3 Sheets—Sheet 1.

J. CRABTREE & W. H. MELCHER.

BRICK-MACHINE.

No. 170,526. Patented Nov. 30, 1875.

Fig 1

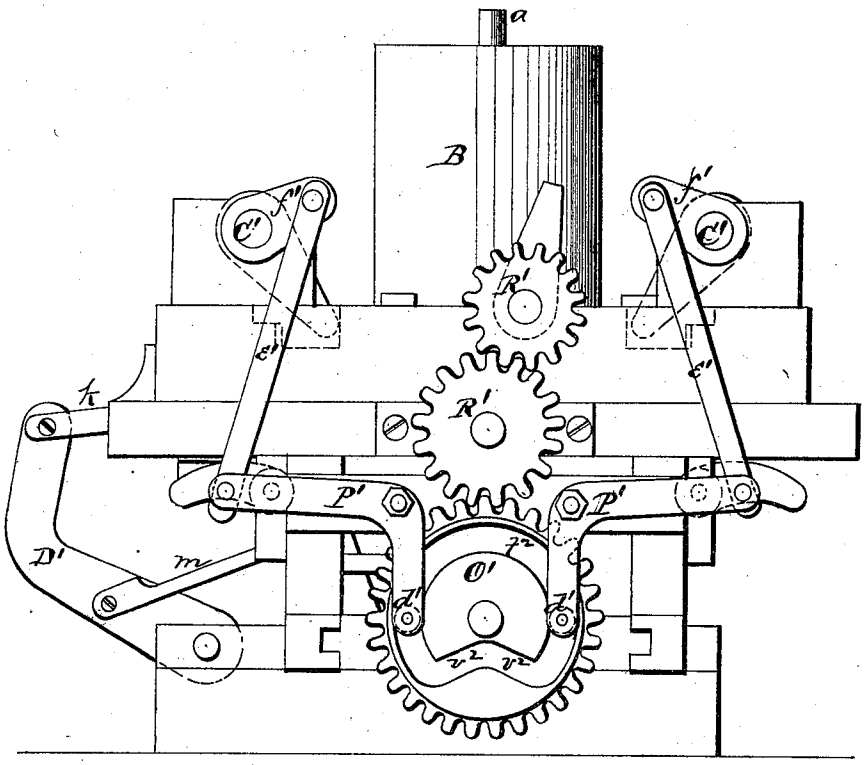

Fig 2

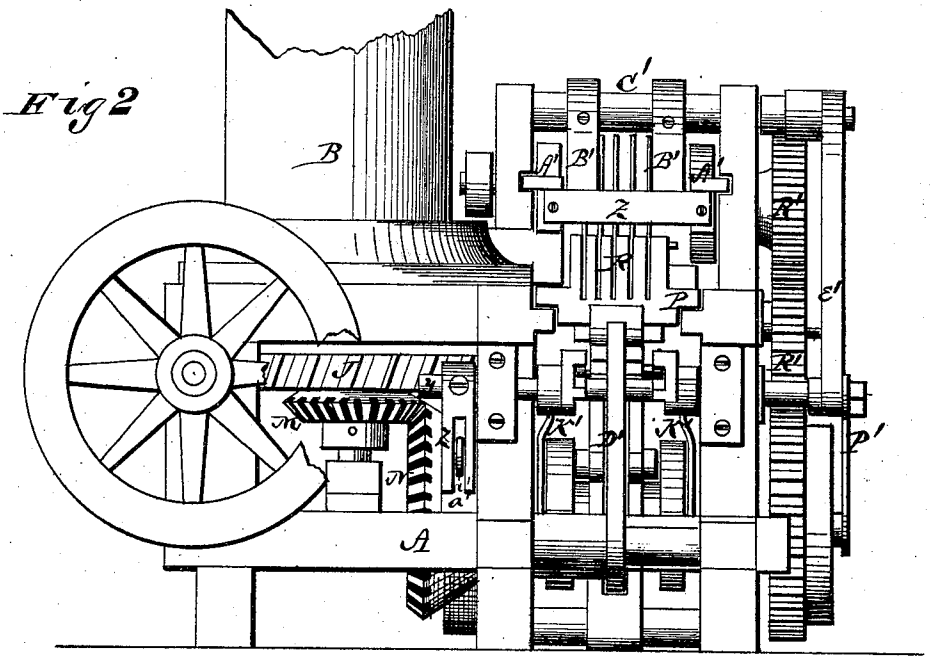

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Fig 3

