

(No Model.)

2 Sheets—Sheet 1.

J. B. McNAMAR.
MACHINE FOR MAKING PAPER.

No. 424,342.

Patented Mar. 25, 1890.

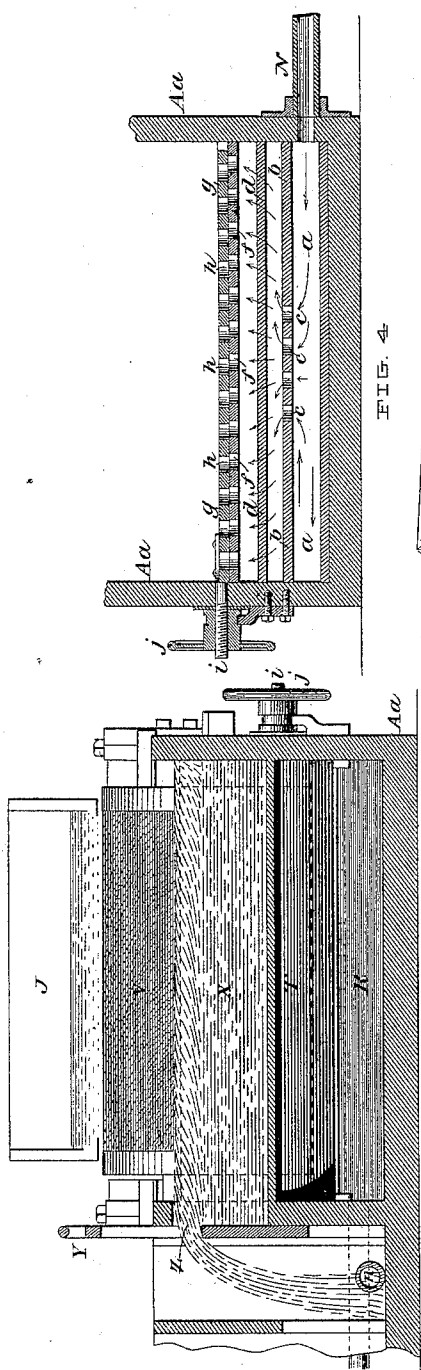


FIG. 3.

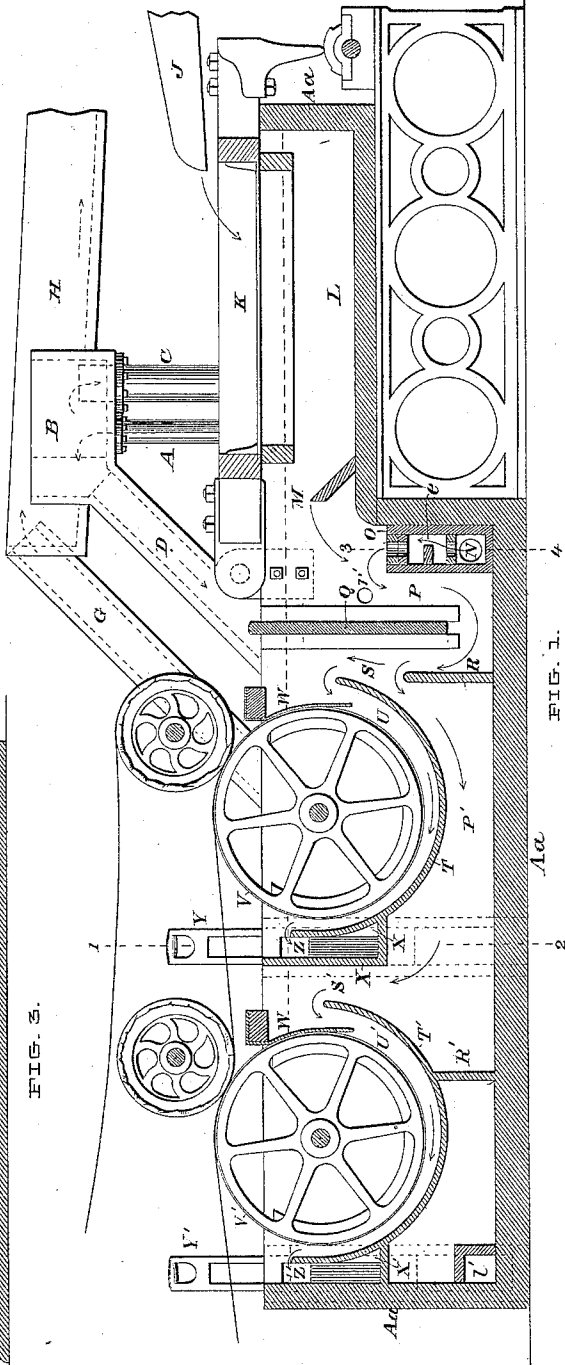


FIG. 1.

