

No. 788,127.

PATENTED APR. 25, 1905.

H. W. AITKEN.
STEAM BOILER.

APPLICATION FILED APR. 12, 1904

3 SHEETS—SHEET 1.

FIG. 1.

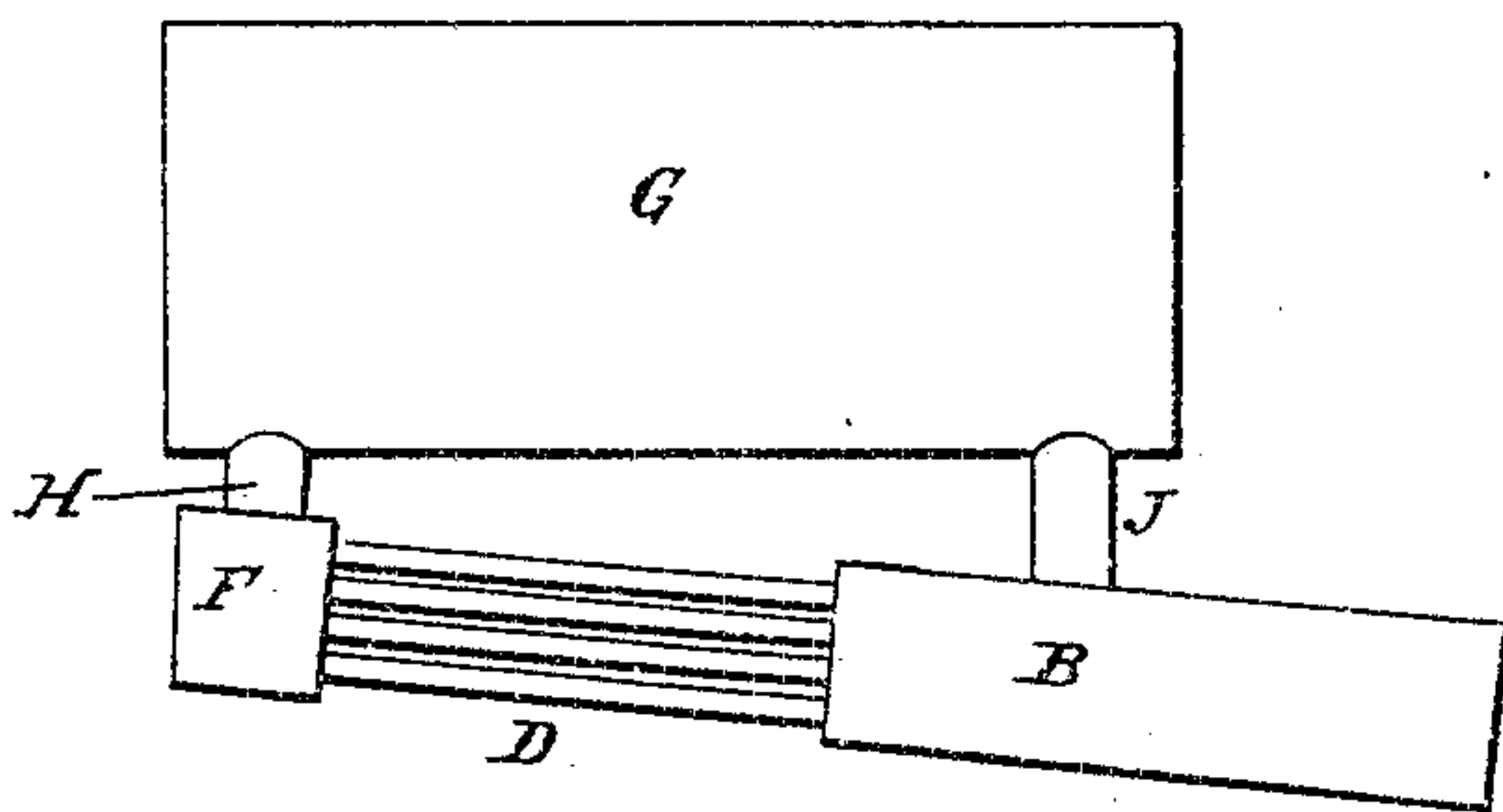


FIG. 2.

