

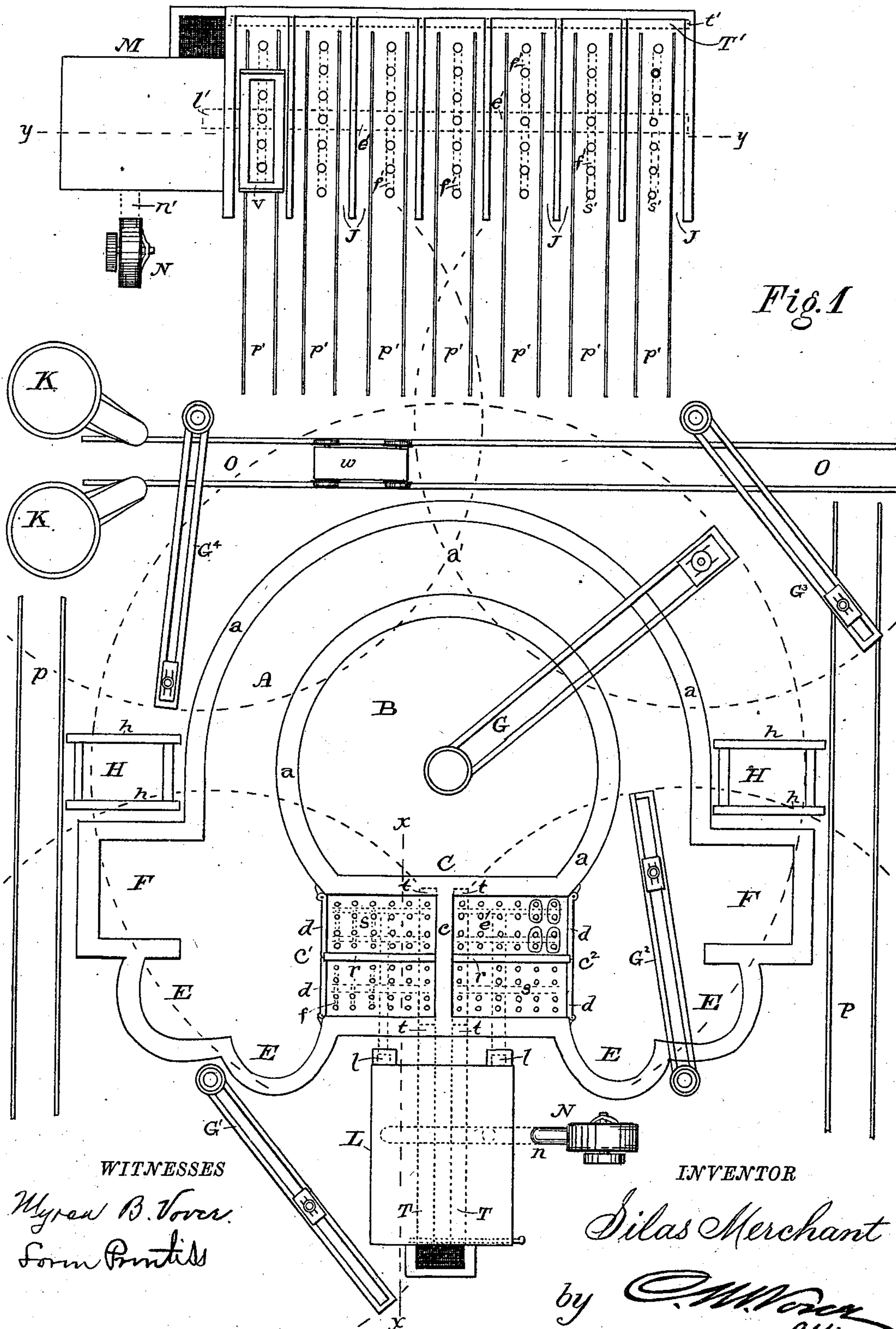
(No Model.)

2 Sheets—Sheet 1.

S. MERCHANT.
FOUNDRY PLANT.

No. 516,397.

Patented Mar. 13, 1894.