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BY *Franklin Scott*, ATTY.

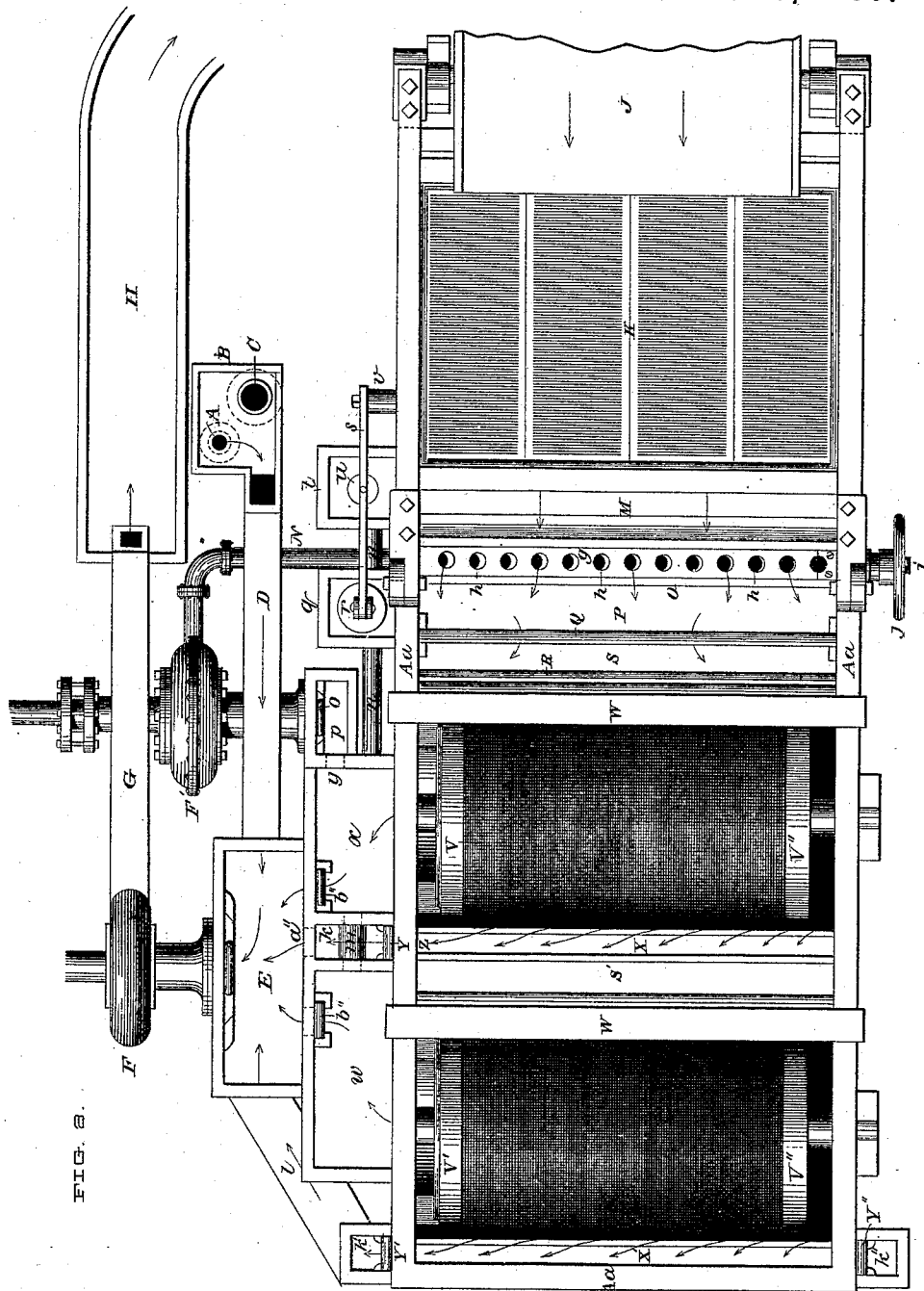
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JAMES B. McNAMAR, OF NORTH BENNINGTON, VERMONT.

