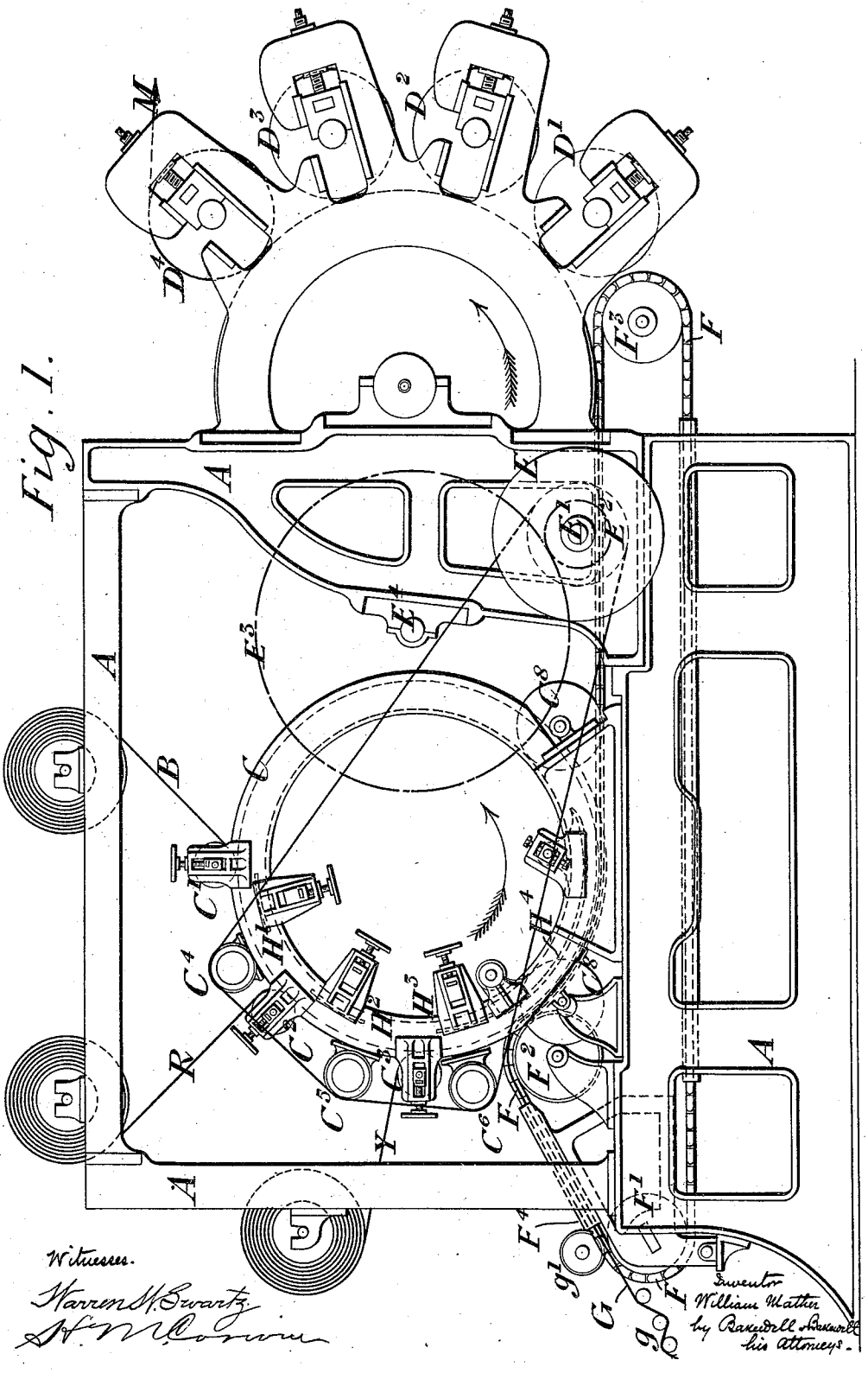
(No Model.) 6 Sheets—Sheet 1.

W. MATHER.

MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

No. 555,650. Patented Mar. 3, 1896.

Fig. 1.



Witnesses.
Warren M. Swartz.
H. M. Corwin

Inventor
William Mather
by Baxendell & Baxendell
his attorneys.

