

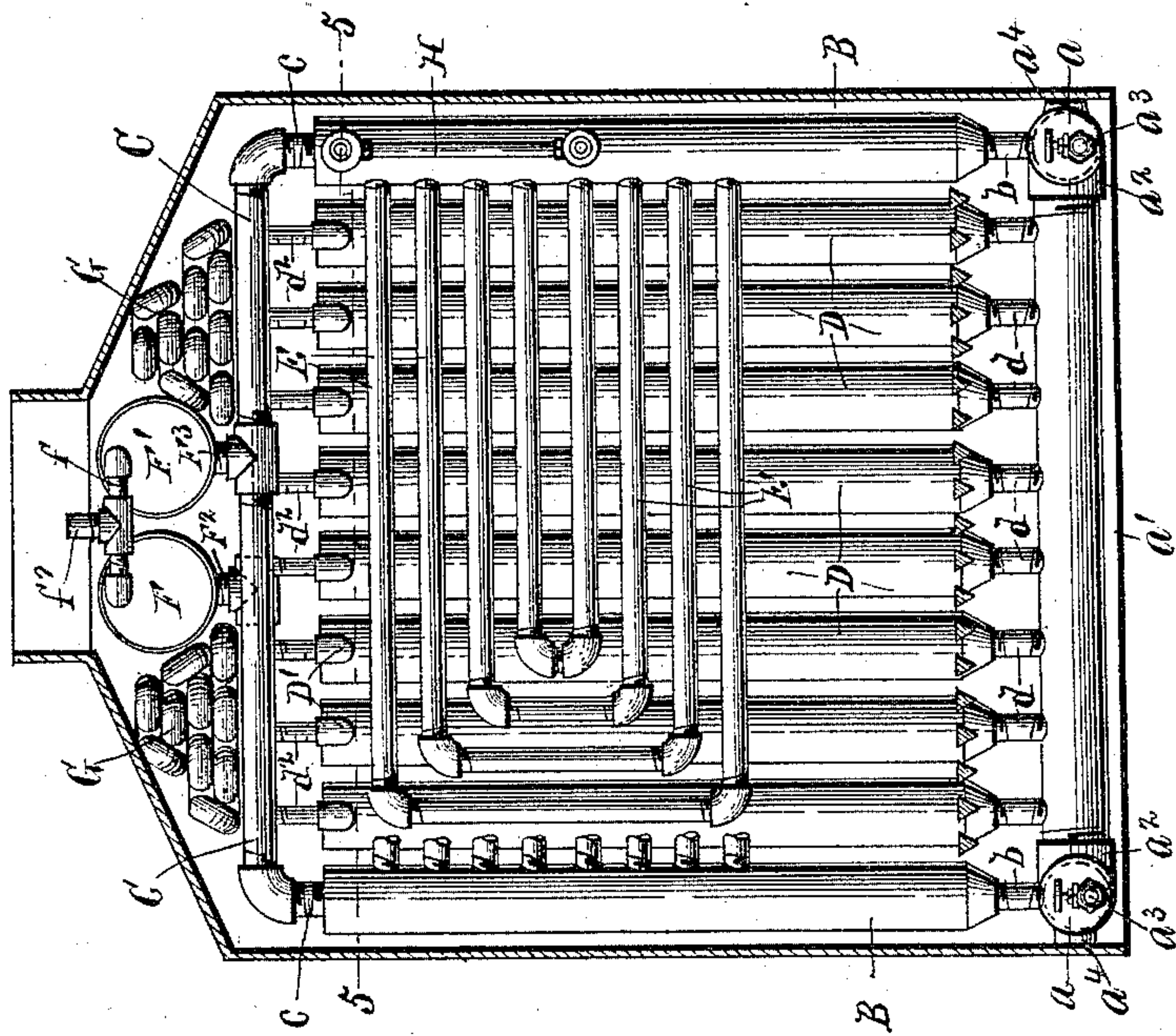