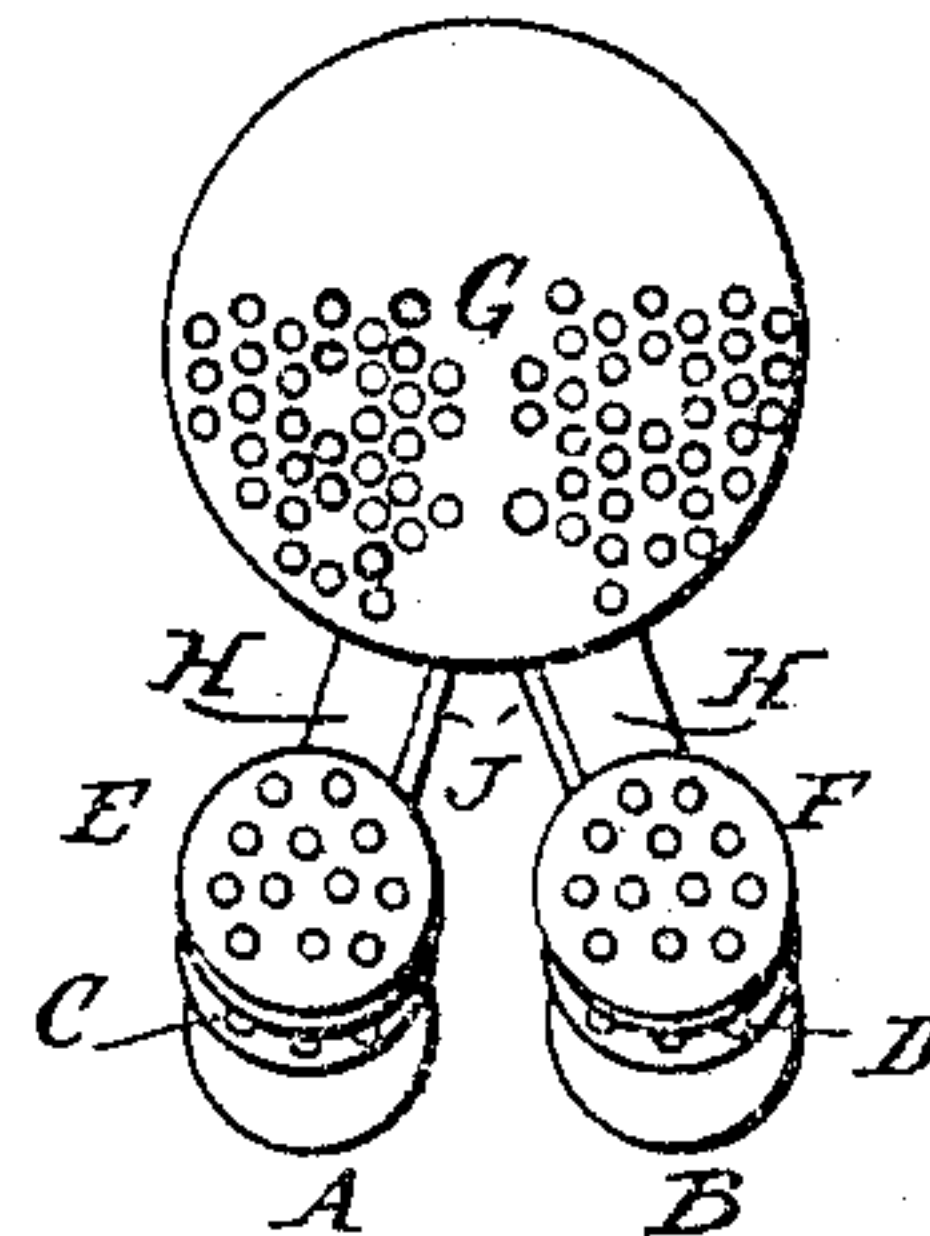


FIG. 3.

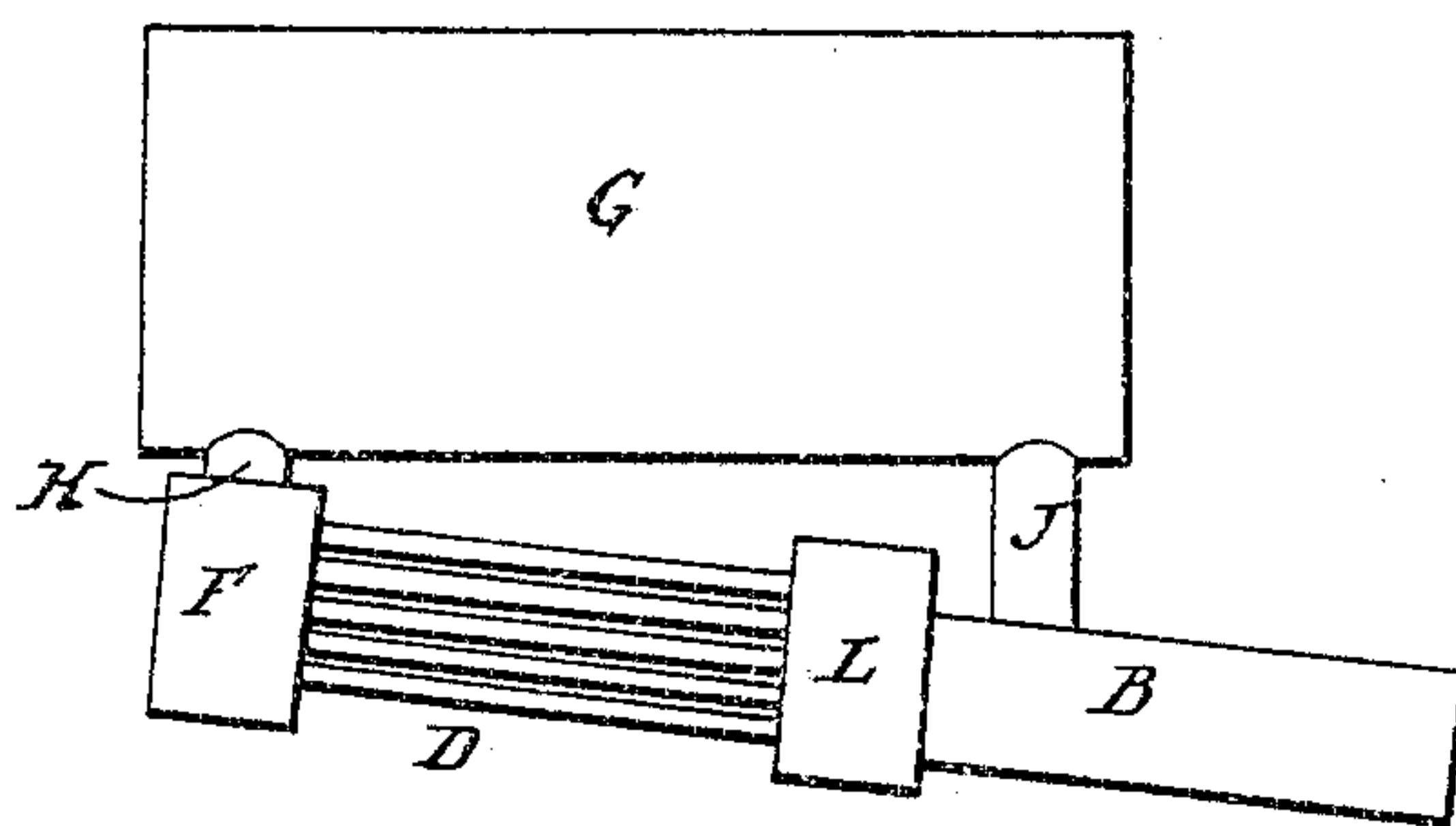


FIG. 4.