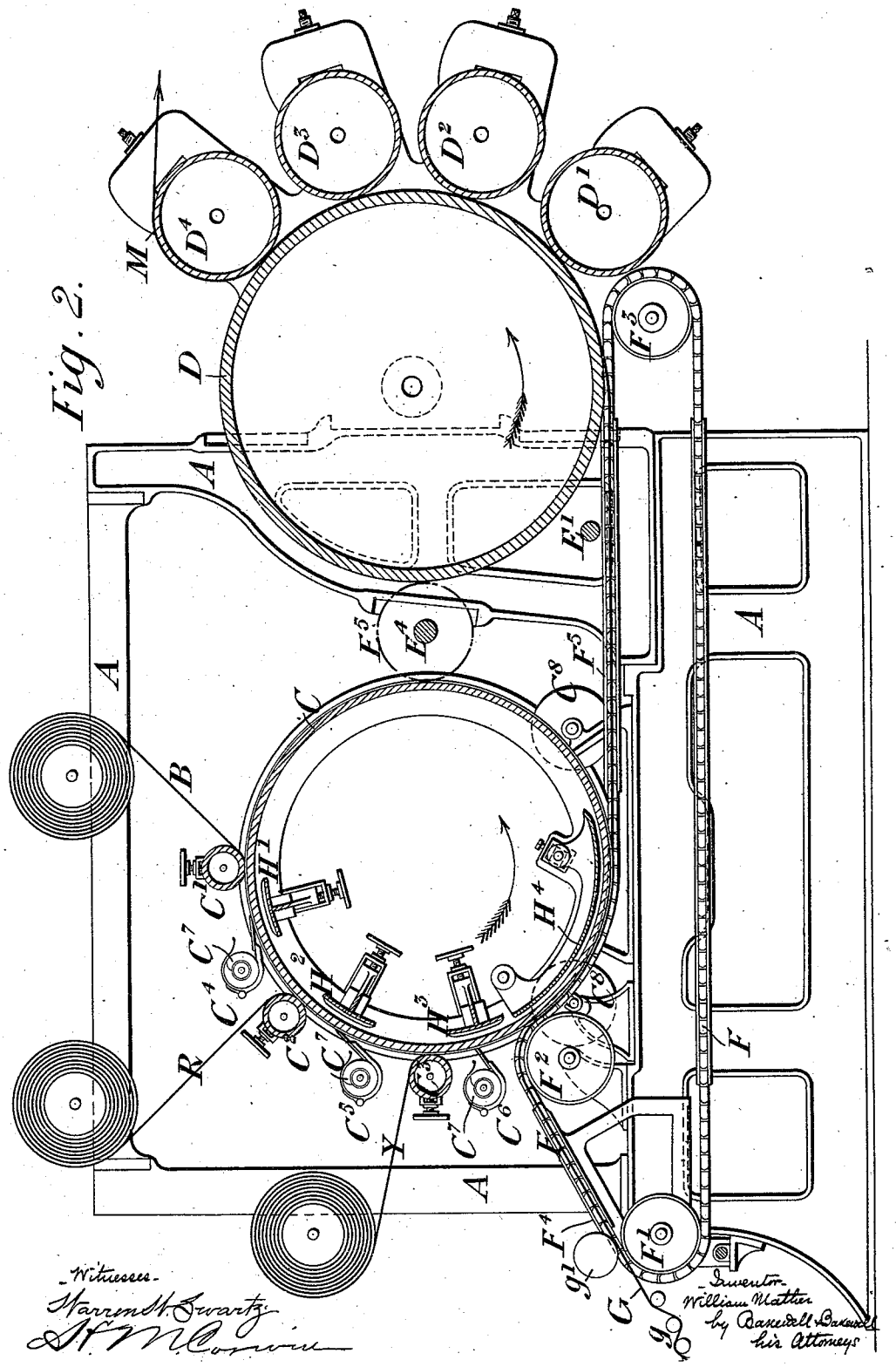
(No Model.) 6 Sheets—Sheet 2.

W. MATHER.

MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

No. 555,650. Patented Mar. 3, 1896.

Fig. 2.



Witnesses:
Warren H. Swartz
A. F. McCormick

Inventor:
William Mather
by Bakewell & Bakewell
his Attorneys

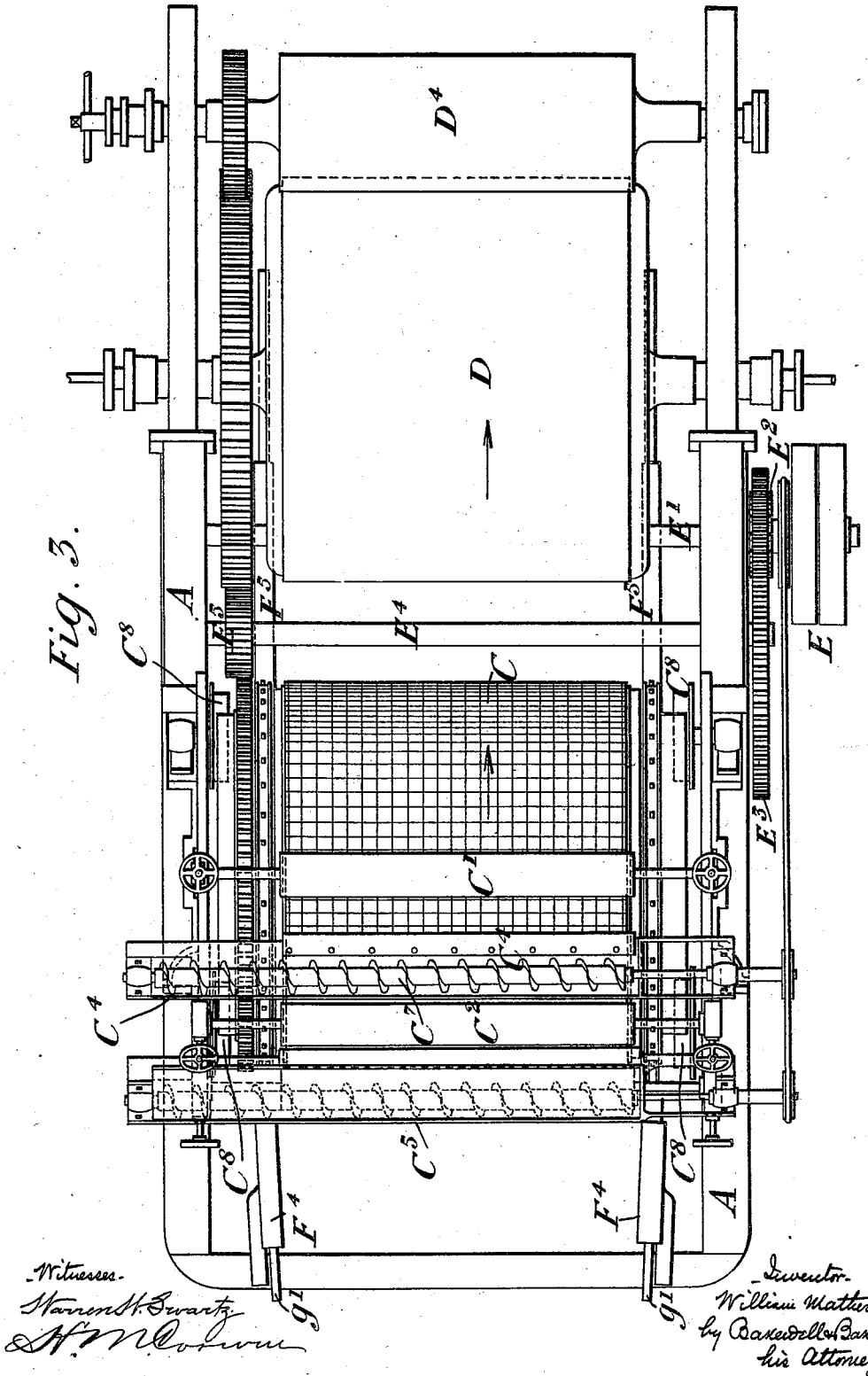
(No Model.) 6 Sheets—Sheet 3.