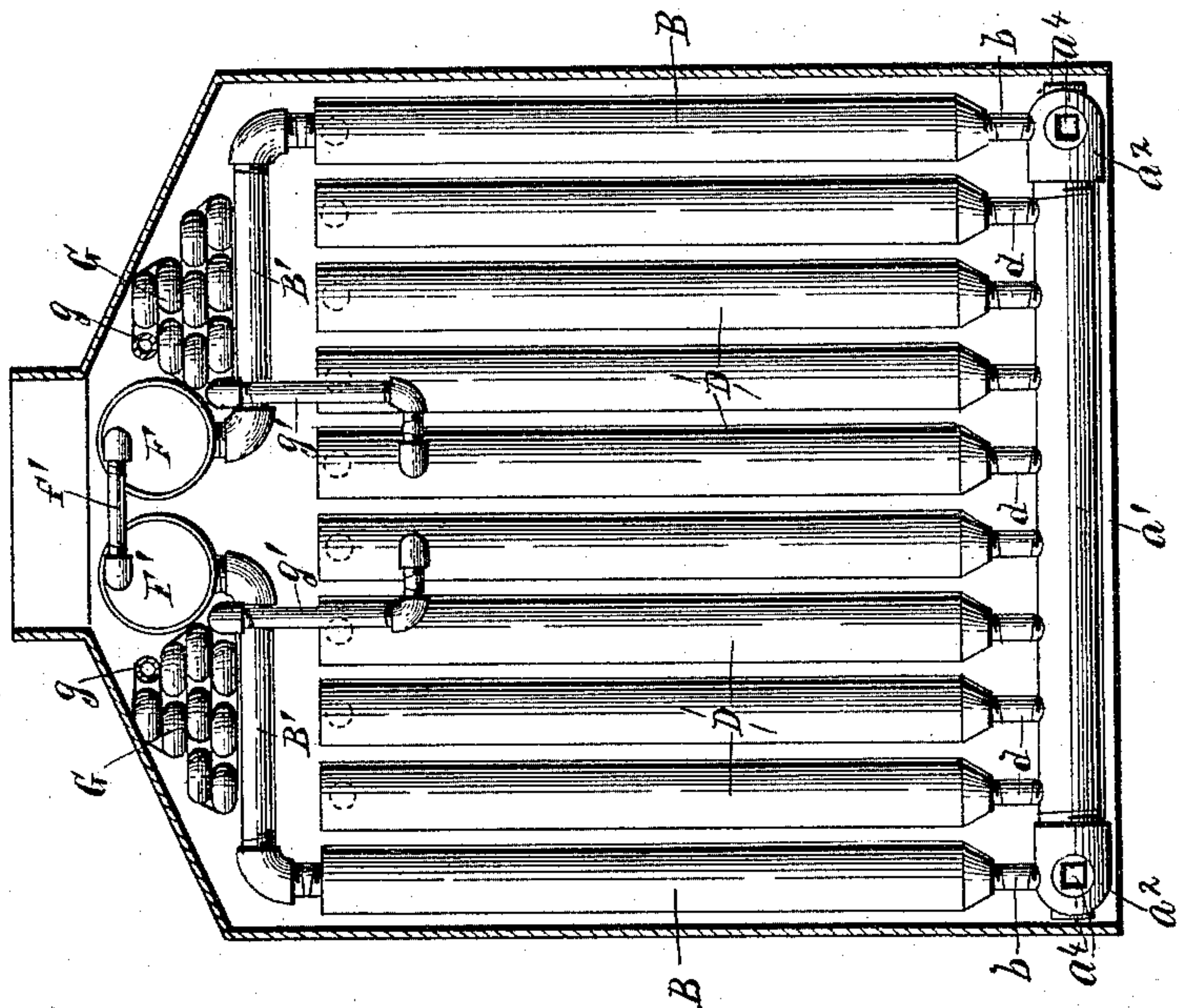
(No Model.)