MACHINE FOR MAKING PAPER.

SPECIFICATION forming part of Letters Patent No. 424,342, dated March 25, 1890.

Application filed October 14, 1889. Serial No. 326,984. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. McNAMAR, of the village of North Bennington, in the county of Bennington and State of Vermont, have made certain new and useful Improvements in Machines for Making Paper, of which the following description, taken in connection with the accompanying drawings, constitutes a specification.

The improvements which constitute the subject-matter of this patent relate to the construction of cylinder-vats in cylinder-machines for making paper, and to specific devices used in connection therewith for more perfectly and homogeneously mixing the pulp in the current just before and at the moment it is delivered to the molds, and to means for effecting a more perfect felting or interlacing of the fiber during its deposition on the surface of the mold.

The invention is fully disclosed in the drawings, wherein a vertical longitudinal section through the screen and cylinder-vats of a cylinder paper-machine is shown in elevation in Figure 1. Fig. 2 shows a plan of the machine. Fig. 3 is a vertical transverse section of the machine, taken on the line 1 2 of Fig. 1; and Fig. 4 is a vertical longitudinal section through the regulator, taken on the line 3 4 of Fig. 1. In Figs. 2 and 3 the couch-rolls are not shown.

The objects sought to be obtained by the use of these improvements are to deliver to each cylinder of a paper-machine in which more than one cylinder is employed a separate and independent current of pulp, to so mix and dilute the pulp that the highest attainable degree of homogeneity shall be obtained, and to so agitate and direct these currents that the fiber shall be laid and felted in the most promiscuous and homogeneous manner.

These improvements are shown as applied to a machine in which two cylinders are employed; but by an appropriate modification and adjustment of parts the same may be adapted to any number of cylinders. The cylinder-vat is shown at A a, and is equipped with two cylinders V and V'. The screen K is attached and is agitated in the usual way. Beneath the screen is the reservoir L, which receives the strained pulp from the screen.

A regulator O is placed in the bottom of the vat just in front of the dam M, over which the pulp passes in the form of a cascade, through which the water is forced that is used to dilute the pulp. Next in front of the regulator is the gate Q, which is vertically adjustable. Under this gate the whole body of pulp which supplies the cylinders passes. Just ahead of the gate, deflector R is placed, against which the current impinges in its passage to the cylinders and takes an upward turn. Here it rises in the channel-way S to the desired level, (indicated by the dotted line,) and a part of it flows over the top edge of the false bottom T and passes under the bottom of the cylinder-mold V, and thence the surplus or overflow passes over the back side of the bottom T into the trough X, and thence out through the outlet Z of the adjustable gate Y, Fig. 2, through the sluiceway k and aperture a'' to the receiving-reservoir E, whence it is carried by the fan-pump F through pipe G and trough H around to the apron J, and thence onto the screen K. The branch of the current not escaping through the channel U passes over the top of the deflector R, and thence under the false bottom T to the throatway S', where it flows over the top of the front edge of the second false bottom T' into the channel U', where it reaches the mold in precisely the same way as the first part did in passing through the channel U. Here the second sheet is formed as in ordinary machines. The overflow from this cylinder passes over the back edge of the false bottom into the trough X', out through the outlet Z', pipe l, Fig. 2, to the receiver E, and thence through the pump F, by the route before described, to the screen again.

As a means for setting up a transverse current in the pulp on the back side of the cylinder, in addition to the devices just described, the ends of the cylinders opposite to the discharge end of the troughs X and X' are closed, and the pulp which passes over the front edge of false bottoms T and T' can flow freely around the closed end and enter the troughs X and X'. By this means a positive current in the troughs across the vat and adjacent to the cylinder is produced, the action of which sets up an induced current in the channels

U and U', whereby the tendency to lay the fiber longitudinally on the surface of the cylinders is largely frustrated.