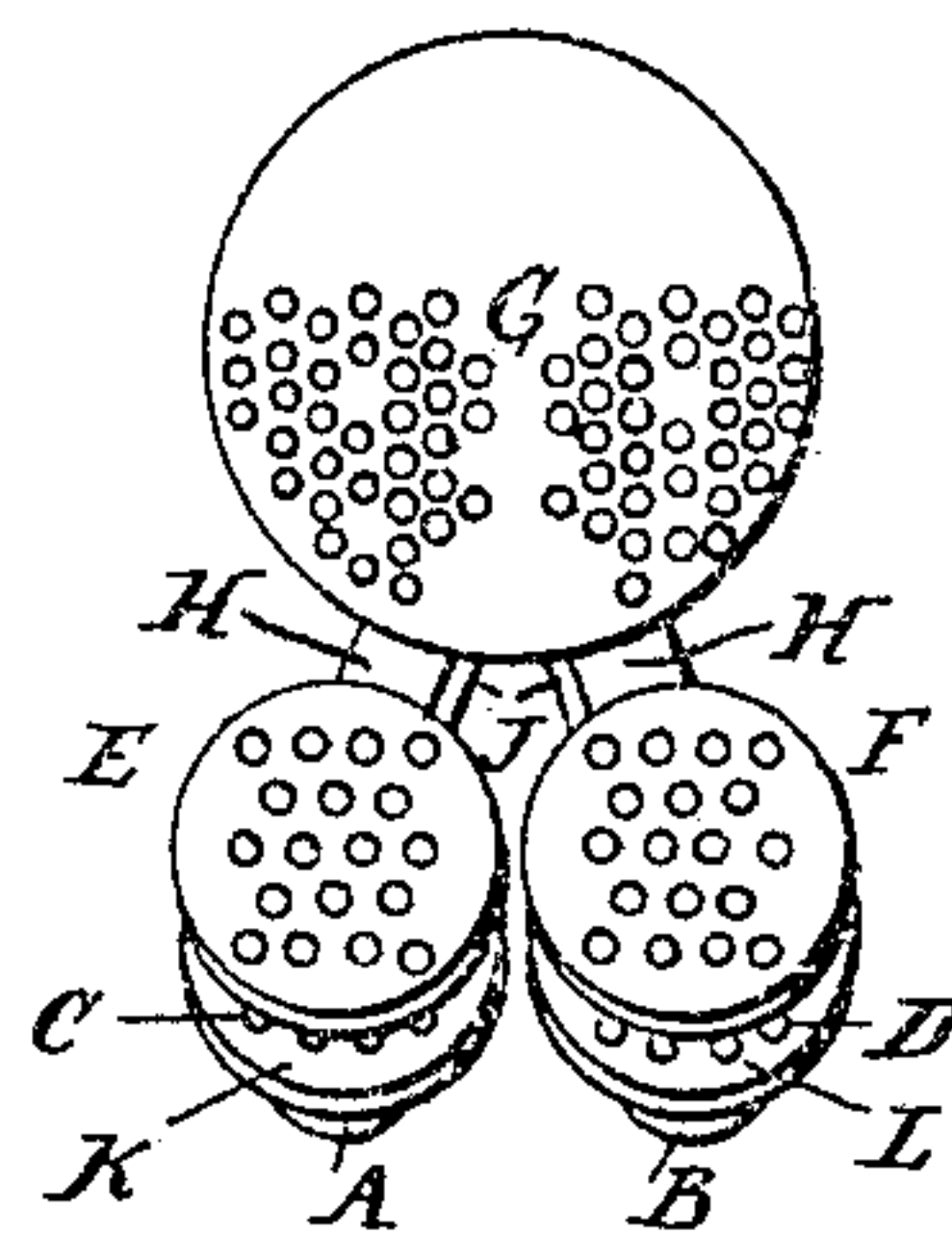


FIG. 5.