3 Sheets—Sheet 1.

H. HYDE.
STEAM GENERATOR.

No. 533,172.

Patented Jan. 29, 1895.



WITNESSES:

C. Schoeneck,
H. E. Chase

INVENTOR

Hampton Hyde

BY

Wey, Wilkinson & Parsons

ATTORNEYS.

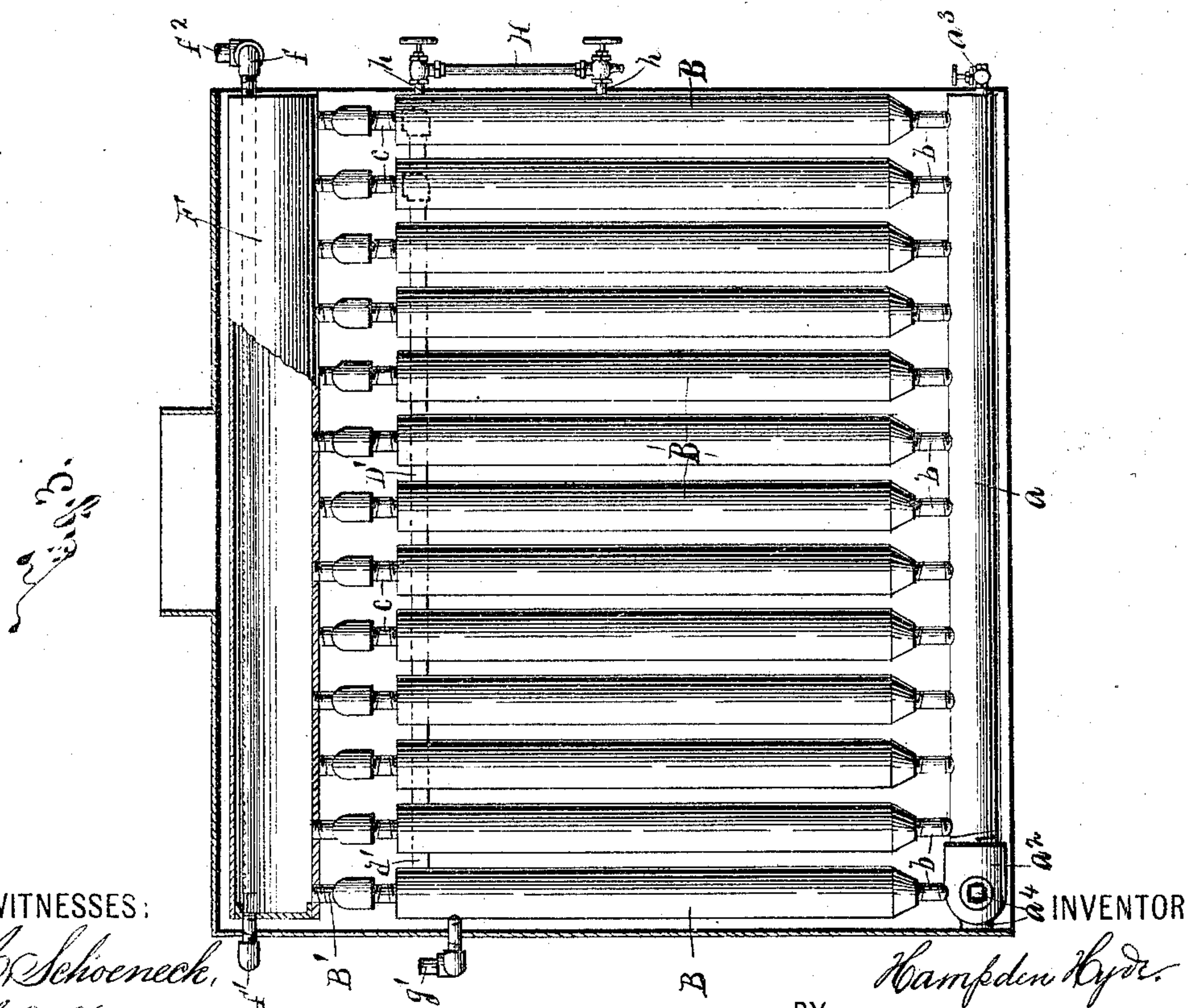
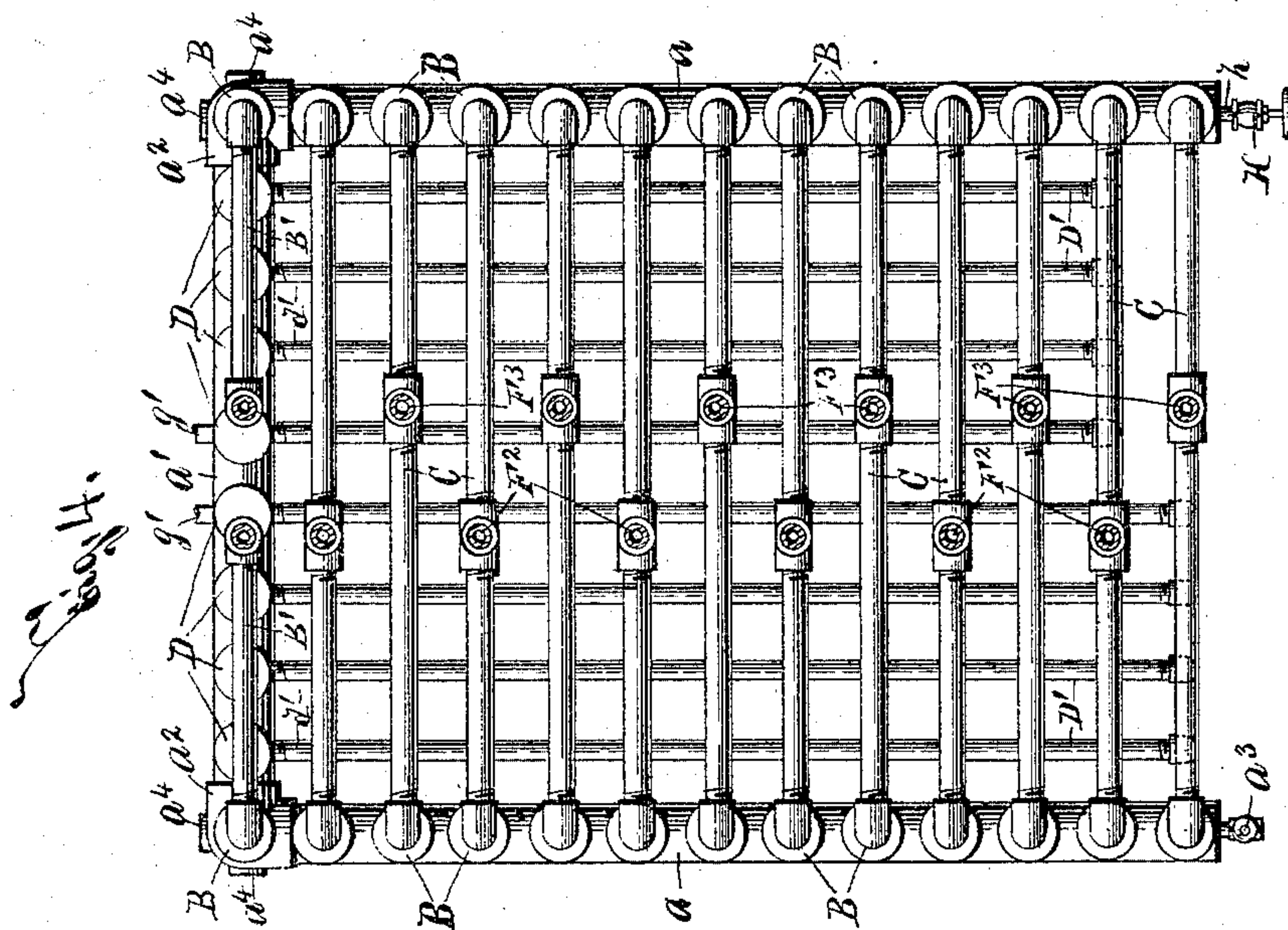
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H. HYDE.
STEAM GENERATOR.

