

No. 632,466.

Patented Sept. 5, 1899.

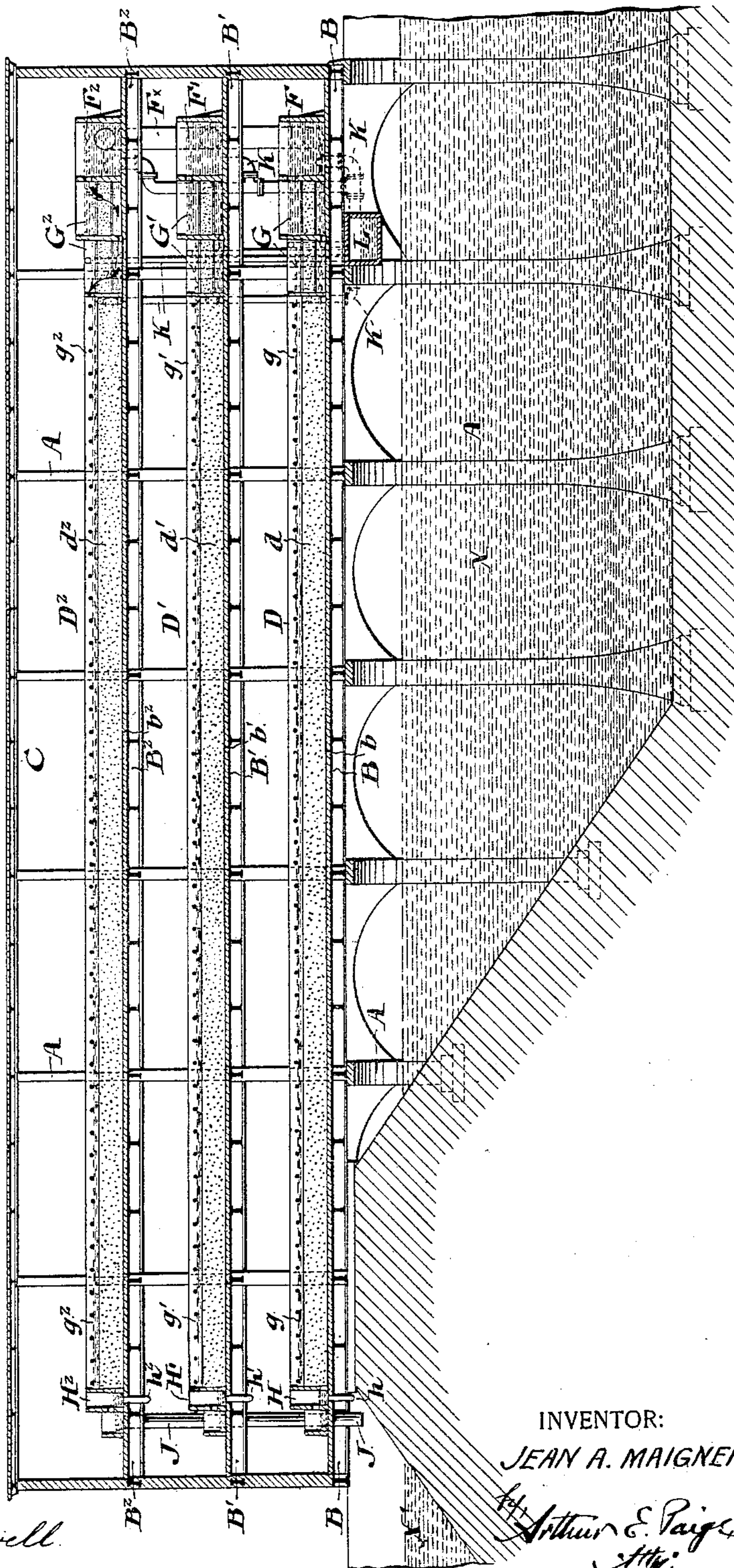
J. A. MAIGNEN.
FILTER.

(Application filed Nov. 28, 1898.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.