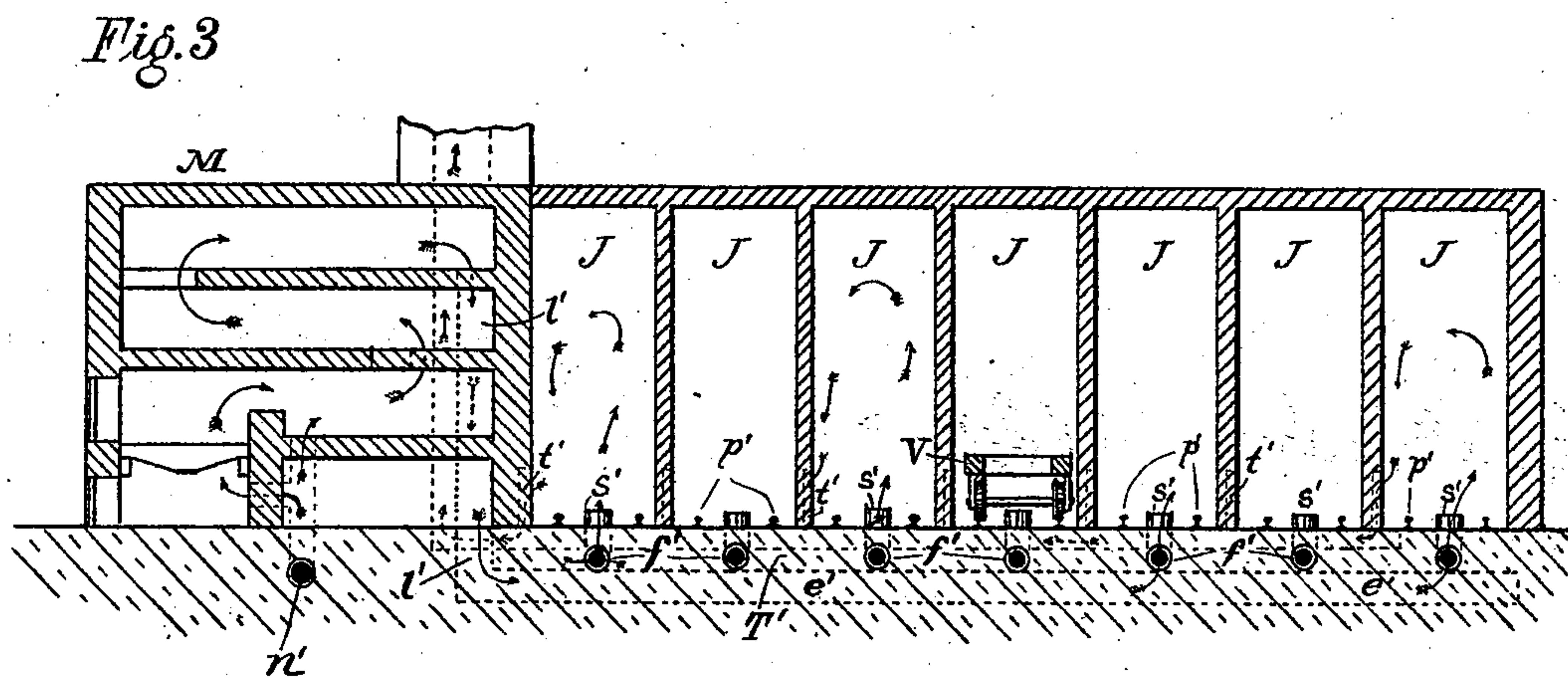
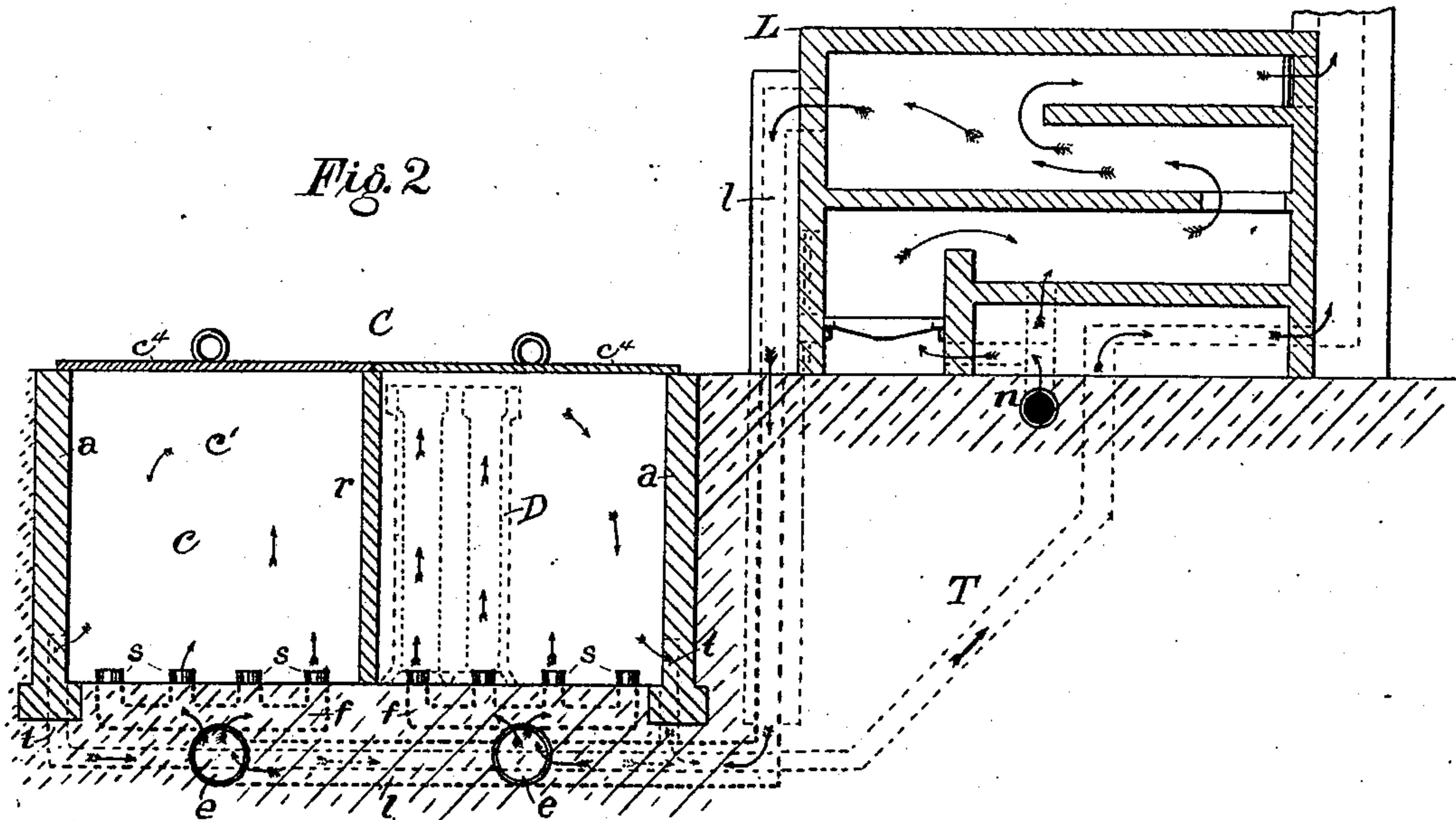
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WITNESSES.

