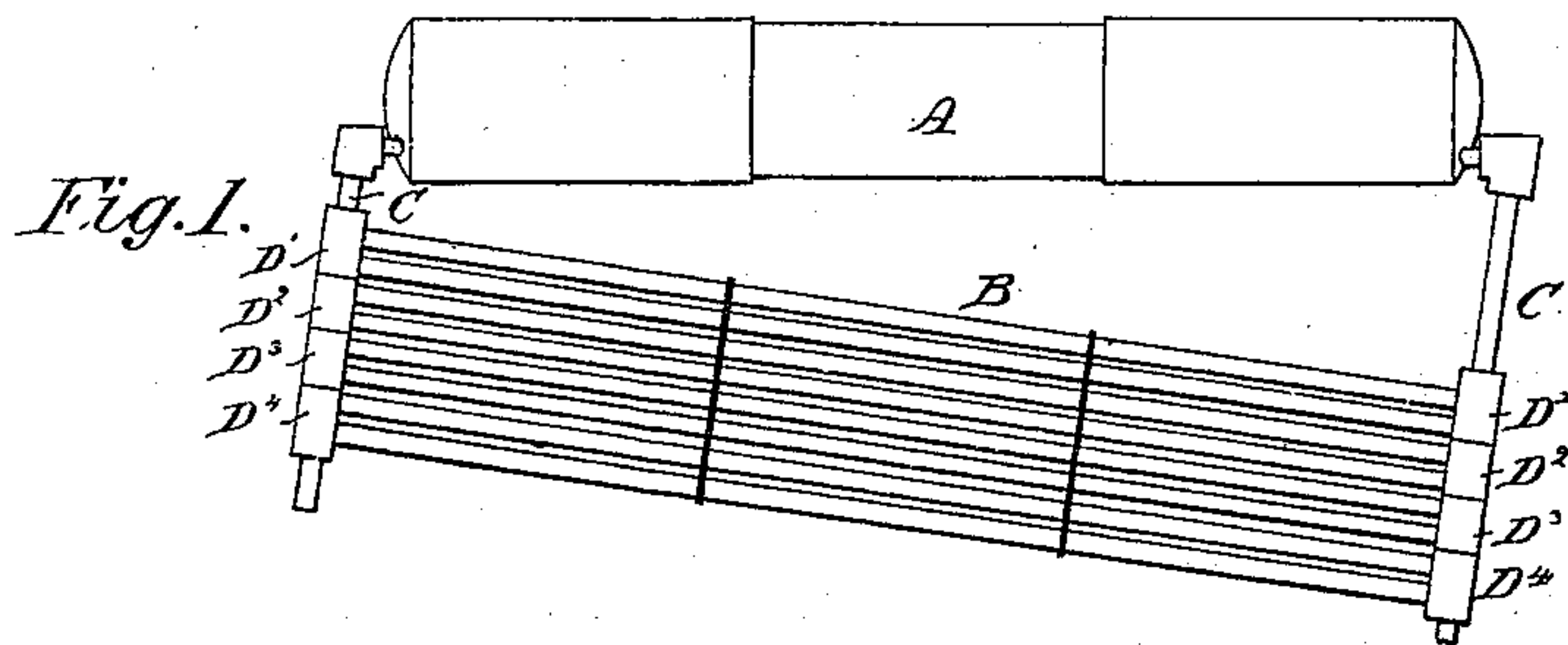


(No Model.)

N. W. PRATT.
STEAM BOILER.

No. 275,788.

Patented Apr. 10, 1883.



WITNESSES:

A. H. Gentry
M. F. Boyle

INVENTOR:

Nathaniel W. Pratt,

By his Atty. James D. Stetson

UNITED STATES PATENT OFFICE.

NATHANIEL W. PRATT, OF BROOKLYN, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 275,788, dated April 10, 1883.

Application filed November 22, 1882. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL W. PRATT, of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements relating to Steam-Boilers, of which the following is a specification.

My invention applies to all that class of boilers in which water is circulated in many small pipes through the furnace or through the hot gases arising therefrom.

I have devised an improved construction of the "headers," by which term I designate the parts by which the ends of the tubes are connected to each other and to the barrel or other chambers above. The headers are in sections, each header extending up and down and receiving only the single line of tubes. The "staggered" position of the tubes is accommodated by making the headers serpentine or wavy. A set of half a dozen or any other number of headers, each extending up and down, side by side, are all correspondingly wavy, and on being placed together the swelled places in the side of one header match into the hollowed places in the side of the adjacent header. So far the construction has been before known and approved.

The nature of my invention consists in dividing each header into a number of sections, so that each header, while serving as a continuous header and allowing a free circulation of the water along the whole height, is waved to accommodate the staggered position of the tubes. This construction allows entire series of headers of varying widths and depths, as required for generators of varying capacities, to be made up of a number of pieces, which may be all exactly alike; or, in one form of the invention, said number of pieces will be composed only of one set of right-handed and one set of left-handed pieces. I thus avoid the necessity of having a large number of different patterns, one or, at the most, two patterns being sufficient in all cases. I have also provided a peculiar means for closing the bottom of the headers, so as to avoid the necessity either of fitting hand-holes or of having special headers or sections of headers formed with a closed bottom. For this purpose I introduce a thimble of sufficient length, and having a closed bottom, in the bottom hole of each header and expand the same therein.

The following is a description of what I consider the best means of carrying out the invention as applied to the style of boiler known as the "Babcock & Wilcox."