WITNESSES:

E. L. Fullerton

Clifton C. Halliwell

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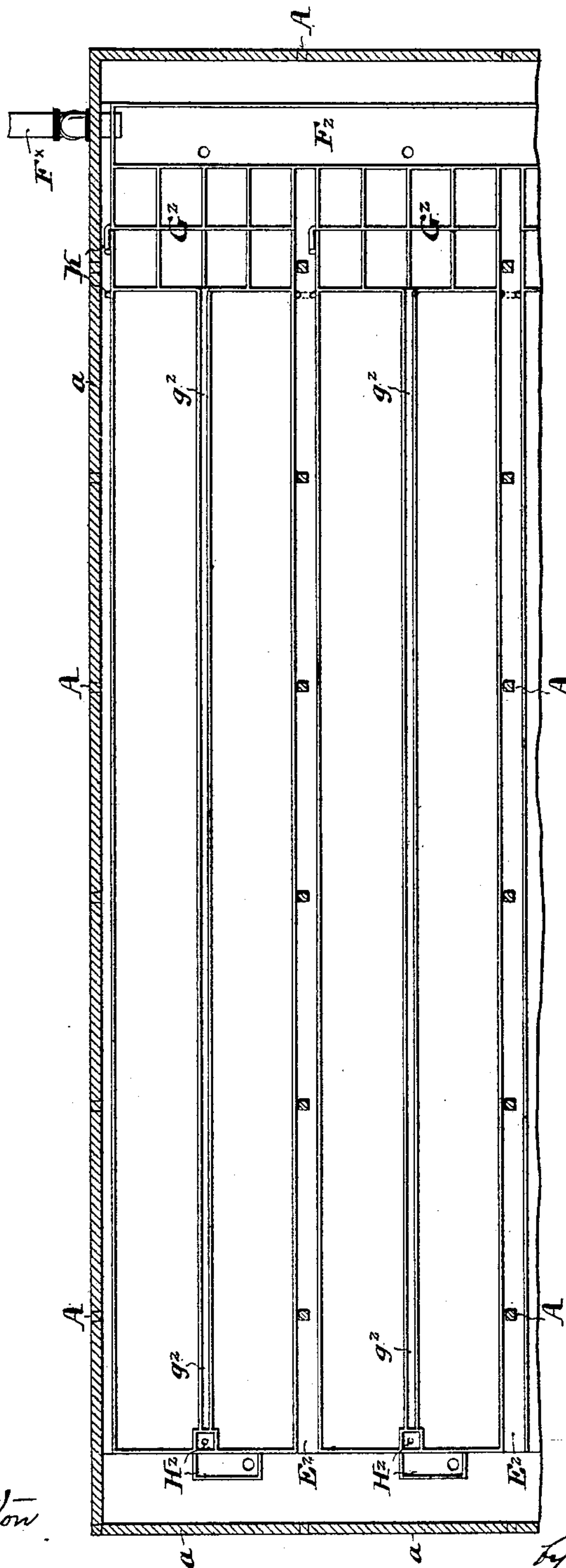
FILTER.

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4 Sheets—Sheet 2.

FIG. 2.



WITNESSES:

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by Arthur E. Paige, Atty.