W. MATHER.

MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

No. 555,650. Patented Mar. 3, 1896.

Fig. 3.



Witnesses.
Warren H. Swartz
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(No Model.) 6 Sheets—Sheet 4.

W. MATHER.

MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

No. 555,650. Patented Mar. 3, 1896.

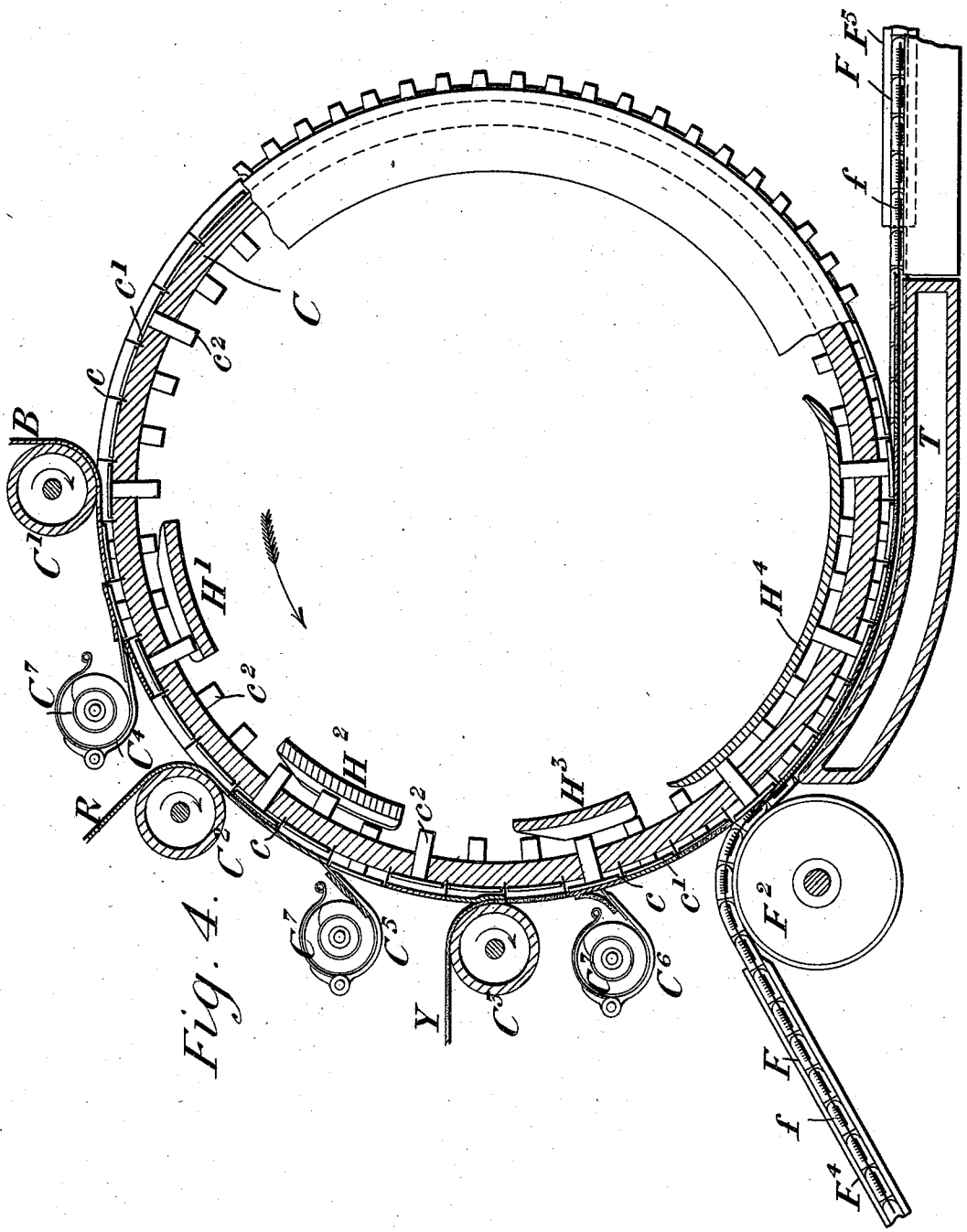

Fig. 4.