No. 533,172.

Patented Jan. 29, 1895.



WITNESSES:

B. Schoeneck,
H. E. Chase,

INVENTOR

BY

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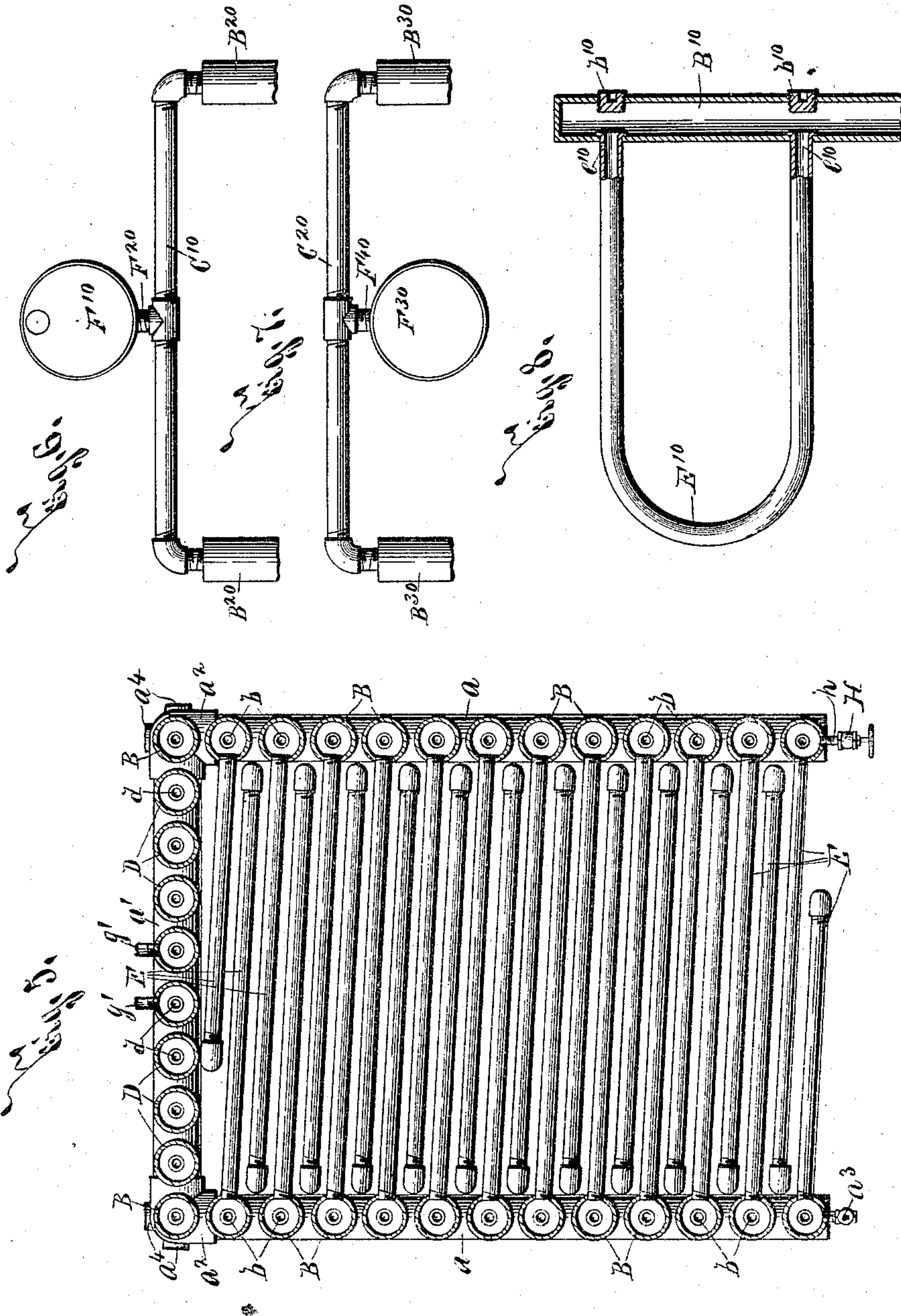
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3 Sheets—Sheet 3.

H. HYDE.
STEAM GENERATOR.

No. 533,172.

Patented Jan. 29, 1895.



WITNESSES:

C. Schoeneck,
H. C. Chase

INVENTOR

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UNITED STATES PATENT OFFICE.

HAMPDEN HYDE, OF ROCHESTER, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 533,172, dated January 29, 1895.

Application filed November 1, 1893. Serial No. 489,730. (No model.)