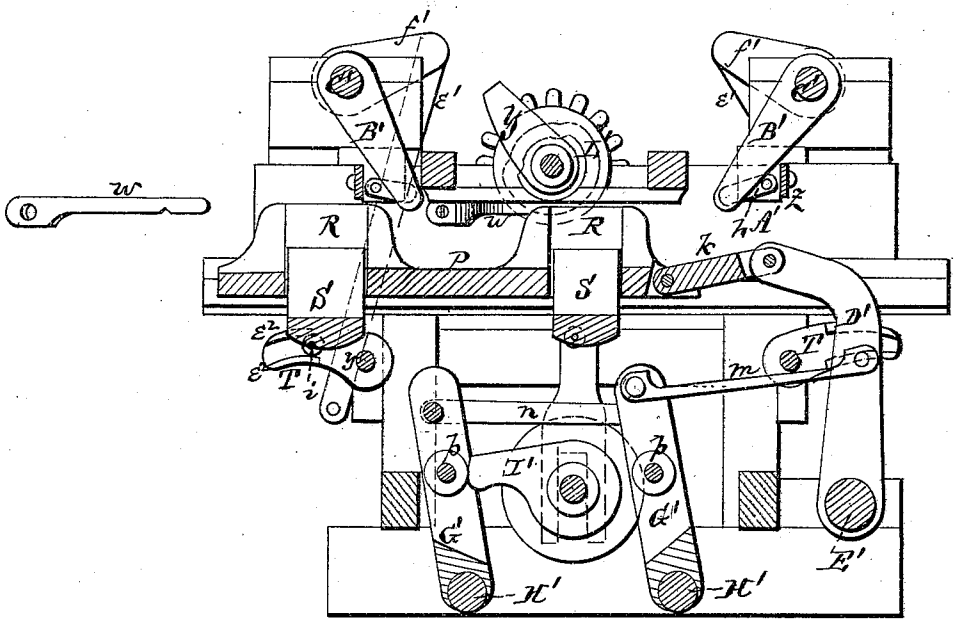

Fig 4

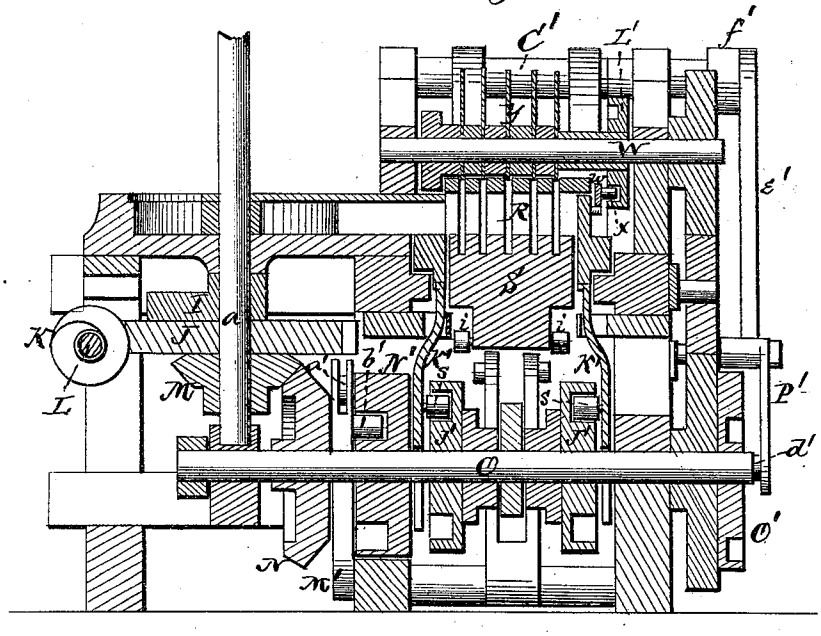

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Fig 5

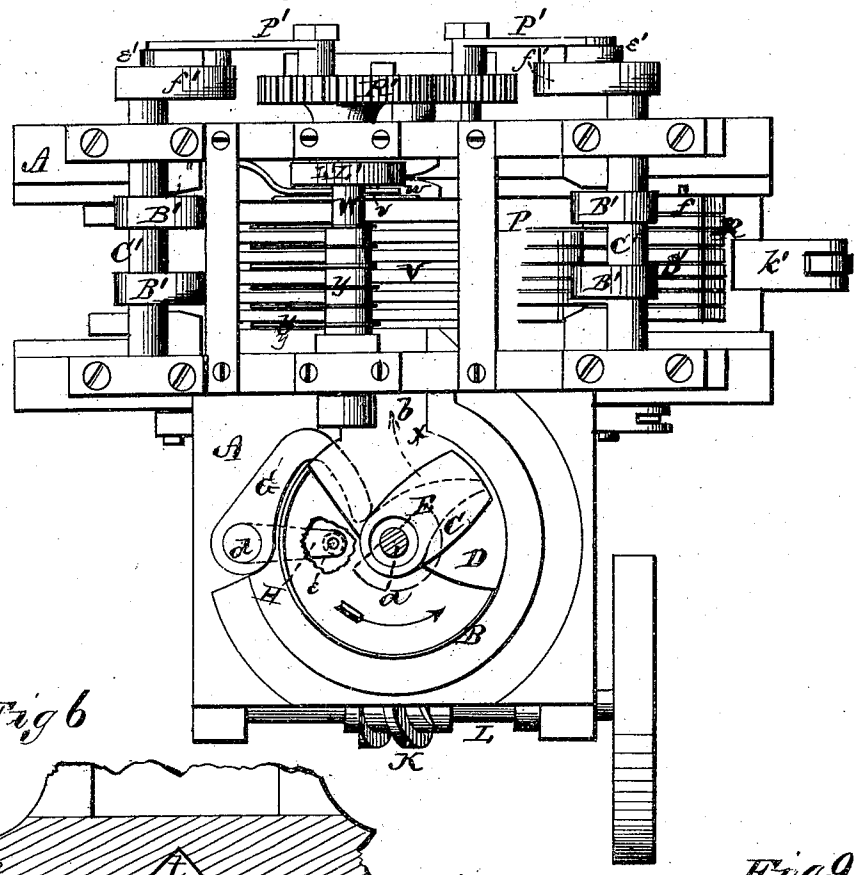


Fig 6

Fig 10

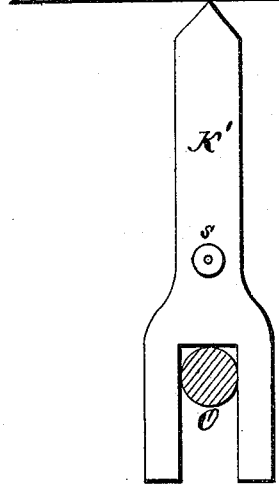


Fig 9