The pulp to supply the machine is forced from the stuff-chest through the pipe A into the box B. The surplus, if any, flows over the top of the escape-pipe C, and passes back to the stuff-chest. From the box B it descends to the reservoir E, whence it is taken up by the fan-pump F and forced through the tube G into the troughs H and J, which deliver it to the screen.

The pump F' is used to supply the regulator O with water, and is speeded to throw a forcible jet into the same. The structure and manner of working of this regulator can be deduced from an inspection of Fig. 4. It consists of a box or tube which extends across the whole width of the vat, as seen in Fig. 1, divided longitudinally into three chambers, one above the other. The pulp is injected through the pipe N into the bottom chamber *a*, whence it passes through the perforated partition *b* into the chamber next above. Here the pulp impinges against the deflector *d*, and is thrown against the back side of the box and passes through a longitudinal space between the edge of the deflector and the side of the box, as seen in Fig. 1. From the upper chamber it passes through the holes *f f f* in the top of the box, and the holes *h h h* in the sliding cover of the box out into the vat. This sliding cover I designate as an "equalizing-gate," and through the perforations therein water-jets are violently forced upwardly, which encounter the downpour of pulp from the dam M, and the collision of these two opposing currents effects a most complete mixture of the water with the pulp, so that it is in its most perfect condition to go to the cylinders.

To effect perfect lateral regulation of the current, so as to secure an even distribution of the pulp to both ends of the cylinders alike, the sliding cover of the regulator *g* has its holes *h h h* bored at a slightly greater or less distance apart than the holes in the top of the box beneath it, so that the two sets of holes are never in exact opposition. By this means of differentiation it becomes possible to throw a greater or less quantity of material to one or the other side of the machine, according as the holes at one or the other end of the regulator are fully opened. This can be effected by simply turning the hand-wheel *j*, the hub of which is a nut and runs on the screw-stem *i*, attached to the sliding cover *g* of the regulator.

The construction and arrangement of the gate Q, deflector R, and false bottom T operate to cause the pulp to be impelled toward and against the cylinder in a direction perpendicular to its surface while in a condition of general agitation, the effect of which is to lay the fiber in promiscuous directions at the moment of its first deposit. As it passes under and around the cylinder through the

channel U, it is in the most favorable condition possible on a cylinder-machine to deposit evenly on the surface of the mold; but as the pulp begins to rise on the back side of the cylinder an influence is brought to bear on the current whereby it is induced to take a transverse diagonal direction across the cylinder, which diagonal trend of the current has the effect of laying the fibers last adhering to the mold in a transverse direction, as shown on the surface of the cylinder in Fig. 3. The means employed to set up this induced current consist of the false bottoms T and T', troughs X and X', and overflow-gates Y and Y'. It will be observed that the gates Y and Y' are made with a long opening in their upper halves and are fitted to slide in vertical ways, while the troughs X and X' are open at their discharge ends from top to bottom, thus forming an opening as deep as the openings in the gates. When the gates Y and Y' are pulled up to their highest limit, the outlet to the troughs will be closed; but when the gates are shoved down, so that the bottom of the opening in the gate comes below the top of the opening in the end of the trough an aperture will be made, through which the surplus overflow from the cylinder can escape. By having a considerable depth of water or pulp at the bottom of the trough the superficial current set up moves off easily, and the tractile force which it exerts causes an induced current to manifest itself, the influence of which retroacts upon the body of pulp in the channels U and U'. This result is due to the establishment of a transverse current on the surface of the body of pulp in the discharge-troughs X and X', at a plane above the top edge of the back side of the false bottoms of the cylinders T and T'. If the gates Y and Y' be shoved down so that the surface of the discharge-current in the troughs falls below the top edge of the back of the false bottoms, thus leaving the overflow-pulp to pass from the channels U and U' in a cascade or waterfall over the back of the false bottom, the current will take a direction parallel with the axis of the machine, and the diagonally-transverse lay of the fiber in the sheet will be lost.