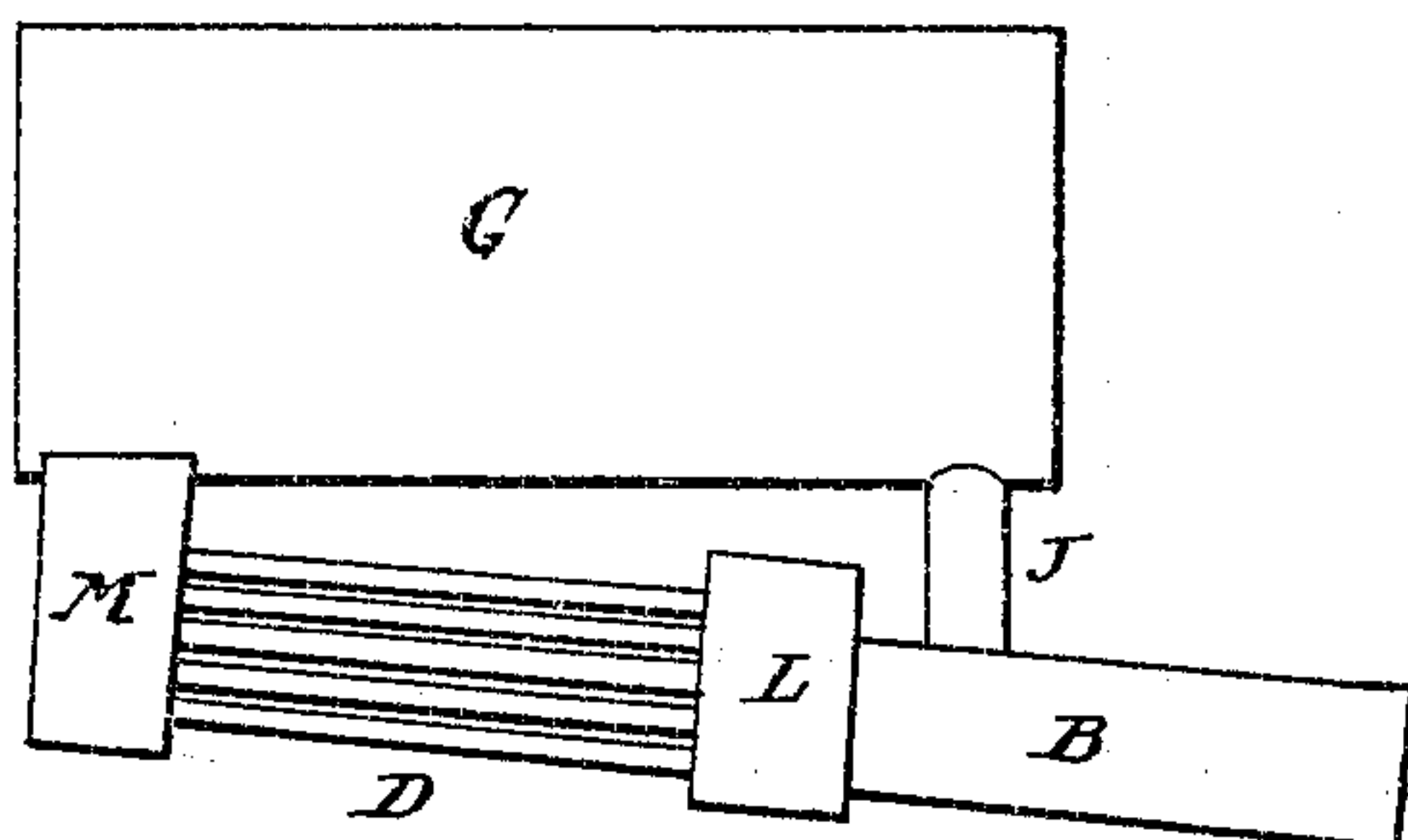
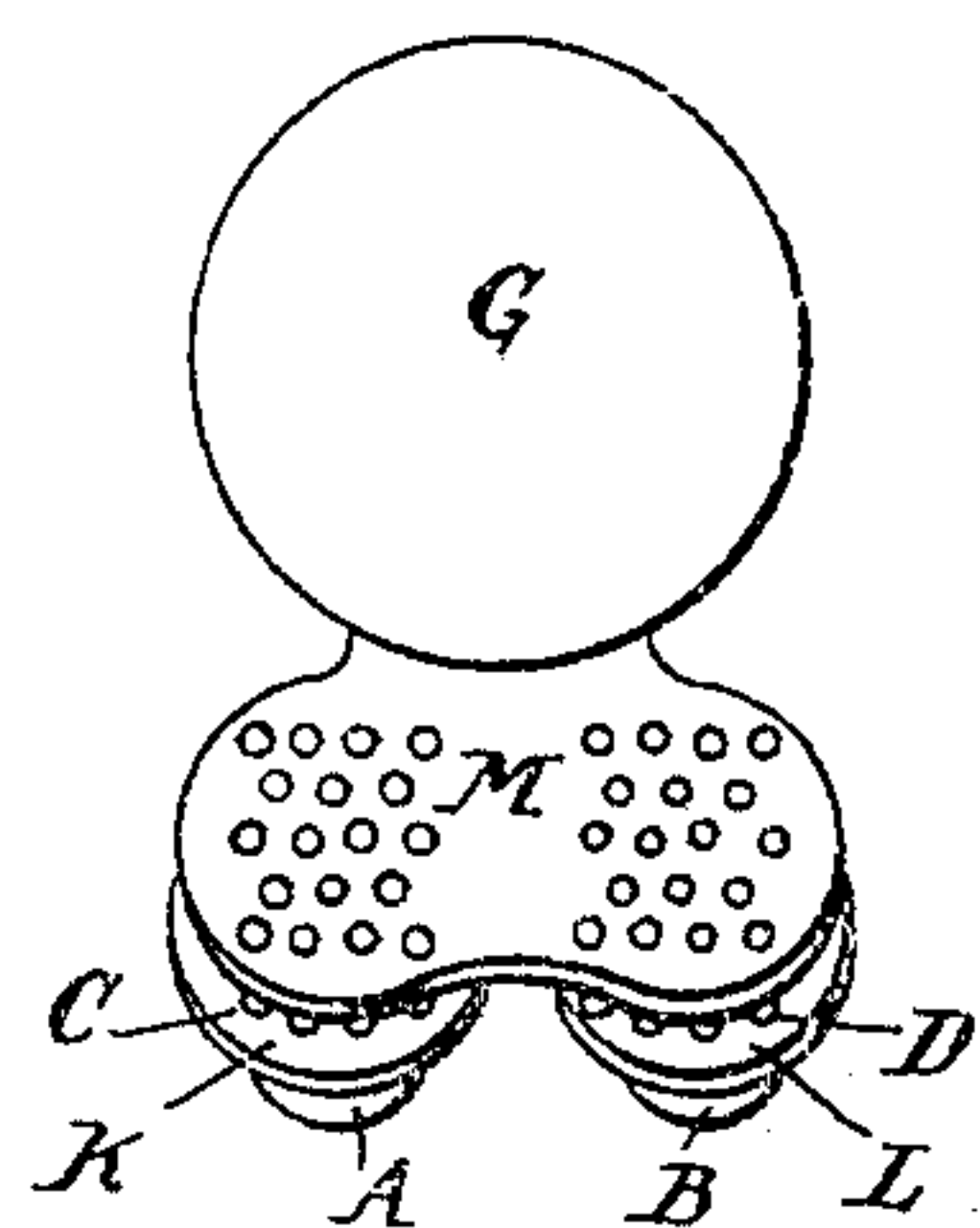


FIG. 6.



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3 SHEETS—SHEET 2.

FIG. 7.

