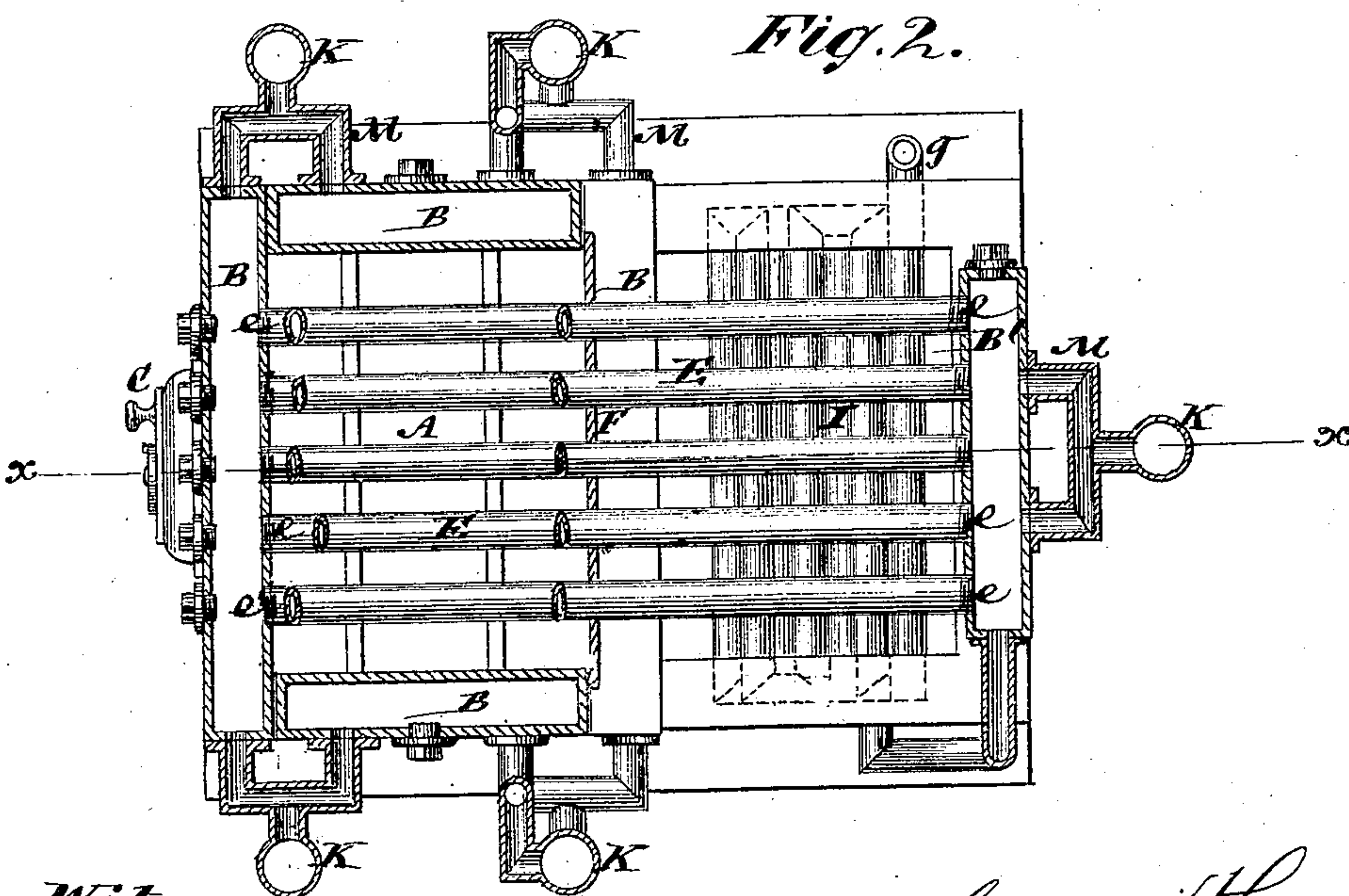