Witnesses-
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H. F. McGowan

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his Attorneys.

(No Model.) 6 Sheets—Sheet 5.

W. MATHER.

MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

No. 555,650. Patented Mar. 3, 1896.

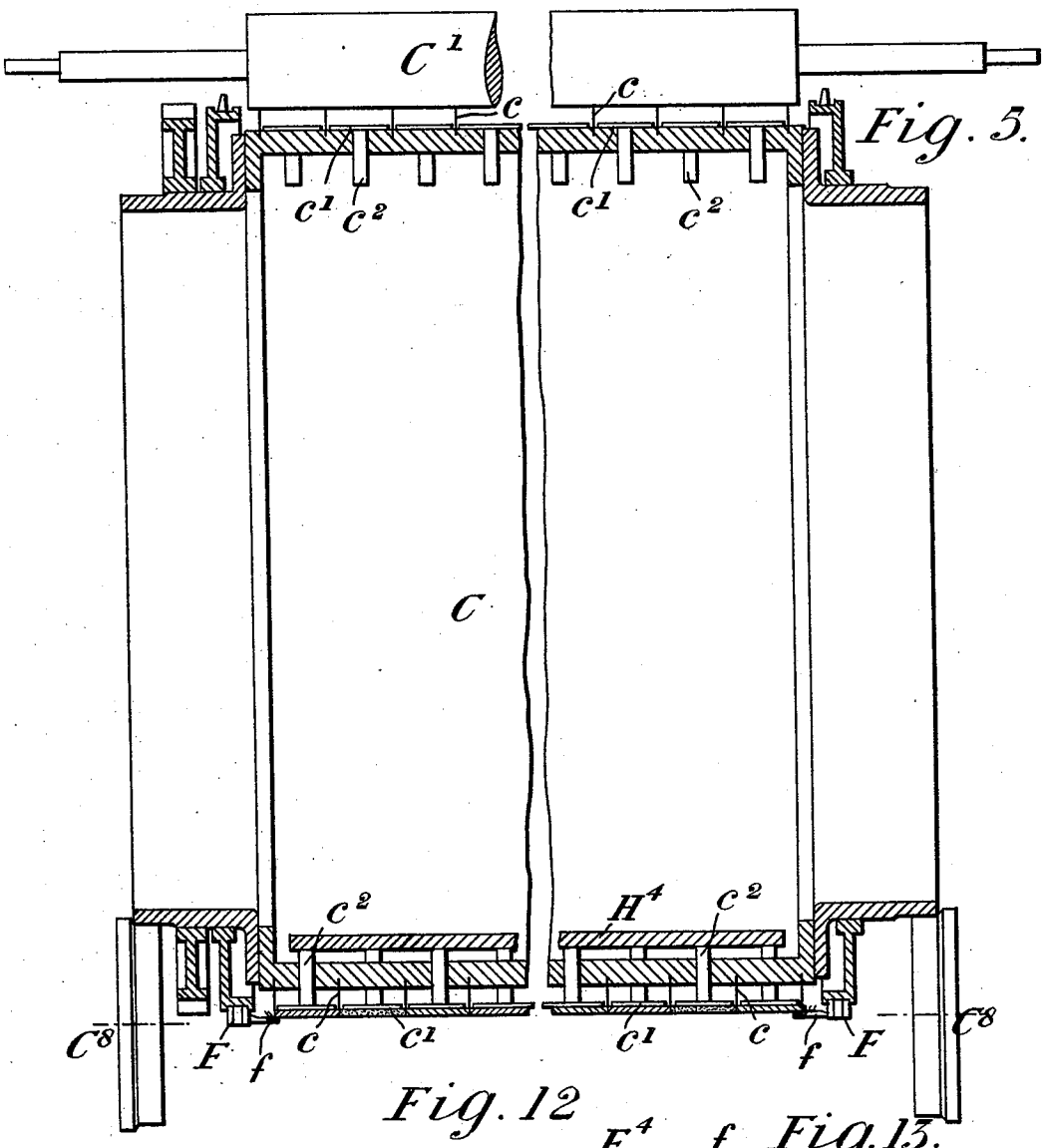


Fig. 5.

Fig. 12

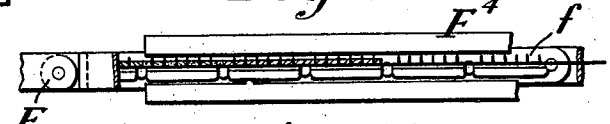


Fig. 14.