Where more than one cylinder is employed in a machine the gates Y and Y' may be arranged on alternately opposite sides of the machine, so that the surface currents in the troughs shall run in opposite directions. By such an arrangement the diagonal lay of the fiber on each successive cylinder will be transverse to that on the one immediately preceding it. In this way a most perfect interlacing of fiber in the sheet can be obtained. As a means for attaining such a result, I have shown in Fig. 2 a gate at both ends of the trough in rear of cylinder V'. This conductor *k''* discharges through the pipe *l'*, Fig. 1, into the pipe *l*. (Seen in Fig. 2.)

As the overflow of pulp from each cylinder varies in making different kinds of papers, it

is obvious that provision should be made for enlarging or diminishing the outlet at the gates without interfering with the maintenance of the proper level of the current in the troughs. This is accomplished by the peculiar construction of the gate-opening in relation to the opening from the trough. As before stated, when the gate is pulled up the outlet is closed, and in depressing it the first opening is made at the top of the outlet-opening instead of at the bottom, as the case would be with a gate of ordinary construction. By this arrangement the hole can be enlarged at the bottom to increase its capacity without disturbing the level of the current.

For the purpose of maintaining the proper level of the pulp in the vat, the reservoir *q*, Fig. 2, is provided, in which is a float *r* connected with lever *s* and waste-valve *u*. The reservoir *q* opens into the main vat by means of the aperture *r'*, Fig. 1, so that the pulp in the vat and float-reservoir at all times maintains the same level.

Each of the cylinders is provided with a blanket *W*, which extends across the whole length of the cylinder and hangs low enough to dip into the pulp a short distance. It drags on the surface of the cylinder for the purpose of breaking any bubbles or removing any adhering particles which may cling to the surface of the cylinder on its upper side after it emerges from the pulp, and also for the purpose of keeping back the froth on the front side of the cylinder.

From the foregoing it will be seen that by this system each cylinder is supplied with a separate and independent current of pulp, and that in its passage over the surface of the molds a transverse diagonal movement is imparted to it, and that such current may be diverted to either side of the machine, so that the fiber can be laid on different molds in opposite diagonal directions. In the machine illustrated, the diagonal fiber laid in the formation of the sheet on the first cylinder will come in the center of the finished sheet, while that laid in the formation of the sheet on the rear cylinder will come on the surface of the sheet.

I therefore claim as my invention and desire to secure by Letters Patent—

1. A regulator for controlling, equalizing, and distributing the supply of pulp to the cylinder-molds of a paper-making machine, consisting of a tube having an inlet-port for the admission of waste water or pulp and a series of outlet-ports for its escape, in combination with a gate adapted to slide over said tube, provided with ports similar in number and form to those of the tube, but differentially spaced, so that when the gate is adjusted to fully open the outlet-ports at one end of the tube the ports at the other end will be partially closed, substantially as described, and for the purposes set forth.

2. A regulator for regulating, controlling, equalizing, and distributing the supply of

pulp to the cylinder-molds of a paper-making machine, consisting of a tube having an inlet-port for the admission of waste water or pulp divided by a longitudinal perforated diaphragm and provided with a series of outlet-ports for the escape of the pulp, in combination with a gate adapted to slide over said tube provided with ports similar in number and form to those of the tube, but differentially spaced, so that when the gate is adjusted to fully open the outlet-ports at one end of the tube the ports at the other end will be partially closed, substantially as described, and for the purposes set forth.

3. A regulator for controlling, equalizing, and distributing the supply of pulp to the cylinder-molds of a paper-making machine, consisting of a chamber having an inlet-port for the admission of the pulp or waste water, a longitudinal perforated diaphragm located above said inlet-port, a longitudinal deflecting ledge or bar located above the perforated diaphragm and in the path of the current from the perforations therein, and a series of outlet-ports for the escape of the pulp, in combination with a gate adapted to slide over said chamber and provided with ports similar in number and form to those of the chamber, but differentially spaced, so that when the gate is adjusted to fully open the outlet-ports at one end of the chamber the ports at the other end will be partially closed, substantially as described, and for the purposes specified.

4. The combination, in a paper-making machine, of a reservoir immediately beneath the pulp-screen with a sliding current-equalizing gate for regulating either water or pulp supply located in front of and beneath the current from the reservoir, said equalizing-gate being connected with the water or pulp supply tube and fitted with a series of perforations which are adapted to co-operate with a like series of perforations in the supply-tube, but differentially spaced, substantially as shown, and so placed as to throw a series of vertical jets of water or pulp against the under side of the inflowing current from the reservoir, whereby the water and pulp become thoroughly mixed, substantially as described and set forth.