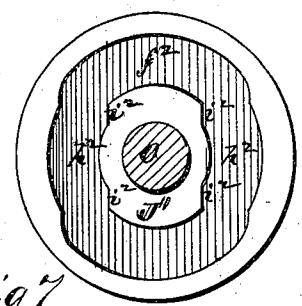


Fig 8

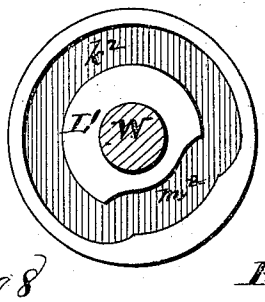
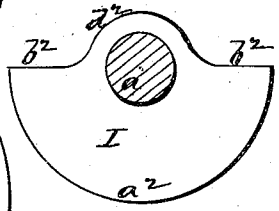
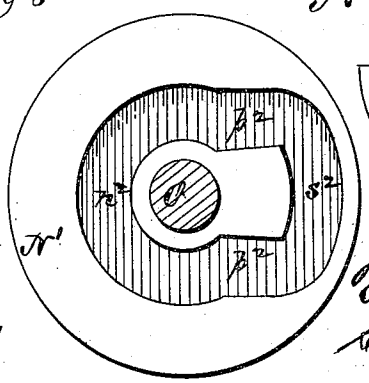


Fig 7





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UNITED STATES PATENT OFFICE.