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UNITED STATES PATENT OFFICE.

SILAS MERCHANT, OF CLEVELAND, OHIO.

FOUNDRY PLANT.

SPECIFICATION forming part of Letters Patent No. 516,397, dated March 13, 1894.

Application filed June 15, 1893. Serial No. 477,638. (No model.)

To all whom it may concern:

Be it known that I, SILAS MERCHANT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Foundry Plants; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in foundry plants for casting pipes, columns, and heavy castings; its object is to economize time, labor and apparatus, and thereby to reduce the cost of the castings produced; and it consists in the novel construction, arrangement and combination of apparatus and structures hereinafter described and pointed out in the claims.

In the drawings Figure 1 is a plan view of a plant suitable for casting pipe, constructed and arranged according to my invention, omitting the covers of the ovens. Fig. 2 is a vertical section through the mold-drying ovens and furnace, taken on the line $x-x$ of Fig. 1. Fig. 3 is a vertical section, in a central line, through the furnace M and the core-ovens, as indicated by the line $y-y$ on Fig. 1.

A represents the casting pit, with its sides supported by walls $a a$, and nearly encircling the central elevation B, technically known as "the island." At one side of the island B is located the mold-drying oven C, which occupies the space between the island and the ground outside the pit, and thus divides the pit A into two working sides or parts, each extending from the oven around to the mid-line of the pit, marked a' , at the opposite side of the island. By preference I construct the oven C with a wall or partition c through the center of the oven from the island to the outer ground, thus dividing the oven into two sides or divisions $c' c^2$, each of which opens by doors $d d$ into one side of the casting pit, but the wall c is merely a convenience and not at all essential. At the end adjoining the oven the casting pit on each side is widened or enlarged to form the molding pits E E and the flask pits F F, each of course, of a size and shape to suit the work to be done and to afford ample room for the men to work.

G is a crane erected upon the center of the

island and having a sweep sufficient to reach across the casting pit, the molding pits, the oven, and the space H where the flasks are "shaken out" after being poured and cooled.

$G' G^2$ are auxiliary cranes, preferably, but not necessarily, smaller than G, erected near the molding pits on each side and having a sweep sufficient to reach across the oven C to its middle wall or partition and across the pits E and F on their respective sides.

$G^3 G^4$ are cranes outside the casting pit and about diametrically opposite the cranes $G' G^2$ respectively, each having a sweep sufficient to reach across the casting pit and to the core-ovens J J. The sweep of the various cranes is shown by the dotted circles from each.

K K are cupola furnaces for melting the metal.

L is a furnace for supplying the hot-blasts used to dry the molds.

M is a furnace for supplying hot-blasts to the core-ovens J J, in place of which a flue from the furnace L could be conducted to the core-ovens and the one furnace made to supply all the ovens, thereby dispensing with the furnace M. Blowers N N, or other suitable mechanism for forcing air, are employed to force air through the furnaces and drying ovens, as hereinafter described.

O is a track extending from the cupola furnaces past the casting pit or pits, within the sweep of crane G.

$p p$ are tracks extending from the outer side of the spaces H where the flasks are shaken-out to any desired point to which it is desired to convey the pipes or other castings; p' are tracks running into the core ovens.

V is a core-truck.

The divisions $c' c^2$ of the mold-drying oven are designed to be operated each in connection with one side of the casting pit, and to dry a set of flasks on each side alternately in each division of the oven, for which purpose it is convenient to provide a removable partition r in each, which, when in place, divides each division of the oven into two compartments. Each division of the oven is provided with hot-blast inlets or nozzles $s s$, which enter through the bottom of the oven and are so arranged and spaced that when the flasks are set in place in the oven the opening of the mold will register correctly with the hot-blast

inlets, which preferably reach to or slightly within the opening of the mold, as seen in Fig. 2, in which a flask D with its molds is shown in dotted lines. Two of the flasks are shown in place over the hot blast inlets in Fig. 1. Passages *ll* lead from the furnace L to a main or mains *e* under the oven C, from which main branch pipes *ff* lead to the nozzles *ss*. The core-ovens J J have a similar arrangement of inlet passages *l'* from the furnace M, a main *e'* underneath the ovens, and branch pipes *f'* therefrom to the hot blast inlets or nozzles *s'* rising through the floor of the oven. The tracks *p'* leading into the core-ovens are provided with skeleton trucks V, on which the cores to be dried are supported in racks so adjusted that when the trucks are run into place in the ovens the cores will be directly over the hot blast inlets *s'* and will receive the blast therefrom directly upon their surface. Exit passages *tt'* are arranged at the lower part of the side walls of the ovens, and lead down into passages T T' beneath the ovens, which passages conduct the moisture-laden air from the molds and cores to the furnace stack, although if preferred it may be conducted to any more convenient point of discharge. Each compartment of each division of the oven C has two rows or gangs of the inlet nozzles *ss* and is thus adapted to dry two rows of flasks at once.

In the drawings each compartment is shown as adapted to receive and dry twelve flasks at once, which is an ample provision for a very large foundry, but any desired number may be employed.