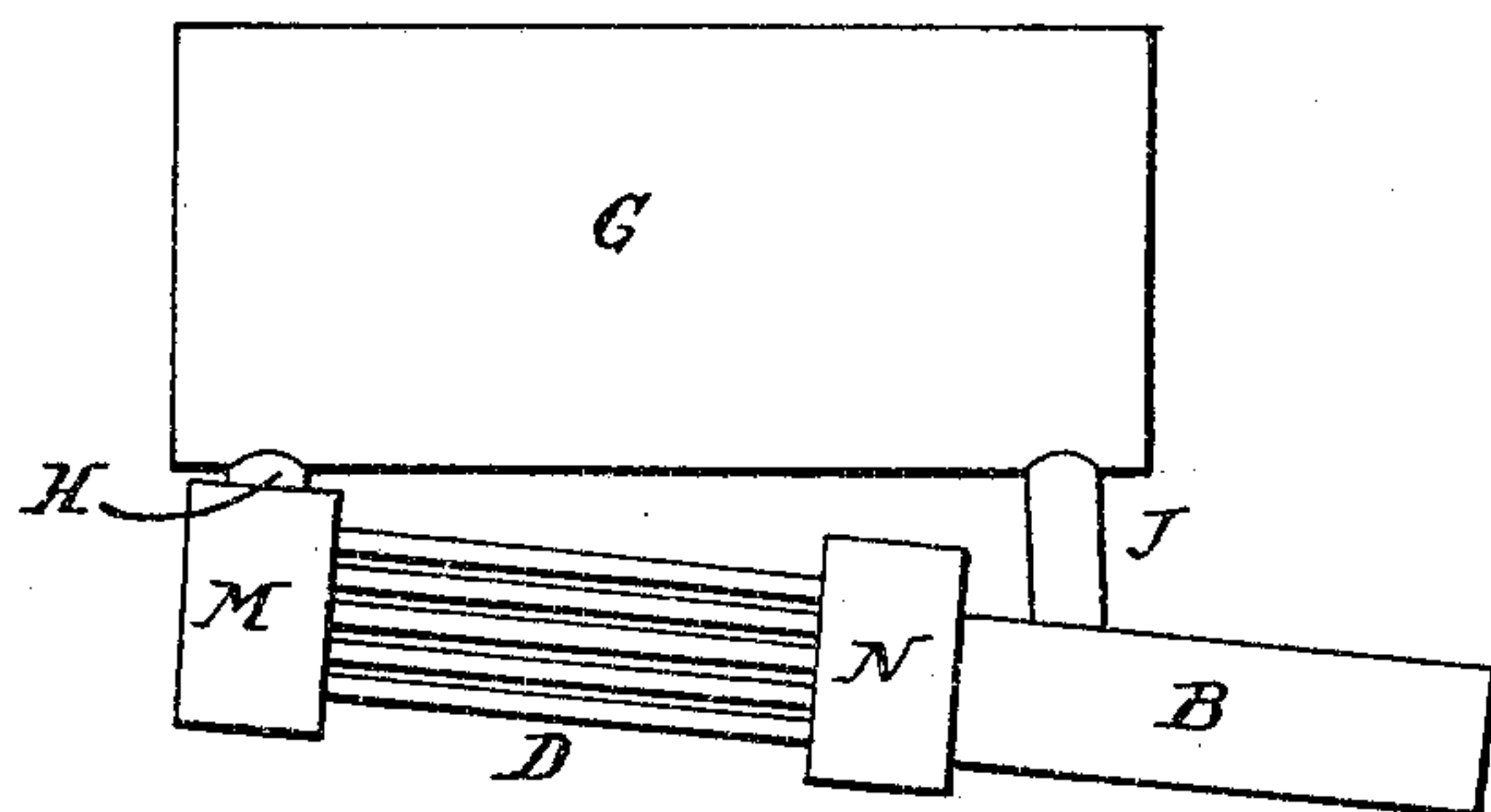


FIG. 9.