To all whom it may concern:

Be it known that I, HAMPDEN HYDE, of Rochester, in the county of Monroe, in the State of New York, have invented new and useful Improvements in Steam-Generators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in steam generators, and has for its object the production of a durable, simple, and efficient device, which is readily constructed and repaired without the exercise of great skill or the use of special fittings, possesses a great amount of heating surface and water capacity, is composed of parts securely tied together and capable of a maximum degree of flexibility for permitting expansion and contraction, and is so constructed as to effect a positive circulation of the water, supply a maximum amount of dry steam and produce a practical and effective drainage of the water from the steam drum or chamber, even when the generator is caused to assume an abnormal position; and to this end it consists, essentially, in a water containing base, substantially upright heads arranged at the opposite sides of the generator, and having their lower ends connected to the base, connecting pipes of less diameter than said heads having their opposite ends secured to the upper ends of the heads, similar upright heads arranged at one end of the generator and having their lower ends connected to the base, and a steam drum connected to the central portions of said connecting pipes.

The invention furthermore consists in the detail construction and arrangement of the parts, all as hereinafter more particularly described and pointed out in the claims.

In describing this invention, reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a front end elevation of my improved generator, the outer casing being shown in section and the greater portions of the heating pipes projecting from the front upright head at one side of the generator being broken away. Fig. 2 is a rear end elevation of my generator, the outer casing being

shown in section. Fig. 3 is a side elevation of the parts as shown at Figs. 1 and 2, the outer casing being shown in section, a portion of one of the steam drums being broken away and the feed water heater being removed. Fig. 4 is a top plan view of my improved generator, the outer casing, the steam drums, and the feed water heater being removed. Fig. 5 is a horizontal sectional view, taken on line 5—5, Fig. 1. Fig. 6 is an end elevation of the upper ends of a pair of opposite upright heads, the connecting pipe between said heads, and a single steam drum arranged above and connected to said pipe. Fig. 7 is an elevation of the upper extremities of opposite upright heads, the connecting pipe for said heads, and a steam drum arranged beneath and connected to said pipe, and Fig. 8 is a modified construction of heating pipe secured to one of the heads of my invention and consisting of a bent tube having its opposite ends expanded into said heads.

The lower frame or water-containing base of my generator is composed of side pipes $a-a$ and an end or cross pipe a' between the rear ends of the side pipes $a-a$, and elbows $a^2 a^2$ interposed between the pipes $a-a-a'$. The free or front ends of the side pipes $a a$ are provided with blow off valves $a^3 a^3$, and the elbows $a^2 a^2$ are formed with removable plugs a^4 .

$B B$ are substantially upright heads arranged above the side pipes $a a$ and the elbows $a^2 a^2$, and formed with contracted or conically shaped lower ends having their inner sides inclining downwardly toward each other for preventing the accumulation of sediment therein, and $b b$ are nipples connecting the lower ends of the heads $B B$ to the side pipes $a a$ and the elbows $a^2 a^2$. The water line of the generator is beneath the top ends of the heads B , and the opposite heads, with the exception of the two rear side heads, are connected together by cross pipes C having down-turned ends $c c$ opening preferably from the upper ends of these heads.

$D D$ are substantially upright heads similar to the heads $B B$ arranged above the cross pipe a' , and formed with contracted or conically shaped lower ends connected by nipples d to said cross pipe. These heads $D D$ are illustrated as of substantially the same cross

sectional area as the heads B for increasing the water capacity of the generator, and it is evident that said heads may be formed of greater diameter than the side heads, or of oval cross section for further increasing the water capacity of the generator.

The heads D at one side of the rear end of the generator are connected to the front cross pipe C by pipes D' arranged beneath the pipes C and extending in a plane substantially perpendicular to said heads and having their rear ends d' opening from the upper extremities of the heads and their front ends provided with upturned extremities d^2 opening into the under side of the front cross pipe C. The heads D at the opposite side of the rear end of the generator are connected to the cross pipe C directly at the rear of the front cross pipe C by similar connecting pipes D' having their rear ends d' opening from the upper ends of said heads and their front ends formed with upturned extremities d^2 opening into the lower side of said pipe C.

If desired the pipes D' may open from the top face of the heads D, and may discharge directly into the steam drums presently described.