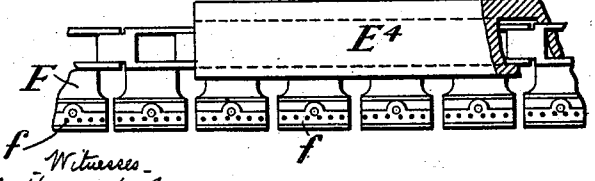
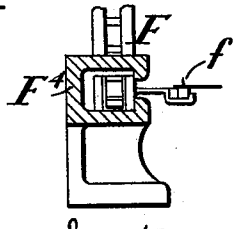


Fig. 13.



Witnesses.
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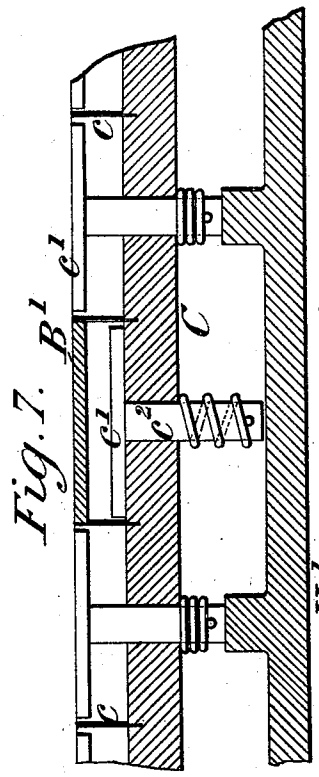
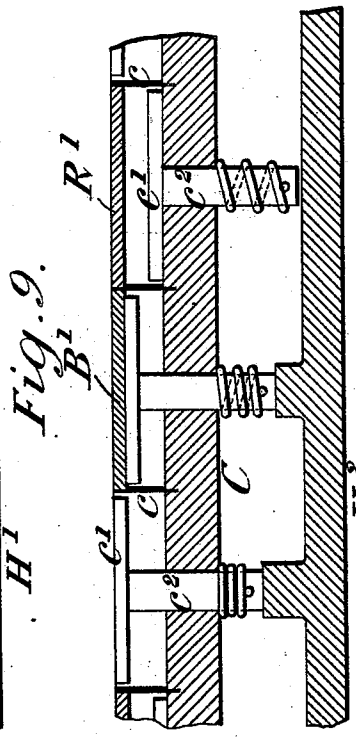
(No Model.) 6 Sheets—Sheet 6.

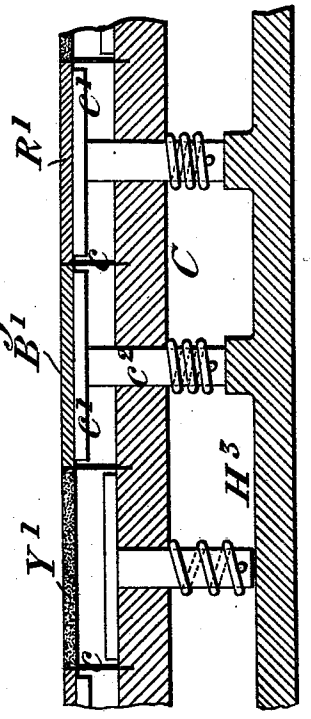
W. MATHER.

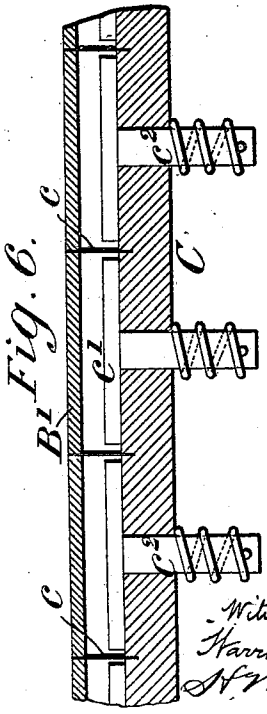
MACHINE FOR MANUFACTURING MOSAIC FLOOR CLOTH.

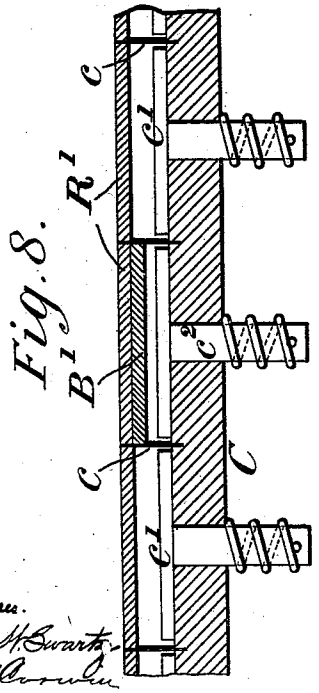
No. 555,650. Patented Mar. 3, 1896.

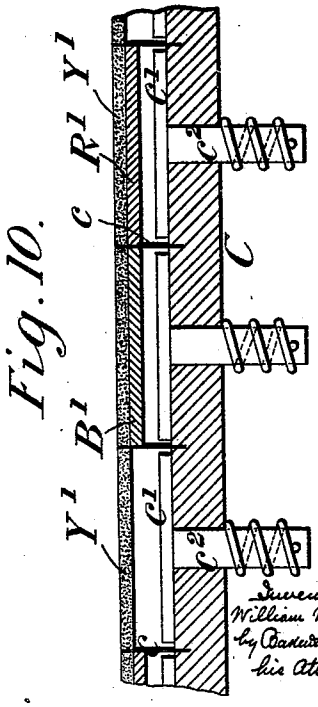












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UNITED STATES PATENT OFFICE.