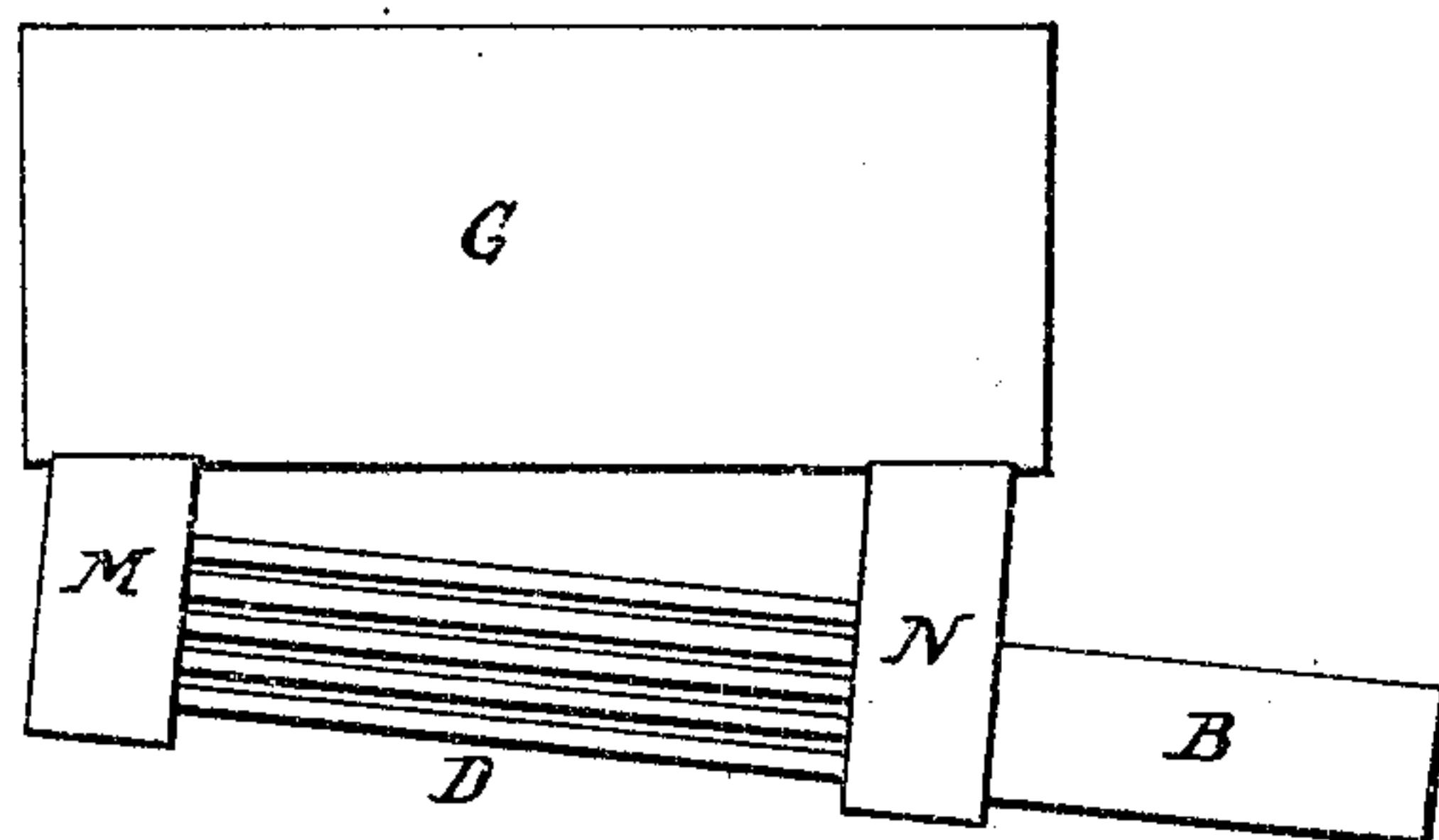


FIG. 8.

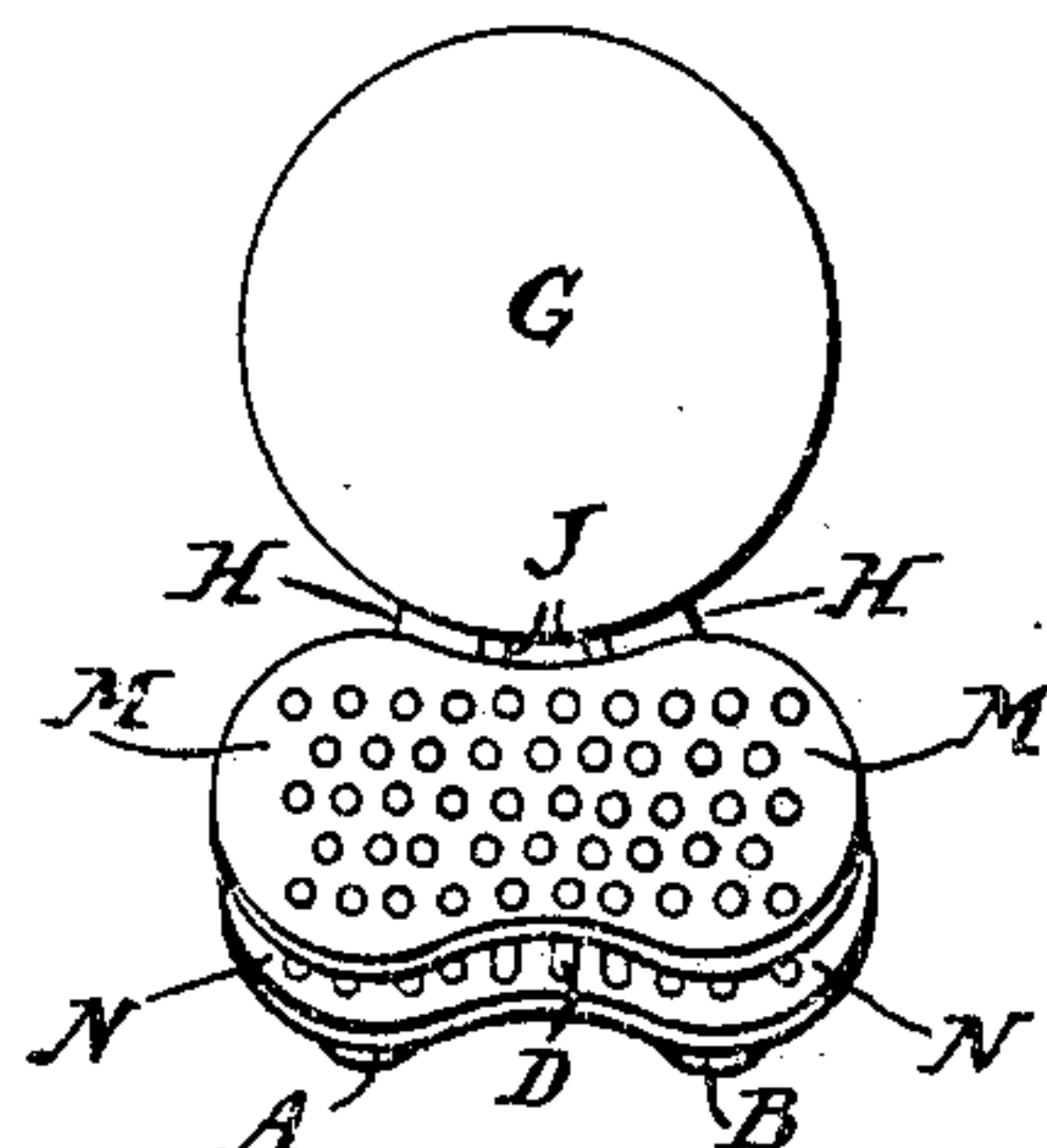
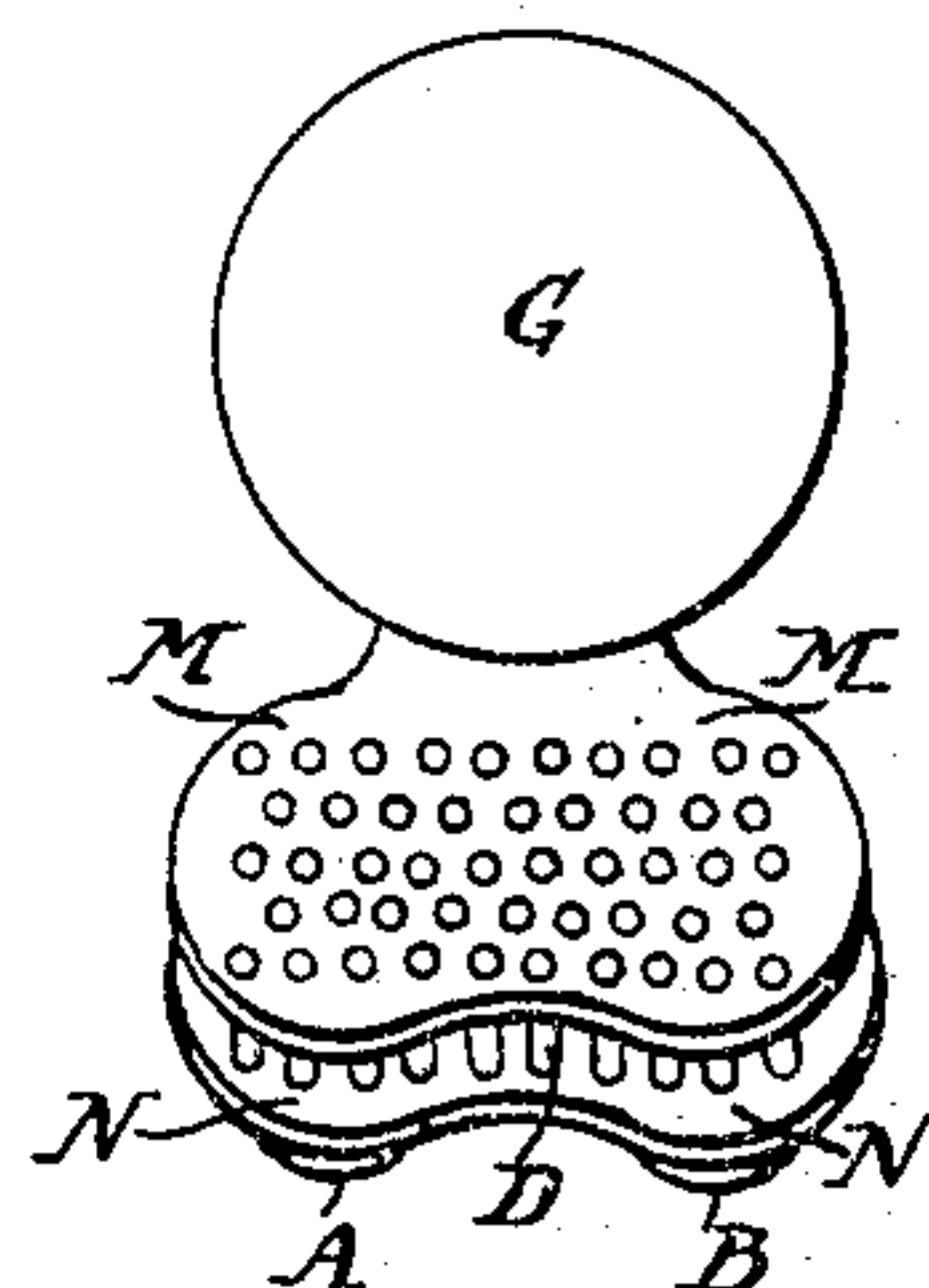