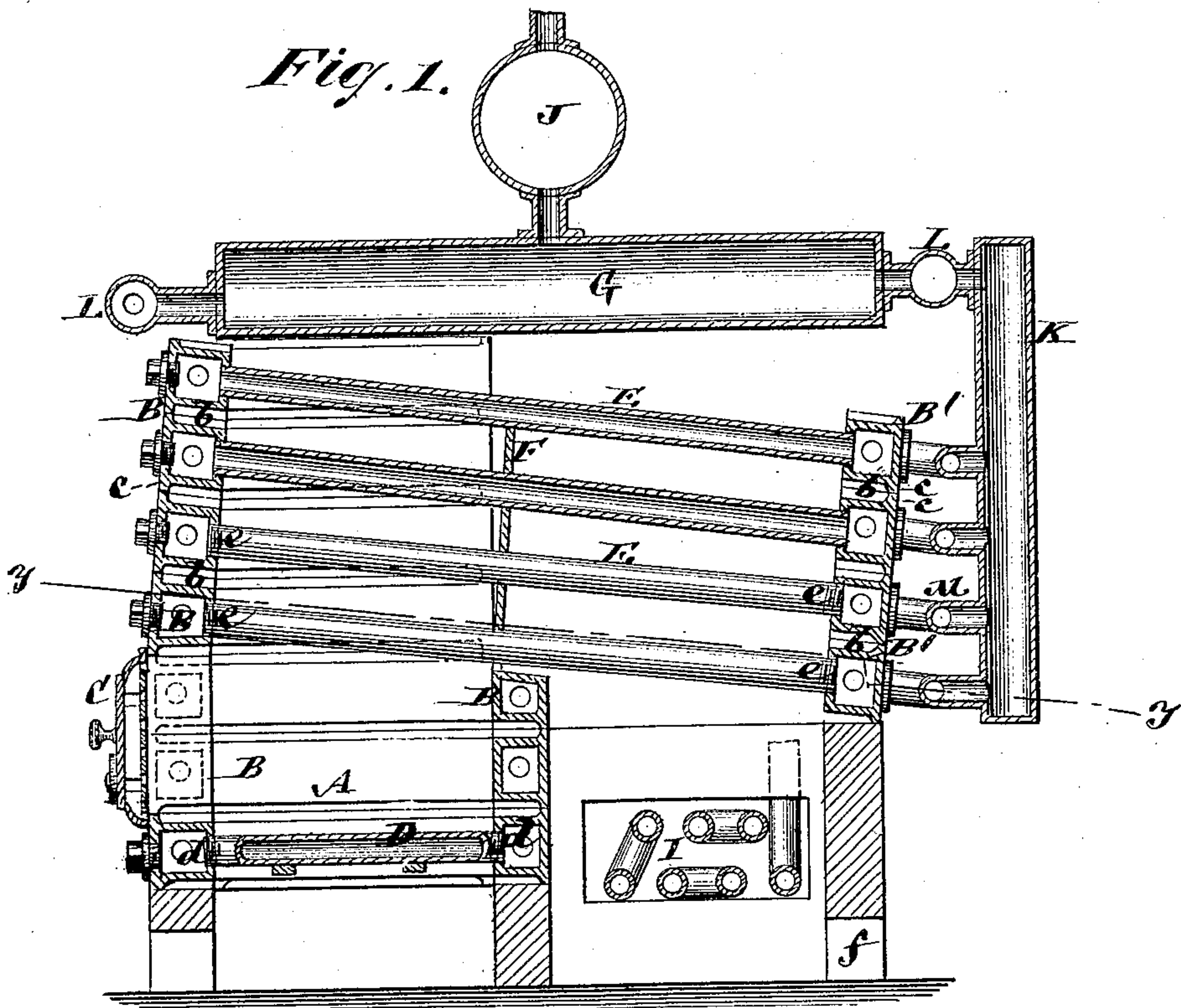