WILLIAM MATHER, OF MANCHESTER, ENGLAND.

MACHINE FOR MANUFACTURING MOSAIC FLOOR-CLOTH.

SPECIFICATION forming part of Letters Patent No. 555,650, dated March 3, 1896.

Application filed August 20, 1895. Serial No. 559,900. (No model.) Patented in England October 6, 1894, No. 19,009; in Belgium August 12, 1895, No. 116,959; in France August 12, 1895, No. 249,566; in Italy September 14, 1895, LXXVII, 344; in New South Wales September 14, 1895, No. 6,059; in Austria October 13, 1895, No. 45/3,793; in Hungary December 3, 1895, No. 4,719, and in India December 6, 1895, No. 277.

To all whom it may concern:

Be it known that I, WILLIAM MATHER, a citizen of England, residing at Salford Iron Works, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Machines for the Manufacture of Mosaic Floor-Cloth, (for which patents have been obtained in Great Britain, dated October 6, 1894, No. 19,009; in Belgium, dated August 12, 1895, No. 116,959; in France, dated August 12, 1895, No. 249,566; in Italy, dated September 14, 1895, LXXVII, 344; in Austria, dated October 13, 1895, No. 45/3,793; in Hungary, dated December 3, 1895, No. 4,719; in India, dated November 23 and December 6, 1895, No. 277, and in New South Wales, dated September 14, 1895, No. 6,059,) of which the following is a specification.

My invention relates to the manufacture of mosaic floor-cloth by apparatus of the following description:

I provide a cutter-carrier, preferably in the form of a revolving hollow cylinder or pattern-cutting drum, the outer periphery of which is divided by thin slightly-projecting blades into spaces forming the complete pattern of the floor-cloth to be made, and when floor-cloths are to be made of various patterns I provide a separate cutter carrier or drum for each pattern.

In each of the pattern-spaces of the drum there is a metal plate which forms a movable bottom to the space and has a stem projecting through a hole in the periphery of the drum some distance into its interior. Through the drum there pass certain stationary bars, the ends of which are fixed to the framing on each side of the machine. The faces of these bars which are presented to the interior periphery of the drum are curved and inclined, so as to act as cams, pushing outward some of the stems which project through the periphery of the drum as these are carried over them when the drum revolves. Three, four, or more sheets of floor-cloth material in a plastic condition, differently colored, are passed between the periphery of the drum and pressing-rollers which bear on the drum. The first sheet of material, which, for instance, may be blue, is thus pressed into all the pattern-spaces of the drum, forcing down their movable bottoms. As the stems of these pass over the first of the cam-bars, some of them are pushed outward, and the pieces of blue material occupying the spaces to which these stems belong are thus extruded and caught by a scraping edge and removed to be again worked up into sheet. In like manner the next sheet of material—say red—is forced into all the pattern-spaces, those that are occupied by blue material as well as those from which the blue had been extruded, and as the stems pass over a second cam-bar all those pieces of red material which are not to appear in the pattern are extruded. Thus as the drum revolves, all its pattern-spaces become finally filled with pieces of material or tesseræ of different colors, constituting the mosaic floor-cloth, all these tesseræ being still separated by the thin partitions. After passing the last of the pressing-rollers the drum presents on its surface the complete pattern of floor-cloth, consisting of the variously-colored tesseræ which fill its pattern-spaces, all in proper relative positions and requiring no setting or adjustment. A backing of suitable fabric is brought to bear on the periphery of the drum and to travel along with it over part of its circumference to a point where it is led off tangentially to a pressing-cylinder over a flat table, which may be heated.

While the backing is held against the pattern-drum a cam-bar acts on all the stems, extruding all the tesseræ from the pattern-spaces and pressing them on the backing fabric. This fabric having been slightly stretched in width by tentering apparatus, shrinks in width when released, and thus crowds all the tesseræ on it close together. It then passes onward, carrying these between the pressing-cylinder and several rollers, all of which may be heated. All the tesseræ are thus compacted together and made to cohere upon the backing, so as to constitute a mosaic floor-cloth, which is conducted away from the pressing-cylinder to be operated on by suitable drying and seasoning appliances.

Such being generally the process of manufacture according to my invention, I shall describe apparatus whereby the process is carried out in practice, referring to the accompanying drawings.

Figure 1 is a side elevation of a machine according to my invention for manufacturing mosaic floor-cloth. Fig. 2 is a longitudinal section of the machine. Fig. 3 is a plan. Figs. 4 and 5 are sections, on planes at right angles to each other, of the pattern-cutting drum. Figs. 6 to 11 inclusive are sections of part of the periphery of the pattern-cutting drum, showing the reception and extrusion of tesseræ in the pattern-spaces. Fig. 12 is a front view of part of one of the chains and of its inclined guide. Fig. 13 is a transverse section of the guide. Fig. 14 is a plan of part of the chain.

The machine shown in the drawings is adapted for mosaic in three colors—say blue, red and yellow—but it is to be understood that by suitable alterations and additions a machine of this kind could be adapted for dealing with a greater number of colors.