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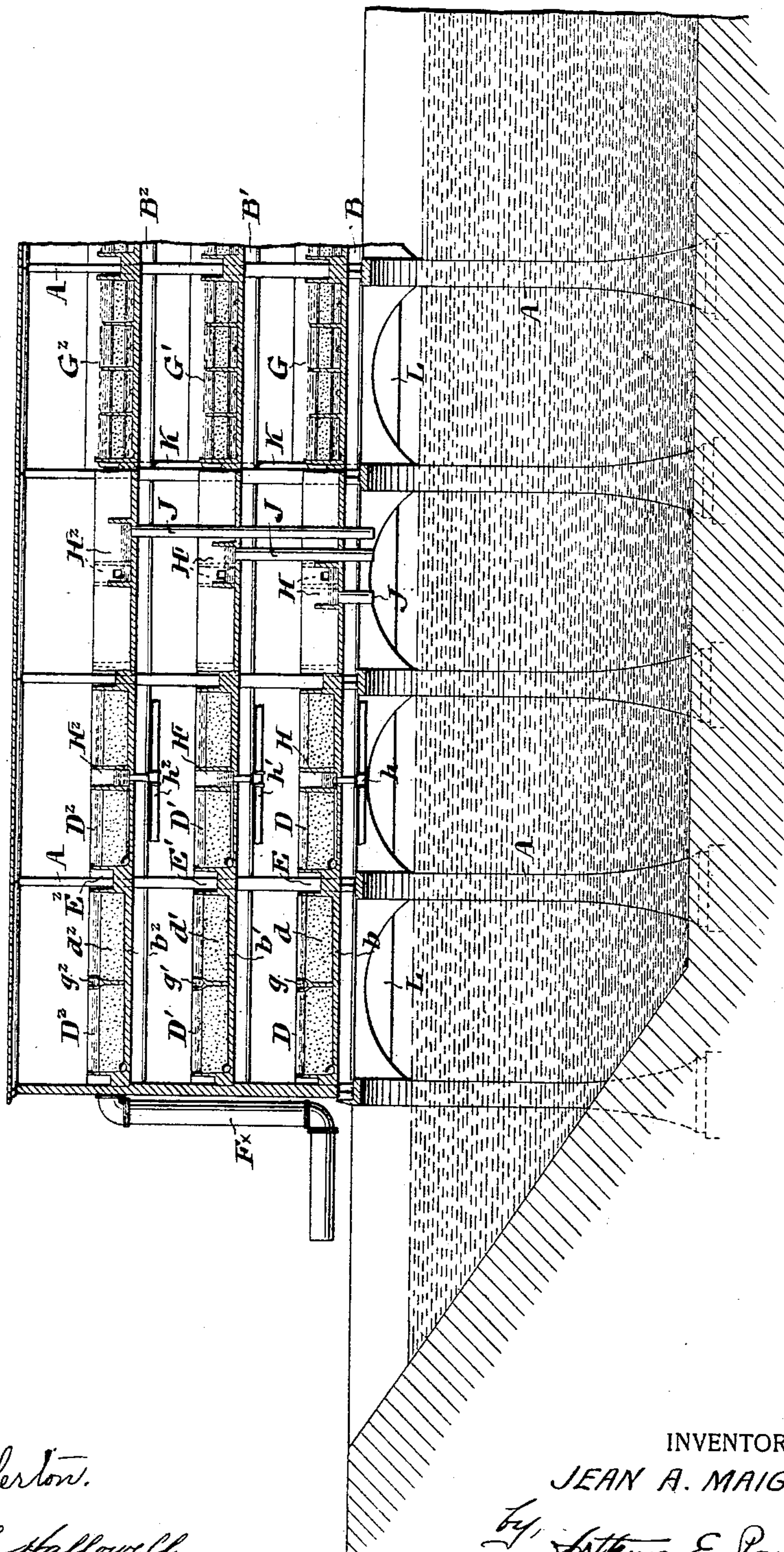
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(Application filed Nov. 28, 1898.)

(No Model.)

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FIG. 3.