G. HIGGINS.
Sectional Steam-Boilers.

No. 153,076.

Patented July 14, 1874.



Witnesses.
John Becker,
Fred Harnes

George Higgins
By his Attorneys
Brown & Allen

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Fig. 4.

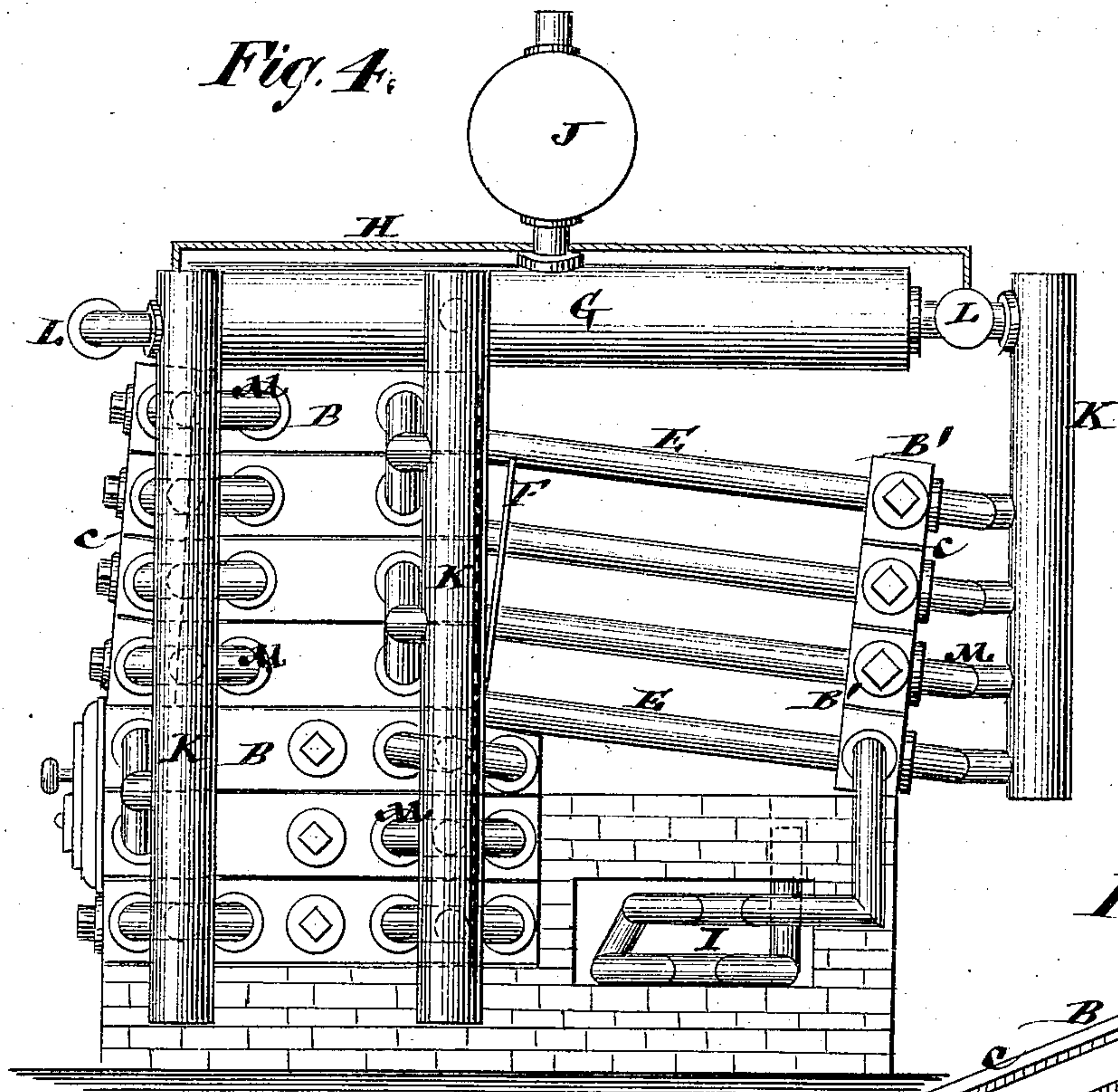


Fig. 3.