JOHN CRABTREE AND WILLIAM H. MELCHER, OF PHILADELPHIA, PA., ASSIGNORS TO THEMSELVES AND WILLIAM CRABTREE, OF SAME PLACE.

IMPROVEMENT IN BRICK-MACHINES.

Specification forming part of Letters Patent No. **170,526**, dated November 30, 1875; application filed November 4, 1875.

To all whom it may concern:

Be it known that we, JOHN CRABTREE and WILLIAM H. MELCHER, of Philadelphia, in the county of Philadelphia and in the State of Pennsylvania, have invented certain new and useful Improvements in Brick-Machines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, making a part of this specification.

The nature of our invention consists in the construction and arrangement of a brick-machine, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which our invention appertains to make and use the same, we will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a side elevation of our machine. Fig. 2 is an end view of the same. Figs. 3 and 4 are vertical sections of the machine. Fig. 5 is a plan view; and Figs. 6, 7, 8, 9, and 10 are views of detached parts thereof.

The frame A of our brick-machine is constructed in any suitable manner to contain the various working parts thereof. B is the cylinder or pug-mill, through the center of which passes a vertical shaft, *a*, provided with a series of knives, C, for cutting the clay and forcing or feeding it downward to and below a segmental false bottom, D, secured in the lower part of the pug-mill. In the space between the bottom of the pug-mill and the false bottom D works a pusher, E, attached to the shaft *a*, the front of said pusher being made convex or curved, as shown by dotted lines in Fig. 5. This pusher forces the clay from the cylinder or pug-mill B through the die or mouth-piece *b* into the molds, and acts in connection with a pivoted stop, G, which also works under the false bottom D. The stop G is secured to a vertical rod, *d*, to which is also secured an arm, H, carrying a stud and roller, *e*, on its under side at the outer end. This roller bears against a cam, I, (shown in Fig. 7,) secured on the shaft *a* below the bottom of the pug-mill. As the clay is forced by the pusher E under the false bottom D, the stop G prevents the clay from going all the way around, but causes it to pass out of the die or mouth-piece *b* into the molds. By the use of the pusher and stop the clay is thus forced direct from the pug-mill, obviating the use of any other machinery for this purpose. These parts, also, through their regulation and motion, produce a safety-valve at the proper time, enabling any excess of clay fed down by the knives in the pug-mill to be returned for the next charge, thereby avoiding any undue pressure in the molds. This is readily seen by reference to Fig. 5. As the pusher advances under the false bottom D, it presses out the stop G before it, and when the point of the pusher has passed the side or point *x* of the die, there is room behind the pusher for any excess of clay to escape and remain for the next charge. As soon as the pusher has cleared the stop, the cam I, acting upon the roller *e* and arm H, at once forces the stop inward to its original position. On the shaft *a*, near the lower end, is fastened a cog-wheel, J, which receives its motion by means of a worm, K, on a shaft, L, said shaft being run by any suitable or convenient power. Under the cog-wheel J, on the same shaft, is secured a beveled pinion, M, which meshes with, and communicates motion to, a large bevel-wheel, N, secured on a shaft, O, running at right angles with the main driving-shaft L, and upon this shaft O are secured the various cams for operating the remaining portions of the machinery. P represents a movable carriage placed upon suitable guides or ways in the frame A, and having a mold, R, formed on or attached to it at each end. The mold is open at the side toward the die or mouth-piece *b*, and on the opposite side it forms a solid abutment, *f*, against which the clay is pressed. The end pieces of the mold are provided with a series of vertical slots, and the bottom of the mold is grooved to form continuations of said slots. The bottom of the mold is a follower, S, which is raised and lowered at the proper time by means of two flanged or grooved cams, T T, operating on pins *i i*, projecting from the sides of the follower near the lower end. In the frame A, opposite the upper edge of the die *b*, is a sta-

tionary slat-work, V, which forms the top of each mold in succession, or alternately, as the carriage is moved back and forth—that is, while the mold is directly opposite the die *b*, it is covered by the slat-work V, and the mold is then filled with clay from the pug-mill.