A is the framing, of form suitable for supporting bearings for the shafts and other parts of the machine.

C is the pattern-cutting drum and D the pressing-cylinder, which are caused to revolve in the direction of the arrows with equal surface speed, being driven from a prime mover by gear such as is shown in the drawings or by other suitable gear. The driving-gear represented consits of fast and loose driving-pulleys E on a shaft E′, a pinion E^2, on which gears with a wheel E^3 on a shaft E^4, a pinion E^5 on the latter gearing with teeth on the end of the drum C and of the cylinder D. The drum C has its periphery divided by a number of cutting-blades *c* into spaces which may be of various forms and numbers, according to the desired pattern of the floor-cloth. In each of these spaces is freely fitted a metal plate *c′* having a stem c^2 passing through a hole in the periphery of the drum C and provided with a spring to draw the plate inward.

Outside the drum C are mounted in adjustable bearings three pressing-rollers C′ C^2 C^3 free to revolve. Between these pressing-rollers and the periphery of the drum C pass sheets of the colored floor-cloth material—one, B, say, blue, one, R, red, and one, Y, yellow. These sheets may come direct from suitable pug and rolling mills working in connection with the mosaic machine or may come, as shown, from rolls of the sheet made elsewhere and mounted on the framing. A little beyond each of the pressing-rollers are provided troughs C^4 C^5 C^6, each terminating with a blade which bears obliquely against the periphery of the drum C and with a suitable worm conveyer C^7, which may be driven by a band from the prime shaft, as shown in Fig. 1.

Within the pattern-cutting drum C extending from side to side of the machine are adjustably fixed three bars H′ H^2 H^3 nearly facing respectively the troughs C^4, C^5 and C^6. There is also fixed in the lower part of the drum a bar H^4. Each of the bars H′ H^2 H^3 has on it projecting cam-ribs sloped off at each end. These ribs are arranged to coincide in position with some of the stems c^2 of the plates *c′*, which have to be pressed outward for extension of the tesseræ. The lowest bar H^4 has no ribs upon it, but operates as an extension-cam to press outward all the stems c^2. One end of H^4 is pivoted and the other end can be adjusted by a screw so as to bear more or less downward upon the stems c^2, which pass under it.

The ends of the pattern-cutting drum C rest on rollers C^8 and are provided with teeth which gear with the links of two pitch-chains. These chains pass over guide-wheels F′ F^2 F^3, and at one part of their course pass through guides F^4, which widen out from the wheels F′ toward the wheels F^2, which are set farther apart on their shaft than the wheels F′. The chains F, after passing the pattern-cutting drum C, again pass through guides F^5, causing them to approach each other until they reach the wheels F^3, which are the same distance apart as the wheels F′. Each link of the chains F has on it a set of sharp pins *f*, which project upward from its side and are inclined a little toward the chain.

The pressing-cylinder D has several pressing-rollers D′ D^2 D^3 D^4 bearing against it with pressure that can be adjusted by screws applied to their bearings. The cylinder D and the rollers D′ D^2 D^3 D^4 are hollow and they have tubular trunnions with stuffing-boxes for admission of steam or hot or cold water, according as it may be desired to heat or cool the floor-cloth which passes between the drum D and the pressing-rollers. From a roll situated where convenient a sheet G of fabric intended to constitute the backing of the floor-cloth passes over tightening-bars *g* and under a pair of brush-wheels *g′*, which are situated immediately above the inner sides of the chains F, which are armed with sharp pins *f*, as above mentioned, these wheels *g′* pressing the edges of the fabric G on the pins, by which these edges are firmly held.

The machine being supplied with the sheets B, R and Y of the plastic floor-cloth material and with the backing fabric G, and having suitable power applied to drive the fast pulley E, operates as follows: The sheet B in passing between C′ and C is entirely cut by the blades *c* into tesseræ, which enter all the pattern-spaces in C as they pass under C′, as shown in Fig. 6, where B′ indicates the tesseræ. As some of the stems c^2 pass over the cam-ribs of the bar H′, as shown in Fig. 7, the plates *c′* belonging to these stems are pushed outward, extruding all the tesseræ except those which are to form part of the pattern, that marked B′ in Fig. 7 indicating one of the retained tessera. In passing the blade at the edge of the trough C^4 the ex-

truded tesseræ are scraped off into the trough and are conveyed away to be worked up again into sheet. The sheet R in passing C^2 has tesseræ cut from it entering all the spaces of C, including those already occupied by pieces of the previous sheet B'. This condition is shown in Fig. 8, where R' indicates the tessera cut from the sheet R, one of them being shown above the previously-retained tesseræ B'. In passing over the bar H^2 its cam-ribs cause extrusion of all the R' tesseræ except those which are to form part of the pattern, as shown in Fig. 9, where B' and R' indicate the retained tesseræ. The extruded tesseræ are scraped off by the blade of C^5. The sheet Y in passing C^3 has tesseræ Y' cut from it entering all the spaces of C, including those already occupied by the B' and R' tesseræ, as shown in Fig. 10. In passing over the bar H^3 the tesseræ Y', which overlie B' and R', are extruded, leaving the spaces of C occupied each by a single tessera, as seen in Fig. 11. The tessera last extruded are scraped off by the blade of C^6. As the spaces of C, now charged each with its appropriate colored tesseræ and occupying the whole width of the pattern, pass over the cam-bar H^4 the whole of the stems c^2 are pushed outward, extruding all the tesseræ which are received and pressed upon the backing fabric G. This fabric having its edges attached to the chains F is stretched in width as the chains pass along the inclined guides F^4 and is in this stretched condition when the tesseræ are pressed upon it while it travels along a table T, which is made hollow, so that it can be heated by steam. As the backing travels onward, carrying the tesseræ, it gradually contracts, thus causing the tesseræ to approach closely to each other, and then as the whole, the backing with tesseræ on it, travels through between the cylinder D and the pressing-rollers D' D^2 D^3 D^4 the tesseræ are all compacted together caused to adhere to the backing and to cohere to one another, constituting a sheet M of mosaic which passes away to be dried and seasoned in the usual way.