WITNESSES:
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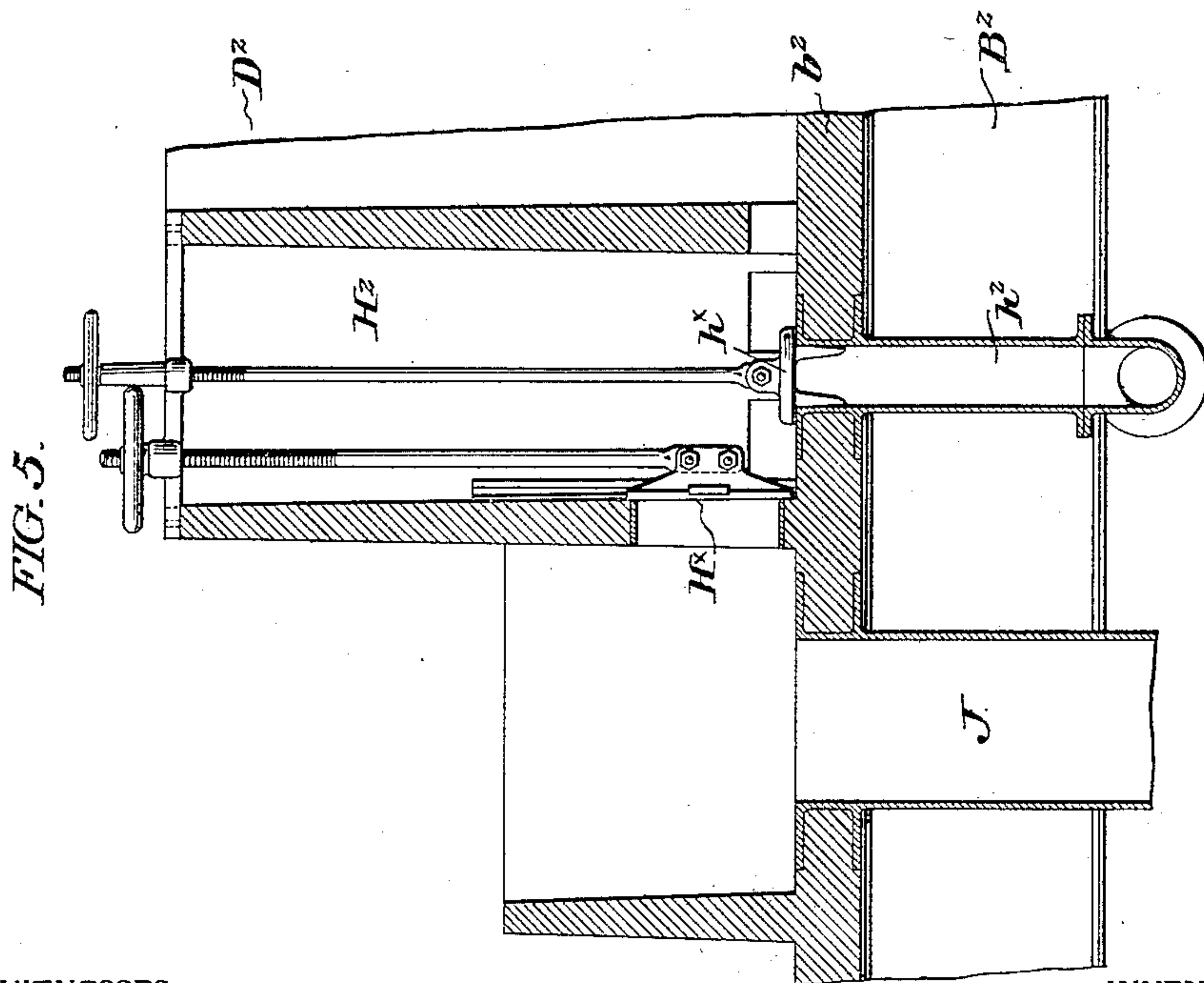
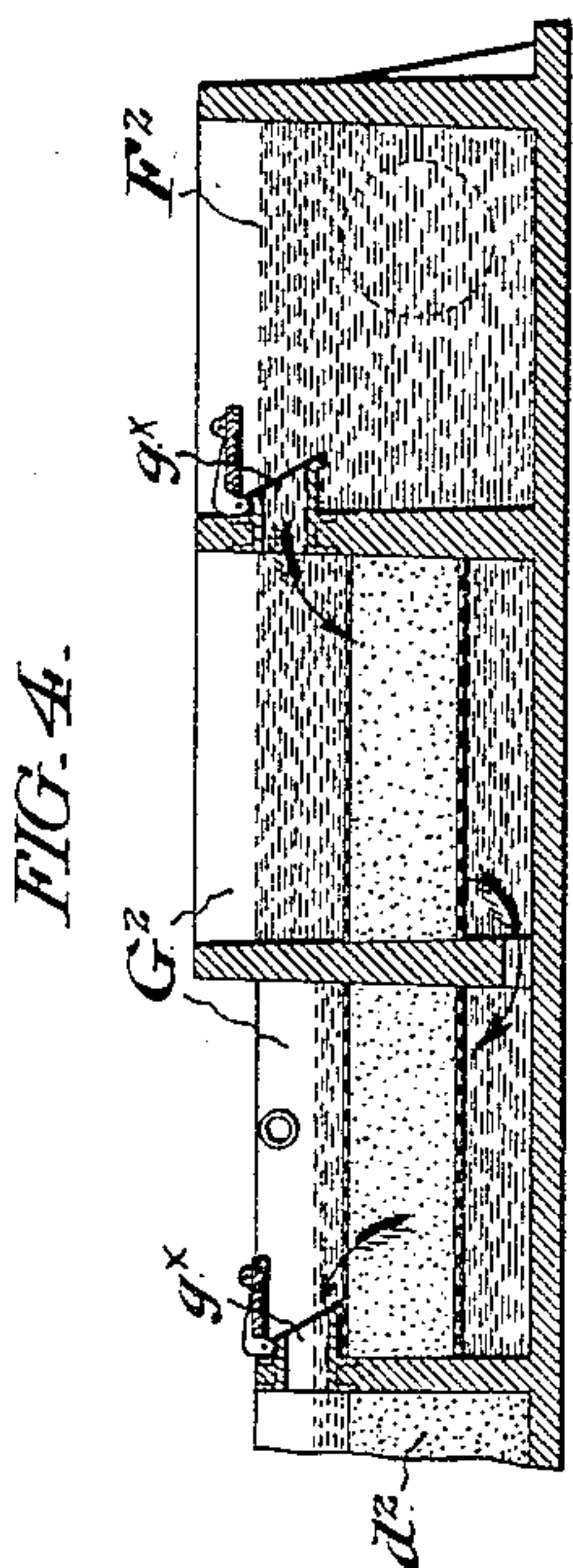
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(Application filed Nov. 28, 1898.)