5. The combination, in a paper-making machine, of a reservoir beneath the pulp-screen, a water or pulp supply chamber having a series of outlet-perforations and provided with a differentially-perforated regulating-gate located beneath the influx-current from the reservoir, and a vertically-adjustable partition-gate extending across the vat between the regulating-gate and the paper-cylinder, when arranged to operate substantially in the manner described, and for the purposes set forth.

6. The combination, in the order named, in a paper-making machine, of a reservoir beneath the pulp-screen, a water or pulp supply chamber having a series of outlet-perforations and provided with a differentially-per-

forated regulating-gate located beneath the influx current from the reservoir, and a transverse deflector located between the partition-gate and the cylinder, when arranged to operate substantially as described, and for the purposes set forth.

7. The combination, in the cylinder-vat of a paper-making machine, of a vertically-adjustable partition-gate under which the current from the screen-reservoir passes, and a transverse deflector adjusted in the bottom of the vat immediately in front of the opening under the bottom of the partition-gate for giving to the current an upward turn as it approaches the cylinder, substantially as specified.

8. The combination, in the vat of a paper-making machine, of a semi-tubular false bottom arranged beneath the cylinder so as to leave a channel-space between it and the surface of the cylinder for the passage of the pulp, having its upper edge on the discharge side a little lower than the normal level of the pulp in the vat when in its working condition, a transverse trough or sluiceway extending across the vat adjacent to the discharge side of said false bottom, and provided at one end with a discharge-gate adapted to effect the discharge of the overflow pulp at the normal working-level of the pulp in the vat as it comes from the channel under the cylinder, substantially as specified.

9. The combination, with the cylinders in the vat of a cylinder paper-machine, of a semi-tubular false bottom under the cylinder, a transverse trough extending across the vat adjacent to the discharge side of said false bottom and having an outlet through the side of the vat at one end thereof on a level with the normal working-level of the pulp in the vat, and a blanket hung below the coucher-roll, so as to wipe the surface of the cylinder and dip into the pulp a short distance to exclude froth, substantially as described and set forth.

10. The combination, with the cylinders in the vat of a cylinder paper-machine, of a semi-tubular false bottom under the cylinder, a transverse trough extending across the vat adjacent to the discharge side of said false bottom and having provisions, substantially as described, at each end of said trough for

carrying off the overflow from the channel beneath the cylinder at a level coincident with the normal working-level of the pulp in the vat, substantially as specified.

11. The combination, in the vat of a paper-making machine in which more than one cylinder-mold is used, of a semi-tubular false bottom under each cylinder, between which and the cylinder a current of pulp is carried to the same, said bottom having that edge over which the surplus pulp escapes a little below the normal working-level of the pulp in the vat, a deep trough adjacent to the overflow edge of each such bottom, having a discharge-outlet through one side of the vat substantially on a level with the normal level of the pulp in the vat, subject to the control of a regulating-gate, said outlets being alternately disposed on opposite sides of the vat, substantially as described, and for the purposes set forth.

12. A cylinder-vat in a paper-making machine provided with two or more cylinders, each of which is provided with a false bottom of the character described and an overflow-trough having an outlet at either or both its ends, in combination with provisions, substantially as described, for supplying a separate and independent current of pulp to each cylinder, in the manner described, and for the purposes set forth.

13. The combination, in a cylinder-vat in a paper-making machine, of a cylinder closed at one end, but leaving free space between such closed end and the wall of the vat for the passage of a current of pulp, with a semi-tubular false bottom beneath such cylinder and a transverse trough in rear of the same, having a discharge-port at the end thereof opposite to the closed end of the cylinder as a means for producing a transverse current of pulp in the vat adjacent to the cylinder, substantially as described and set forth.

In testimony whereof I have hereto set my hand at the village of North Bennington, in the State of Vermont, this 5th day of October, A. D. 1889.

JAMES B. McNAMAR.

In presence of—

FRANKLIN SCOTT,
MERRIT C. HOLT.