The described construction of frame is particularly practical, durable, and effective, since the side heads B B and the rear heads D are firmly secured together by the cross pipes C and the connecting pipes D', and are also able to yield perceptibly to accommodate the expansion and contraction of the generator. Moreover, a perfect equilibrium is established between the heads at the opposite sides of the generator and between the heads at the rear end of the generator and the front connecting pipes, and, as is evident to one skilled in the art, any of the heads may be readily withdrawn for permitting repair or substitution.

E E represent heating pipes arranged beneath the longitudinal connecting pipes D' and projecting transversely across the generator from the inner sides of the side heads B B, and, as preferably constructed, these heating pipes are U shaped, and are arranged one within the other for forming a number of short paths across the fire and affording a great amount of heating surface. As clearly seen at Fig. 5 the heating pipes projecting from one of the heads lap with the heating pipes of the next adjacent heads on the opposite side of the generator, and extend almost to the plane of the inner faces of said opposite heads.

It is evident that different forms of heating pipes may be used in connection with my generator, and at Fig. 8 I have shown a modified construction of heating pipe consisting of a U shaped tube E^{10} having its opposite ends e^{10} e^{10} flanged to the inner side of the head B^{10} , the outer face of which is provided with plugs b^{10} b^{10} .

F F' are steam drums arranged above the pipes D' and having their front, and, if de-

sired, their opposite extremities connected together by cross pipes $f f'$, the front cross pipe f being provided with a steam discharge pipe f^2 .

The drum F is connected to the central portions of alternate pipes C by upright nipples F^2 opening from its under face, and the drum F' is connected to the central portions of pipes C alternating with the pipes connected to the drum F by means of upright nipples F^3 similar to the nipples F^2 opening from the under face of said drum F'.

The steam drums F F' connected, as described, to the central portions of the steam pipes C opening from the upper ends of the heads at opposite sides of the generator, are extremely effective, since they receive steam from opposite sides of the generator, and are practically and effectively drained of any water that may be present therein from any of the usual causes, owing to the opening of the connecting nipples from the lower walls of said drums. Moreover, the pipes C form a firm support for the drums F F' and connect the same to the generator with a maximum degree of flexibility, since said pipes C are free to expand or contract throughout their entire length, and, when said expansion or contraction takes place, merely raise or lower the drums which are perfectly free to move up or down. This means of connecting the steam drums requires but a minimum amount of openings in the walls thereof, as each drum is connected to but half of the pipes, although each pipe discharges into one of the drums. Any steam produced in the rear heads D is conveyed by the pipes D' to the front two cross pipes C C, and thence into the steam drums F F', and any steam produced in the two rear side heads B B is conveyed to the steam drums F F' by pipes B' having downturned extremities opening from the upper ends of said rear side heads and upturned extremities opening into the lower walls of said steam drums, as clearly seen at Fig. 2.

It is evident that a single steam drum may be used instead of two arranged side by side, and at Fig. 6 I have illustrated a single steam drum F^{10} arranged above and connected by a nipple F^{20} to the central portion of a cross pipe C^{10} having downturned extremities connected to the upper ends of heads B^{20} B^{20} .

At Fig. 7 I have illustrated a steam drum F^{30} arranged beneath a cross pipe C^{20} and connected thereto by a nipple F^{40} , and have shown opposite heads B^{30} as connected to the downturned ends of the cross pipe C^{20} .

G G represent feed water coils arranged above the pipes C on opposite sides of the drums F F' and provided with inlet ends $g g$ suitably connected to an inlet pipe not shown, and provided with depending outlet ends $g' g'$ discharging into the upper ends of the two middle rear heads D. This peculiar connection of the feed water to the heads of the generator aids the circulation therein, and the

pipes C form a strong and adequate support for the feed water coils.

H is a water gage having its opposite extremities connected by nipples *h h* directly to one of the heads B for informing the attendant of the level of the water.