(No Model.)

4 Sheets—Sheet 4.



WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

JEAN A. MAIGNEN, OF PHILADELPHIA, PENNSYLVANIA.

FILTER.

SPECIFICATION forming part of Letters Patent No. 632,466, dated September 5, 1899.

Application filed November 28, 1898. Serial No. 697,608. (No model.)

To all whom it may concern:

Be it known that I, JEAN A. MAIGNEN, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Filters, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to granular-bed filters, and particularly to the details of arrangement and construction of a filter plant of that type of such magnitude as is required in the filtration of a municipal water-supply. As ordinarily constructed such filters comprise beds located in a lined excavation in the ground or embanked upon the ground-level with masonry walls to resist lateral pressure. The amount of land required for said ordinary construction is directly that of the surface acreage of the filter-bed plus sufficient marginal area to give access thereto. Such an ordinary filter plant when not provided with a cover or roof, being exposed to the action of the elements, not only receives all sorts of refuse, such as leaves, &c., deposited by the wind, but if subjected to freezing temperature may only be cleansed with great difficulty, owing to the formation of ice above the filter-beds, which must be broken up and removed to secure access to the latter for the cleansing operation. It is therefore not only desirable but essential to the successful operation of such a bed at its full capacity during all seasons of the year that it shall be inclosed in such manner as to be sheltered from the elements. The plant erected at Albany, New York, is considered an example of the best form of the ordinary construction, and in said plant the cost of the roof and filter superstructure supporting the same was fifty per cent. of the cost of the filter-beds inclosed. It is to be noted in this connection that the costly housings referred to as of the ordinary type are separate and distinct from the filter beds and tanks, which they do not serve to support or retain.

It is the object of my present invention to so arrange and support the granular beds and the tanks inclosing them that a given ground area may be used for a filter plant of several times the capacity hitherto possible with the ordinary excavated or ground-level bed construction.

My invention consists in providing a framework of structural iron or steel, comprising a series of floors and a roof, and locating open-topped tanks for the granular beds in said framework in such relation therewith that the floors forming the solid bottoms of the respective tanks serve as covers for the subjacent tanks.

My invention also comprises certain details of construction and arrangement, hereinafter more definitely specified and claimed.

In the accompanying drawings, wherein I have shown a convenient embodiment of my invention, Figure 1 is a longitudinal section through a structure comprising three tiers of filter-beds and a roof. Fig. 2 is a plan view of one of the floors or tiers. Fig. 3 is an irregular sectional elevation showing certain details of construction and arrangement of parts. Figs. 4 and 5 are fragmentary sectional views, on a larger scale than Fig. 1, showing the arrangement of the controlling-valves.

I have illustrated the preferred embodiment of my invention, wherein the structure supporting the respective filter-beds in the superposed relation aforesaid is built upon or overhangs a twin-basin reservoir, X being the basin to which water is directly pumped from the source of supply and wherein the bulk of its impurities may be permitted to subside, and X' being the basin in which the filtrate is received after passing from the subsiding-basin X through the superposed filter-beds.

A are vertical metal columns upon which are secured metal floor-frames B B' B² and the roof-frame C. The frames B B' B², respectively covered with concrete *b b' b²*, form the bottoms of respective tanks D D' D², containing respective filtering-beds *d d' d²*.

In order to minimize the production of eddy-currents through the filtering material, I prefer to subdivide the respective floor areas and form series of said tanks, as indicated in Fig. 2. As a matter of convenience that access may be afforded to all portions of the filtering-area for inspection, repairs, &c., foot passage-ways E E' E² are formed between the adjoining subdivisions of each floor. As, however, said tanks are similar in detail of construction, I shall not separately describe them.