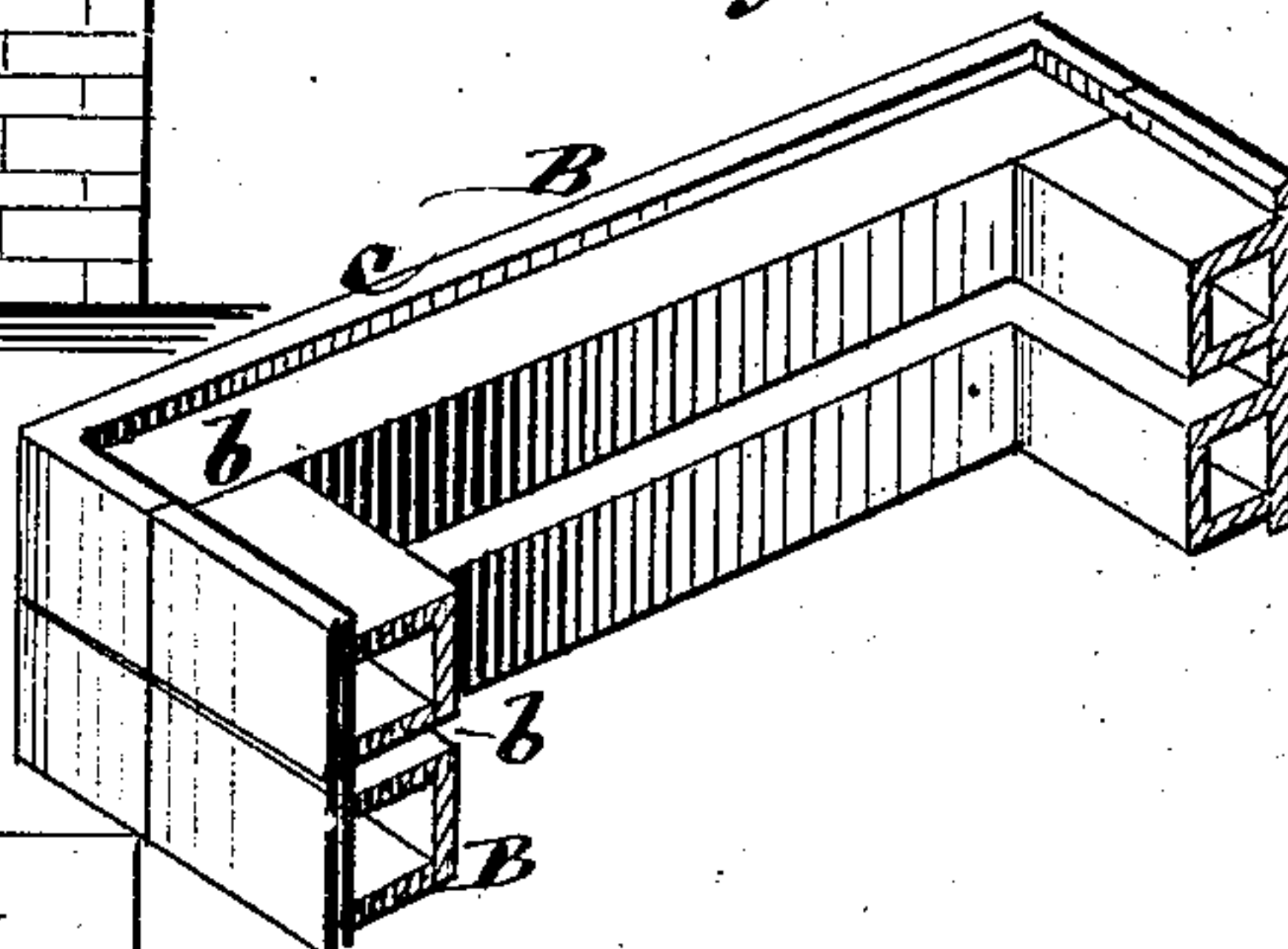