The delivery pipe *n* from the air-forcing apparatus N enters the furnace, preferably at the bottom, and the air forced in passes through the furnace, carrying with it the combustion products, and thereby becoming highly heated, and, passing through the passages *ll* and mains *ee'*, emerges from the nozzles *s* directly into the cavity of the mold and upon the inner surface thereof, and from the nozzles *s'* directly upon the surface of the cores. In Fig. 2 the arrows show the course of the hot blast from the furnace into and through the molds and back to the furnace, where the moist air enters the stack. The air-blast from the blower may either be conducted underneath the grate or into any of the flues of the furnace, as indicated in Fig. 2. As the blast will seek the easiest and freest escape, valves or dampers (not shown in the drawings) are provided at such points as may be needed to direct the blast to any desired portion of the system of air conduits, in the manner familiar to everybody. Such dampers are provided in the mains *e* and *e'* at proper points to enable the blast to be turned on or cut off from any one or more of the compartments of the ovens, as may be required.

By the means above described the molds and cores are dried very quickly by the di-

rect impact thereon of the currents of hot air and combustion products, whereas the manner of drying cores and molds hitherto employed, which has been simply that of the circulation of air in the oven caused by the draft of a fire burning in the oven, or in an adjoining chamber, has required as the shortest time from seven to twelve or more hours. The uniform practice has been to put the flasks in the oven during the day as they are rammed and to dry them all night, removing and pouring them the next day, whereas I am enabled by the arrangement described to dry the largest flask in an hour, and of course to dry all the flasks in the oven simultaneously.

I do not herein claim the method or process of drying the molds and cores above described, as it forms the subject matter of my pending application, filed January 18, 1893, Serial No. 458,844.

The method of operation is as follows: As fast as the flasks are rammed in the molding pits E E they are lifted by the cranes G' G² and swung into their appropriate oven *c'* or *c²*, being placed, let it be supposed for illustration, in that compartment of each division of the oven which is nearest the island B, and which may be designated as the inner compartment, in one of which four flasks are shown in place in Fig. 1. Each flask when set in place in the oven is so adjusted that its opening or openings will register with one or more of the hot blast inlets *ss*, as seen in Figs. 1 and 2. As soon as one compartment of an oven is filled with flasks its door *d* is closed, the usual covers *c⁴* are put on, as seen in Fig. 2, and the blast of hot air is turned on. While the flasks in this compartment of the oven are drying the molding goes on without interruption, and the flasks as fast as rammed are swung into the other or outer compartment of each division of the oven, nearest to the furnace. Before this compartment is filled the flasks in the first or inner compartment will have completely dried, and, the cones *c⁴* being removed from that compartment, the flasks therein, which may be designated as the first set, are swung by the crane G and set in place in the casting pit A, being placed on the inner side thereof next the island, beginning about the mid-line at *a'*, and proceeding around on each side toward the oven. As fast as the flasks are set into place in the pit A by the crane G the cores, which have in the meantime been dried in the ovens J, are run out upon their trucks on the tracks *p'* as fast as needed, and are swung by the cranes G³ G⁴ and set into the flasks, after which the core-heads are set, and the flasks are ready to be poured. The ladle from which the flasks are to be poured is placed on a truck *w* which runs on the track O, and is filled from one of the cupolas K and run within reach of the crane G, by which it is swung from the truck and the flasks are