FIG. 10.



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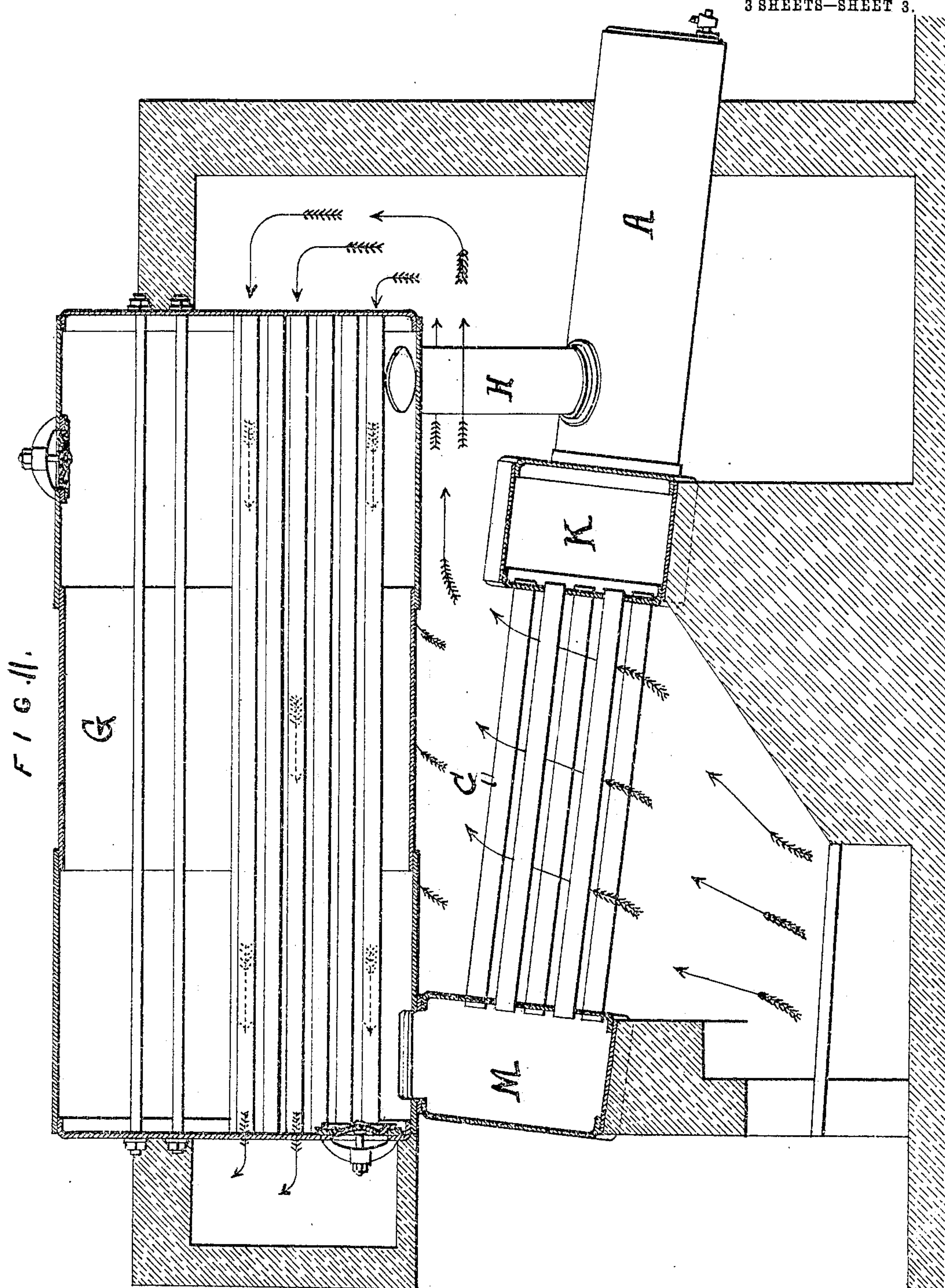
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