The operation of my invention will be readily perceived from the foregoing description and upon reference to the drawings, and it will be particularly noted that the same is readily constructed and repaired without the exercise of great skill or the use of special fittings, possesses a great amount of heating surface and water capacity, is composed of parts securely tied together and capable of a maximum degree of flexibility for permitting expansion and contraction, and is so constructed as to effect a positive circulation of the water, supply a maximum amount of dry steam, and produce a practical and effective drainage of the water from the steam drum or chamber, even when the generator is caused to assume an abnormal position. It will be evident, however, that the detailed construction and arrangement of the same may be considerably varied without departing from the spirit of my invention; hence I do not herein specifically limit myself thereto.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base, and having their lower ends connected to the base, heating pipes projecting from the inner faces of the heads, connecting pipes above the heating pipes having their opposite ends connected to opposite heads, heads at one end of the generator having their lower ends connected to the water containing base, and connecting pipes interposed between said heating and connecting pipes and having corresponding ends opening from the latter end heads and their opposite ends discharging into one of said connecting pipes, substantially as and for the purpose specified.

2. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base and having their lower ends connected to the base, heating pipes projecting from the inner faces of the heads, connecting pipes above the heating pipes having their opposite ends connected to opposite heads, a steam drum above said connecting pipes, upright connections between the steam drum and said connecting pipes, heads at one end of the generator having their lower ends connected to the water containing base, and a second series of connecting pipes interposed between the heating pipes and the former connecting pipes and having corresponding ends opening from the latter end heads and their opposite ends discharging into one of the former connecting pipes, substantially as and for the purpose specified.

3. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base and having their lower ends connected to the base, heating pipes projecting from the inner faces of the heads, connecting pipes above the heating pipes having their opposite ends connected to opposite heads, a pair of steam drums arranged above the intermediate portions of the connecting pipes, a series of upright connections between one of the steam drums and alternate connecting pipes, a second series of upright connections between the other steam drum and the remaining connecting pipes, substantially upright heads at one end of the generator having their lower ends connected to the water containing base, and connecting pipes interposed between said heating and connecting pipes and having corresponding ends opening from the latter end heads and their opposite ends discharging into one of said connecting pipes, substantially as and for the purpose specified.

4. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base and having their lower ends connected to the base, connecting pipes having opposite ends secured to opposite heads, steam drums connected to the central portions of said connecting pipes, one drum being connected to alternate pipes and the other drum to pipes alternating with the former pipes, substantially upright heads at one end of the generator having their lower ends connected to said base, connecting pipes between the latter heads at one side of said end of the generator and the corresponding portion of one of the connecting pipes between the side heads, and connecting pipes between the latter heads at the opposite side of said end of the generator and the corresponding portion of another of the connecting pipes between the side heads, substantially as and for the purpose set forth.

5. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base, and having their lower ends connected to the base, heating pipes projecting from the inner faces of the heads, connecting pipes above the heating pipes having their opposite ends connected to opposite heads, feed water coils supported upon said connecting pipes, heads at one end of the generator having their lower ends connected to the water containing base, and connecting pipes interposed between the heating pipes and the former connecting pipes and having corresponding ends opening from the latter end heads and their opposite ends discharging into one of the former connecting pipes, substantially as and for the purpose described.

6. In a steam generator, the combination of a water containing base, substantially upright heads arranged at opposite sides of the base

and having their lower ends connected to the
base, connecting pipes having their opposite
ends secured to opposite heads, steam drums
connected to the central portions of said con-
5 necting pipes, one drum being connected to
alternate pipes and the other drum to pipes
alternating with the former pipes, feed water
coils arranged on opposite sides of the steam
drums and supported upon said connecting
10 pipes, substantially upright heads at one end
of the generator having their lower ends con-
nected to said base, connecting pipes between
the latter heads at one side of said end of the
generator and the corresponding portion of
15 one of the connecting pipes between the side

heads, and connecting pipes between the lat-
ter heads at the opposite side of said end of
the generator and the corresponding portion
of another of the connecting pipes between
the side heads, substantially as and for the 20
purpose set forth.

In testimony whereof I have hereunto
signed my name, in the presence of two attest-
ing witnesses, at Rochester, in the county of
Monroe, in the State of New York, this 23d 25
day of October, 1893.

HAMPDEN HYDE.

Witnesses:

M. BAXTER,

K. H. THEOBALD.