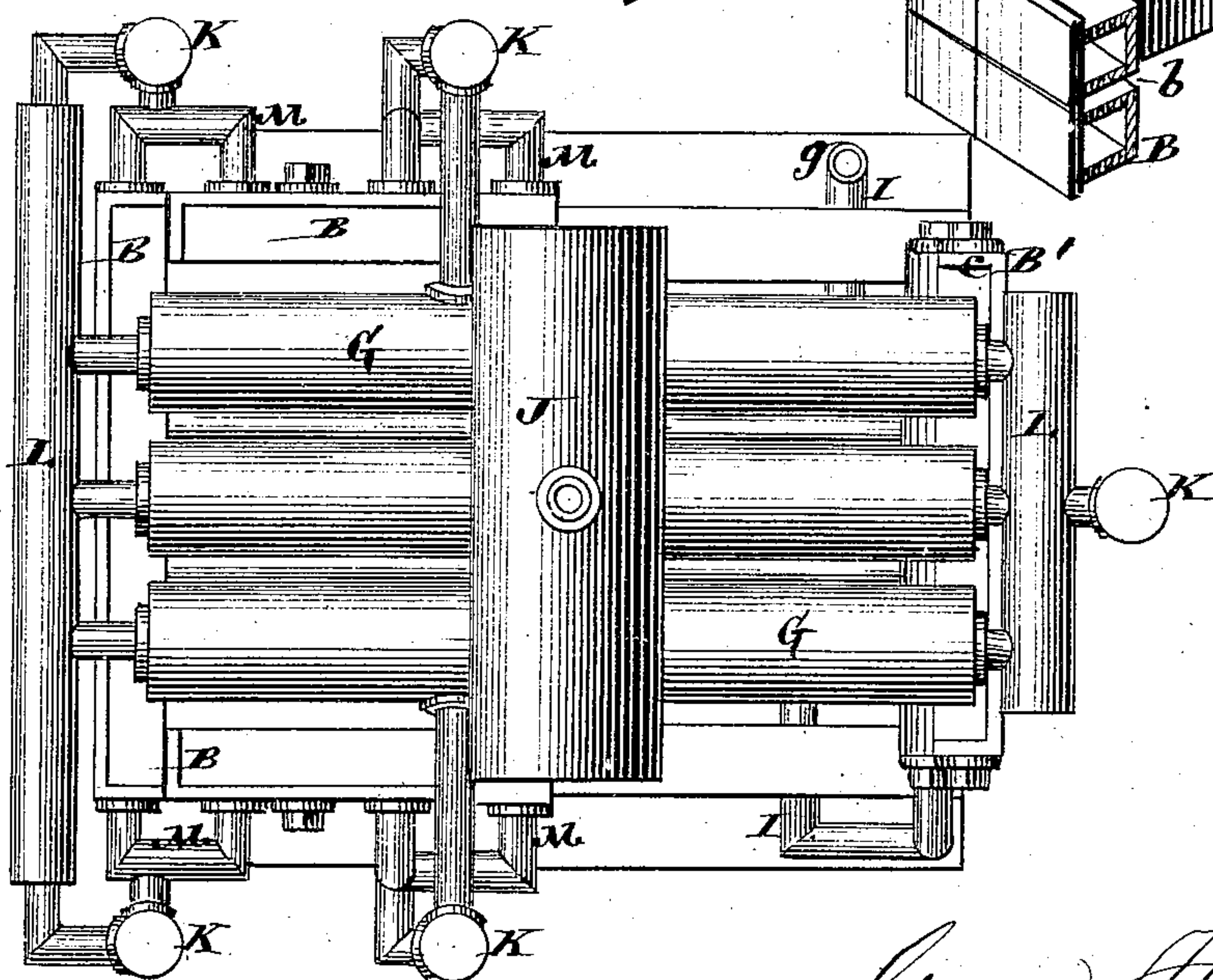