HUGH WALLACE AITKEN, OF GLASGOW, SCOTLAND.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 788,127, dated April 25, 1905.

Application filed April 12, 1904. Serial No. 202,855.

To all whom it may concern:

Be it known that I, HUGH WALLACE AITKEN, a subject of the King of Great Britain and Ireland, and a resident of Glasgow, in the county of Glasgow, Scotland, (whose postal address is 140 Bath street, Glasgow, Scotland,) have invented certain new and useful Improvements in Steam-Boilers, (for which I have applied for a British patent, No. 19,321, dated September 8, 1903,) of which the following is a specification.

My invention relates to steam-boilers, and has for its object to provide an improved combination of water-tube and preferably multi-tubular fire-tube sections or other type of cylindrical boiler, which combination will form a highly efficient and durable boiler.

In certain boilers as hitherto constructed a water drum or cylinder (or there may be more than one) is connected by a number of up-comer and downcomer pipes with a single overhead multitubular fire-tube section or other type of cylindrical boiler of considerably larger dimensions than the water-drums. The combination is so arranged over the furnace that the fire-gases after acting on the water-drums and the outside of the fire-tube section pass through the fire-tubes in either a backward or a forward direction (depending on the position of the smoke-box) before escaping to the chimney. To obtain a more efficient action of this type of boiler, I, according to my invention, substitute for the front portion of the water-drums a water-tube section or sections which extend in an inclined direction, more or less, directly over the furnace and to the rear of the boiler proper, the water-drums extending back from the water-tubes in the same direction as such tubes or more or less at an angle thereto in any direction.

On the two accompanying sheets of explanatory drawings, Figures 1 to 10 show side and front diagrammatic views of five examples of the application of my invention varying slightly from each other, Fig. 11 being a sectional side elevation of a furnace and boiler, showing the path of the products of combustion.

Throughout the drawings like reference-

letters indicate similar parts wherever they are repeated, and it is to be understood that the examples are merely typical, numerous other modifications being possible without departing from the nature of my invention.

In carrying out my invention according to the modification shown in Figs. 1 and 2 two water-drums A B are used. In front of these drums A B two water-tube sections C D are placed. The back ends of the tubes for each water-tube section are simply expanded in the front end plate of each water-drum A B, so that all the tubes for each section are within the area of the end of its rear water-drum. The front ends of the water-tubes for each section are carried in separate headers E F, and these headers and the water-drums A B are connected with the water-space in the overhead boiler G by the usual upcomer and downcomer pipes H J, the overhead boiler G being in this case shown as of the usual fire-tube section.

The arrangement shown in Figs. 3 and 4 differs from that hereinbefore described only in so far that the back ends of the tubes for each water-tube section C D are expanded in headers or chambers K L, formed on or attached to the front of the water-drums A B, thus permitting of an increased number of water-tubes being employed.

The example shown in Figs. 5 and 6 differs from that shown in Figs. 3 and 4 in that the front headers are united in one, M, and this header is connected direct with the water-space in the overhead boiler G, the separate upcomer pipes of the previous modifications being dispensed with. The boiler G in this and the following examples is shown without fire-tubes.

In Figs. 7 and 8 both the front and both the back headers are united in one, M N, so that the number of water-tubes can be very considerably increased. In Figs. 9 and 10 these single front and back headers M N are connected direct with the water-space in the overhead boiler G, so that they also serve as upcomer and downcomer pipes, the water drum or drums A B in this case extending backward only from the combined downcomer and header P.

As shown in Fig. 11, with any of the improved combinations hereinbefore described the fire-gases in their passage from the furnace R to the smoke-box, as hereinbefore described, act first on the water tube section or sections and insure a rapid circulation of the water (and generation of steam) from the back to the front of the combined boiler. At the same time the possibility of the water-tubes being burned by the steam generated in such tubes forcing the water in both directions, and thus leaving the tubes dry, is prevented or greatly diminished by the relatively large volume of water in the water drum or drums A B behind the lower ends of the water-tubes, and in addition such drums serve also very efficiently as mud-drums, as any sediment in the water falls to and becomes deposited in their lower ends, from which it can be withdrawn in the usual manner.

I claim as my invention—

1. A steam-boiler, comprising a boiler proper, a number of inclined water-tubes in rows, a header for the upper ends of said tubes in communication with one end of the boiler, a water-drum of large area and cross-section, one end open to and its interior facing tubes of a number of said rows, the said drum

extending rearwardly of the boiler and communicating with the adjacent end of the boiler.

2. A steam-boiler, comprising a boiler proper, a communicating header at the forward lower end thereof and another and lower header near the rear thereof, rows of water-tubes connecting said headers, a water-drum open at one end to the header, its open end facing a number of rows of tubes and a downcomer-pipe communicating with said drum near its forward end.

3. A steam-boiler, comprising a boiler proper, a communicating header at the forward lower end thereof and another and lower header near the rear thereof, rows of water-tubes connecting said headers, a water-drum open at one end to the header, its open end facing all of said tubes and a downcomer-pipe communicating with said drum near its forward end.

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

HUGH WALLACE AITKEN.

Witnesses:

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