From what has preceded it will be seen that all that part of the pattern-cutting drum which has passed the last of the scrapers has all its spaces filled with tesseræ of the various colors forming the pattern, all in their proper relative positions when they are extruded on the backing. There is consequently no adjusting of these tesseræ required; also, when a change of pattern is required the whole drum with its cam-bars can be removed, and a drum and set of cam-bars for another pattern can be substituted, the rest of the machine remaining unchanged.

Having thus described the nature of my invention and the best means I know for carrying the same into practical effect, I claim—

1. In a mosaic floor-cloth machine the combination of a pattern-cutting drum, three or more adjustable pressing-rollers, three or more bars with cam-ribs, three or more scraping-blades and conveyers, and a final ejector-cam, arranged and operating substantially as described.

2. The combination with a rotary pattern-cutting drum carrying cutters adapted to cut tesseræ from sheets, of means for feeding such sheets successively to the pattern-cutting drum, means for ejecting the undesired tesseræ, chains gearing with teeth on the pattern-cutting drum and having pins to hold a backing fabric, and wheels over which and inclined guides through which the chains pass; substantially as described.

3. The combination with the rotary pattern-cutting drum carrying cutters adapted to cut tesseræ from sheets, of means for feeding such sheets successively to the pattern-cutting drum, and means for ejecting the undesired tesseræ after the respective sheets are fed and cut; substantially as described.

4. The combination with the rotary pattern-cutting drum carrying cutters adapted to cut tesseræ from sheets, of means for feeding such sheets successively to the pattern-cutting drum, means for ejecting the undesired tesseræ after the respective sheets are fed and cut, pressing-rollers for the rotary pattern-cutting drum, spring-backed ejector-plates in the spaces of the pattern-cutting drum, pressing-rollers, cams for operating the ejector-plates, scraping-blades for removing the undesired tesseræ, and a final ejector-cam for operating the ejector-plates to eject all the tesseræ; substantially as described.

5. In a mosaic-cloth machine, the combination of a moving pattern-cutting drum provided with cutters spaced according to the pattern desired and adapted to cut tesseræ from sheets, means for feeding such sheets successively to the pattern-cutting drum, means for ejecting the undesired tesseræ after the respective sheets are fed and cut, and a final ejector for ejecting the remaining tesseræ; substantially as described.

6. In a mosaic-cloth machine, the combination of a moving pattern-cutting drum provided with cutters spaced according to the pattern desired and adapted to cut tesseræ from sheets, means for feeding such sheets successively to the pattern-cutting drum, a series of ejectors adapted to eject the undesired tesseræ after the respective sheets are fed and cut, a final ejector for ejecting the remaining tesseræ, and means for feeding a backing for the finally-ejected tesseræ; substantially as described.

7. In a mosaic-cloth machine, the combination of a moving pattern-cutting drum provided with cutters spaced according to the pattern desired and adapted to cut tesseræ from sheets, means for feeding such sheets successively to the pattern-cutting drum, a series of ejectors adapted to eject the undesired tesseræ after the respective sheets are fed and cut, a final ejector for ejecting the remaining tesseræ, means for feeding a backing for the finally-ejected tesseræ, and means

for pressing the tesseræ thereon; substantially as described.

8. In a mosaic-cloth machine, the combination of a moving pattern-cutting drum provided with cutters spaced according to the pattern desired and adapted to cut tesseræ from sheets, means for feeding such sheets successively to the pattern-cutting drum, a series of ejectors adapted to eject the undesired tesseræ after the respective sheets are fed and cut, a final ejector for ejecting the remaining tesseræ, means for feeding a backing for the finally-ejected tesseræ, and means for maintaining the backing in tension during the application of the tesseræ thereto; substantially as described.

9. In a mosaic-cloth machine, the combination of a moving pattern-cutting drum provided with cutters spaced according to the pattern desired and adapted to cut tesseræ from sheets, means for feeding such sheets successively to the pattern-cutting drum, a series of ejectors adapted to eject the undesired tesseræ after the respective sheets are fed and cut, a final ejector for ejecting the remaining tesseræ, means for feeding a backing for the finally-ejected tesseræ, means for maintaining the backing in tension during the application of the tesseræ thereto, and means for pressing the tesseræ upon the backing after the same has relaxed and contracted; substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of August, A. D. 1895.

WILLIAM MATHER.

Witnesses:
ALFD. WILLET,
FRED K. MILLS.