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE HIGGINS, OF NEW YORK, N. Y.

IMPROVEMENT IN SECTIONAL STEAM-BOILERS.

Specification forming part of Letters Patent No. **153,076**, dated July 14, 1874; application filed April 29, 1874.

To all whom it may concern:

Be it known that I, GEORGE HIGGINS, of the city, county, and State of New York, have invented certain Improvements in Sectional Steam-Boilers, of which the following is a specification:

This invention more particularly relates to that class of steam boilers or generators in which the fire or products of combustion are made to play between or on the outside of tubes forming, at least in part, the water and steam-generating space of the boiler, and set horizontally or inclined in one or more clusters. The invention consists in certain combinations of upright water-circulating pipes and branches or connections, preferably made of copper, with the block composing the side walls of the furnace, and the arrangement of the various parts as a whole, substantially as hereinafter described.

In the accompanying drawing, Figure 1 represents a side view of the boiler, and Fig. 2 a plan of the same with the top covers or hoods removed. Fig. 3 is a view in perspective of certain of the blocks used in the construction of the furnace. Fig. 4 is a longitudinal vertical section on the line *x x*, and Fig. 5 an approximately horizontal section on the line *y y*.

A is the furnace, the fronts and backs or heads and sides of which, both above and below, are composed of hollow blocks B, either of straight or angular construction in direction of their length, and constituting water chambers or spaces, the same being mounted one upon the other to make or build up the walls of the furnace. The back head of the boiler is also constructed of similar hollow or water blocks B', mounted one upon the other. These several blocks B B', which may be of wrought-iron, cast-iron, or malleable iron, are formed with recesses *b* in their upper and lower exterior surfaces, or either, where they rest one upon the other, but are closed externally by ledges *c*, which form the bearing-surfaces of the blocks upon each other. By this recessed construction of the blocks, the fire, gases, or heated products of combustion

act directly not only upon the inner faces of the blocks, but also on their tops and bottoms, thus obtaining three faces, instead of one, as exposed to the action of the fire. C is the fire-door of the furnace, and D D the grate-bars, which are of tubular construction for the circulation of water through them, and are made with a right and left hand screw-thread, *d*, at their opposite ends, for the purpose of connecting them in a simple and efficient manner with the back and front walls or blocks of the furnace, into which they screw. E are the horizontal or inclined water-tubes, arranged to connect the front head of the boiler with the back head or blocks B' thereof, said tubes extending over the fire and through a bridge, F, at the back of the combustion-chamber. These tubes are provided with a right and left hand thread, *e*, at their opposite ends, to screw into the blocks B B', which they connect. This forms a very simple, rapid, and efficient construction, with every facility as regards disconnection and tightening up or adjustment of the tubes. Above these tubes are other horizontal and larger tubes or cylinders G, forming steam and water spaces under cover of a hood, H, which extends over the top of the combustion-chamber to the back end of the boiler, and under which the products of combustion pass, as the same circulate over, down, and among the several tubes E G, the draft being over the bridge F and down through between the rear portions of the inclined tubes to and among a nest of return-pipes, constituting a water-heater, I, and from thence through a rear lower outlet, *f*, said water-heater being arranged in the back portion of the foundation, and having its inlet at *g*, while its end on the other side connects with the lower block B' of the back head of the boiler, for the purpose of feeding the boiler with water heated by the escaping products of combustion, in the manner described. Mounted on or connected by suitable necks with the larger horizontal tubes G is a steam-drum, J. K K are upright outside pipes for promoting the circulation. These pipes are connected above,

by cross horizontal pipes L and suitable branches, with the upper horizontal pipes G, and with the several blocks B B' by copper elbows or connections M, which, by reason of their greater expansion, serve to keep the joints tight and from breaking, the circulation-pipes K themselves being of iron.

A boiler constructed as described may, as a general thing, dispense with outside walls, and the steam, in a measure, be superheated.

Instead of the water-tubes E and hollow grate-bars D being secured to their places by right and left hand screw-threads, as de-

scribed, they may be secured by expanding them to or within their places.

I claim—

The combination of the circulating-pipes K, the cross-pipes L, the elbows M, the water chambers or blocks B B', the tubes E G, the hood H, and the bridge F, essentially as shown and described.

GEORGE HIGGINS.

Witnesses:

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