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation of a Babcock & Wilcox boiler constructed with my improvements. Fig. 2 is a front elevation of a portion of a series of my improved headers. Fig. 3 shows two sections of my header united, in front elevation. Fig. 4 shows a single section in front elevation. Fig. 5 is a side view, partly in section, of Fig. 4. Fig. 6 is a front view of my improved header adapted to receive two tubes. The lower part of this figure is in section, and shows also the improved means of closing the lower hole when the piece forms the lowermost part of a header. Figs. 7 and 8 show a certain modification.

Similar letters of reference indicate corresponding parts in all the figures.

A is the ordinary barrel of the boiler.

B B, &c., are the ordinary inclined tubes bathed in flame from the furnace, through which tubes the water in the boiler circulates.

C C are ordinary connections between the barrel and the headers. Each header is composed of a number of separate boxes or chambers, $D' D^2 D^3$, connected together in a nearly vertical series, having the proper wavy form to hold the tubes in the staggered position. The width of each header is only sufficient to receive a single tube. The several sections are connected together by thimbles H, of as large diameter as the width of the header will conveniently allow. The tubes B are connected with the chambers $D' D^2$, &c., by expanding the tube B in a close-fitting hole in the chamber, as is well understood. A hand-hole, *b*, is provided opposite to each tube end, of just sufficient size to allow the introduction or removal of a tube. A hand-hole cover, E, is provided for each, with a suitable cross-bar, F, bolt G, and cap-nut G' . The contact-surfaces of the covers E and their seats around each hand-hole should be accurately finished, so as to make steam-tight contact. Packing may be employed, if desired. The thimbles or short tubes H may be of good iron capable of being expanded. In applying the parts together the thimble is first set in one of the

chambers, as D' , and then the next chamber, as D^2 , is applied in the proper position, receiving the unexpanded end of the thimble, and, a suitable expanding-tool being introduced and operated, that end is expanded, and the junction of the two chambers by the now fully-expanded thimble H is complete. I use for the second expansion a form of expanding-tool which can be operated through the hand-hole. I provide passages through which a blast of steam may be introduced by any suitable nozzle from the same boiler or another, to blow away and remove ashes or other foreign matter which is liable to accumulate between the tubes. These passages are marked i . They are produced by giving the required contour to the shells of the chambers in two adjacent headers, taking care to so arrange them that the recess in one will be presented against the recess in the other, so that both together serve to produce an approximately-round passage of sufficient capacity to allow the introduction of a strong blast.

In the form shown in Figs. 3, 4, 5, and 6 the joints separating each separate box or chamber D' D^2 D^3 , &c., are inclined, and the thimbles H , which join the parts, are correspondingly inclined. In Figs. 6 and 7 the box or chamber is of such length up and down as to receive two tubes. In Figs. 3, 4, 5, and 8 each chamber is only of such height as to receive one tube in each. With this form as many thimbles H as there are tubes B connected are required for a given height of header. The joints are laterally inclined in one direction and in the other. In the form shown in Figs. 6 and 7 only half as many thimbles are required for a given height of header, and the joints are all inclined in the same direction. In the form of the parts shown in Figs. 7 and 8 the joints are horizontal. Fig. 7 shows two tubes connected to a single chamber. Fig. 8 shows only one tube in a chamber.

It will be observed that the thimbles H in Figs. 2 and 3 are shown as in place, each effecting the proper tight and reliable connection between adjacent parts to allow the circulation of water and steam freely from one chamber to another, and that in Fig. 4 a thimble is shown partially set on the lower orifice of the single chamber represented; also, in Fig. 8 a thimble is shown partially set in the upper surface of the single chamber shown. Either of the forms here represented may be employed successfully. I prefer that shown in Figs. 3, 4, and 5.

There may be various forms given to the

parts additional to those here shown. I can, for example, make the joints between two adjacent chambers horizontal, as shown in Figs. 7 and 8, or so much inclined as to extend at right angles across the serpentine header, as in Figs. 3, 4, 5, and 6. Intermediate inclinations may be adopted and may in some cases be preferred.

I can apply the invention to other forms of boiler than the Babcock & Wilcox. It may be used successfully in most forms where there are thickly-set tubes to be connected to headers.

In Fig. 6, M is a thimble having a closed bottom. It is fixed by expanding in the bottom part of the header-section, forming a tight joint therewith. Any section thus provided with a thimble M may conveniently be used to form the lowermost section of a complete header, thus allowing the latter to be made up of similar pieces or sections. These thimbles M serve to stop the lower holes in the lower series of boxes or chambers D' D^2 D^3 , and when placed in position and expanded form a steam-tight joint, serving efficiently for the purpose described, applied with little expense and labor.

Modifications may be made in the details without departing from the principles of the invention. Certain parts may be used advantageously without the other parts. Thus the thimble M may serve to close the bottom of a header constructed otherwise in a single piece. I can combine sections arranged to receive only one tube with sections receiving two tubes to form a complete header.

I claim as my invention—

1. As an improvement in steam-boilers having a series of tubes, as shown, headers of waved or serpentine form to give a staggered position to said tubes, each section of header composed of a series of separate chambers united by thimbles with blow-holes between, and substantially as herein specified.

2. In a steam-boiler having a series of tubes, as B , set in suitable headers, as shown, the thimbles M , set in holes in the bottom portion of the headers, and the thimble H , connecting the chamber, substantially as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand, at New York city, N. Y., in the presence of two subscribing witnesses.

NAT. W. PRATT.

Witnesses:

E. S. IRMET,
A. H. GENTNER.