poured. In case the crane G is busy at the time, the pouring can be done by the cranes $G^3 G^4$. By the time this has been done the flasks in the second or outer compartments of the ovens $c' c^2$ are dry, and they are in like manner swung by the crane G and set in the casting pit, being placed around the outer side thereof, beginning at about the mid-line a' and proceeding around each way toward the flask pits F. While the cores are being set in this second set of flasks by the cranes $G^3 G^4$, the first set of flasks, which have in the meantime cooled sufficiently, are lifted by the crane G and swung over the skid-ways at H H, where they are opened and "shaken out," the pipes landing on the ways $h h$, and the empty flasks are deposited in the flask pits F F, from which they are lifted by cranes $G' G^2$ and set into the pits E E as fast as needed by the molders, who proceed at once to set the patterns and to fill and ram the flasks, which, as fast as they are got ready, are again swung into the oven for drying. Before the first compartment of the ovens is again filled, the second set of flasks around the outer side of the casting pit will have been poured and cooled, and some will have been removed and shaken out; while this is going on the flasks in the inner compartment will have dried, and they are swung out and set around the inner side of the casting pit, as before. While the cores are being set in these flasks, the core-heads placed, and the flasks made ready for pouring, the rest of the flasks around the outer side of the pit are swung out, shaken out, and the empty flasks set in the pits F F, and the outer compartments of the oven will have been partly filled again, and thus the work goes on continuously, and may be carried on day and night without interruption by running "double turn" with two sets of men. The pipes received upon the ways at H H are rolled onto trucks running on the tracks $p p$ and conveyed away as usual. The disposition of the pipes after their removal from the flasks does not differ from that in common practice, and forms no part of the present invention. It is however contemplated by me to arrange two or more of the pits A, constructed, arranged and equipped in all respects as shown and described, side by side along the track O and supplied by the same cupolas K K.

By the arrangement shown I am enabled, with not more than two thirds as many flasks, to cast two and one half times as many pipes in each turn of ten hours as has ever before been cast in twenty-four hours. I have shown the oven C arranged for drying twelve flasks in each compartment of each division c' and c^2 , so that each division of the oven has a capacity of twenty-four flasks, and is intended to supply one side of the casting pit, but by omitting the partition c , or making it removable, like the partition r , a larger number of flasks can be worked on one side than on the

other, in case circumstances should render it desirable.

Although I prefer to construct the furnace so that the air forced in passes directly through the fire or into the combustion products, as shown, I do not limit myself thereto, as any furnace which supplies a large quantity of highly heated air will answer, whether the air be mixed with combustion products or not.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with the casting pit A of the mold drying oven C opening into both ends of the pit, the flask pit and molding pits adjoining each end of the casting pit, a furnace and air forcing device for supplying hot-blasts to the drying oven, a crane having a sweep including all the pits and the oven, and auxiliary cranes of shorter sweep ranged around the pits, substantially as described.

2. The combination of the substantially semi-circular casting pit, the mold drying oven extending between the ends thereof and opening into both ends of the pit, a furnace and air forcing device for supplying hot-blasts to the drying oven, the molding pits and flask pit adjoining the ends of the casting pit on each side of the oven, a central crane having a sweep including the oven and all the pits, and auxiliary cranes of shorter sweep located around the outer border of the pits, substantially as described.

3. The combination of the substantially semi-circular casting pit, the mold-drying oven extending between the ends thereof and divided into two sections each of which opens into one end of the casting pit, a furnace and air forcing device for supplying hot-blasts to the drying oven, molding pits adjoining each section of the oven, a central crane having a sweep including all the pits and oven, and auxiliary cranes of shorter sweep located around the outer border of the pits, substantially as described.

4. The combination of the substantially semi-circular casting pit, the mold-drying oven extending between the ends thereof and having hot-blast nozzles extending up through its floor in position to register with the openings of the molds, a furnace and passages extending therefrom to said nozzles, an air forcing device communicating with said furnace for supplying the blast to said nozzles, and a crane having a sweep including the entire pit and oven, substantially as described.

5. The combination of the substantially semicircular casting pit, the mold drying oven extending between the ends thereof, a central crane having a sweep including the entire pit and oven, an outer crane having a sweep including the casting part of the pit, a core-drying oven withing the sweep of the outer crane, and a furnace and air forcing device for supplying a hot-blast to each of the ovens, substantially as described.

6. The combination of the substantially
semicircular casting pit, a mold-drying oven
extending between the ends thereof and hav-
ing hot-blast inlets corresponding to the open-
5 ings of the molds to be dried, a furnace and
air forcing device for supplying the hot-blast
to the oven, and a centrally located crane
having a sweep which includes the whole of

the pit and the oven, substantially as de-
scribed. 10

In testimony whereof I hereto affix my sig-
nature in presence of two witnesses.

SILAS MERCHANT.

Witnesses:

WM. G. TAYLOR,
LOREN PRENTISS.