F F' F² are main supply-ducts upon the re-

spective floors, each of said ducts being common to the series of subdivisions or tanks upon its respective floor. Said ducts communicate with the supply-pipes F^x , which extend from pumps, which have been omitted from the drawings for clearness of illustration. Intermediate of said supply-ducts and the tanks common thereto are primary filtration-compartments $G\ G'\ G^2$. Suitable valved openings g^x (see Fig. 4) being provided for communication from said ducts through said primary filtration-compartments to the respective tanks, the water is distributed to the latter through central longitudinal troughs $g\ g'\ g^2$, which extend from end to end of the tanks and are provided with suitable lateral openings through which the water reaches the top of the granular material. The water gravitating to the bottom of the respective beds passes thence through suitable apertures to outlet-pockets $H\ H'\ H^2$, and the latter are provided with suitable valves H^x (see Fig. 5) to control the exit of the filtrate through the pipes J , which, as shown in Fig. 1, overhang the basin X' .

As indicated in Fig. 1, the outlet-pockets $H\ H'\ H^2$ are provided with pipes $h\ h'\ h^2$ for intercommunication between the respective tanks for the transfer of filtered water from one to the other, and said pipes are conveniently provided with valves h^x , as shown in Fig. 5. Suitable waste or drain pipes, such as are indicated at K at the right-hand side of said figure, are provided wherever necessary to facilitate the cleansing operation of the filter. Said pipes conveniently lead to a waste-duct L .

I prefer to make the tank-bottoms and side walls of concrete, the latter being supported by expanded metal plates, and to face the concrete with a lining of pure cement. It is obvious, however, that said tanks may be constructed of masonry, enameled metal, or any other suitable material.

I am aware that it is not broadly new to superpose a series of filtering-beds in a single closed casing, and I do not desire to claim the mere vertical series relation of filtering-beds. However, I believe it to be broadly new to provide, in a filter structure of the class described, a superposed series of solid-bottomed and open-topped filter bed-retaining-tanks in such relation that the bottoms of the respective tanks serve as roofs for the subjacent tanks. I therefore do not desire to limit all of the following claims to the precise construction which I have shown and described, as it is obvious that various modifications may be made therein without departing from the spirit of my invention.

I claim—

1. In a filter structure, a superposed series of open-topped filter-bed-retaining tanks provided with imperforate floors, a roof for the upper tank in said series, a framework supporting said roof and said tanks in such re-

lation that the bottoms of the respective tanks serve as roofs for the subjacent tanks, beds of filtering material retained in the respective tanks, a main supply-duct communicating with each of the tanks in said series, and means to control the passage of water from said duct through the respective beds, substantially as set forth.

2. In a filter structure, a metallic floor-frame, a series of filter-bed-retaining tanks upon said floor-frame, imperforate floors for said tanks, side walls for said tanks, united with said imperforate floors, beds of granular material supported by said imperforate floors, within said side walls, a main supply-duct common to said series of tanks, and means to control the passage of water through the respective beds, substantially as set forth.

3. In a filter structure, a metallic floor-frame, a series of filter-bed-retaining tanks upon said floor-frames, separated by foot passage-ways, imperforate floors for said tanks formed of concrete, united with vertical side walls, beds of granular material supported by said imperforate tank-floors, within the respective side walls thereof, a main supply-duct common to said series of tanks, a primary filtration-compartment intermediate of said supply-duct and the tanks of said series, and means to control the passage of water from said main duct through said primary filtration-compartments and said beds in the respective tanks, substantially as set forth.

4. In a filter structure, a metallic framework, comprising supporting-columns, and superposed floor-frames, filter-bed-retaining tanks upon said floor-frames, imperforate floors for said tanks, united with vertical side walls, beds of granular material resting upon said imperforate floors within the respective side walls thereof, supply-ducts leading to the respective tanks, and means to control the passage of water through the respective beds, substantially as set forth.

5. In a filter structure, a metallic framework comprising vertical supporting-columns, and superposed horizontal floor-frames, a series of filter-bed-retaining tanks upon each of said floor-frames, imperforate floors for said tanks, formed of concrete, united with vertical side walls, beds of granular material resting upon said metal and concrete tank-floors, within the respective side walls thereof, main supply-ducts for the respective series of tanks upon said floor-frames, primary filtration-compartments intermediate of said respective main supply-ducts, and the tanks of the series common thereto, and means to separately control the passage of water through the respective beds, substantially as set forth.

JEAN A. MAIGNEN.

Witnesses:

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ARTHUR E. PAIGE.