Above the slat-work V is a cross-shaft, W, carrying a series of knives, Y, which revolve with the shaft and pass between the slats, and through the clay in the mold, dividing the same into proper size for bricks.

After the clay has been thus divided and the carriage moved to one end, the follower S is raised up above the top of the mold, lifting the bricks with it, when they are pushed off onto boards or stationary tables by means of a cross-bar, Z, attached at its ends to heads A′ A′, sliding in grooves in the sides of the frame A, and connected by links *h h* with two arms, B′ B′, projecting from a rocking shaft, C′.

The carriage, followers, and push-bars are operated by the following means: At one end of the carriage is a hinged link, *k*, the outer end of which is pivoted to an elbow-lever, D′, pivoted to a rock-shaft, E′. The elbow-lever D′ is, by a rod, *m*, connected with the upper slotted end of a straight lever, G′, attached at its lower end to a rock-shaft, H′. It is understood that these devices may be the same at both ends of the carriage.

The two levers G′ G′ are connected by means of a bar or rod, *n*, as shown in Fig. 3, and in the slot of each lever is mounted a roller, *p*, for a cam, I′, to operate against, said cam being secured on the shaft O. By the revolution of this shaft the cam I′ operates alternately on the two rollers *p p*, to move the carriage endwise a suitable distance to bring first one mold, R, and then the other mold opposite the die or mouth-piece *b*.

To insure that the carriage will stop and be held stationary at the exact point where the mold will be opposite the die, so that the sides of the die and sides of the mold will be flush with each other, I provide the shaft O with two cams, J′ J′, each of which operates an arm, K′, vertically up and down by means of a roller, *s*, mounted on a stud in the side of the arm, and working in said cam. The arm K′ moves in suitable guides, and its upper end is pointed or V-shaped, as shown in Fig. 6. When the carriage arrives in position to bring either mold opposite the die, the arms K′ are raised by the cams J′, so that their pointed ends will enter correspondingly-shaped notches *t* in the under side of the carriage, and hold it perfectly rigid while the clay is being forced into the molds, and while the knives are cutting the same into bricks. This is of great importance, as there is always more or less play or lost motion in the gearing.

As an additional security against any vibration or movement of the carriage while the arms K′ are being raised and lowered, a hook, *w*, pivoted to the inside of the frame A, catches on a pin, *v*, in the side of the carriage. This hook is raised and lowered by having a stud and roller, *x*, working in a cam, L′, on the knife-shaft W.

The grooved cams T, which raise and lower the followers S in the molds, are secured on a shaft, *y*, to the inner end of which is attached an arm, *z*, and this arm is, by a rod, a^1, connected with a lever, M′, pivoted at its lower end to the frame, and provided near its upper end with a stud and roller, b^1, that works in a cam, N′, on the shaft O. By these means the followers in the two molds are raised and lowered at the proper time, it being understood that the mechanism just described is the same at both ends of the machine, and the rollers b^1 of the two levers M′ both work in the same cam N′.

On the rear end of the shaft O is secured a cam, O′, in which work two studs and rollers, d^1, attached to the lower ends of two elbow-levers, P′ P′, mounted upon posts projecting from the frame. The other arms of these levers are, by rods e^1 e^1, connected with arms f^1 f^1 attached to the shafts *c′ c′*. These shafts having the arms B′, to which the push-bars Z′ are connected, said push-bars are moved at the proper times to move the bricks from the molds. The knife-shaft W is rotated by suitable gearing R′ R′ from the shaft O.

The operation of the machine is, briefly, as follows: The machine being in motion, the knives C on the shaft *a* in the pug-mill cut the clay, and force it downward until the pusher E presses the mold full that is then opposite the die or mouth-piece *b*. As soon as the mold is full and the pusher E has passed the mouth of the die the knives Y descend through the slat-work V, and through the slots and grooves of the mold, cutting the clay into the proper size for bricks. Just before the knives clear the clay the arms K′ are moved downward to clear the notches *t* therein, and when the knives have entirely cleared the mold the hook *w* is, by its cam, raised from off the pin *v*. The carriage will then be moved, so as to bring the other mold opposite to the die or mouth-piece *b*, and while this mold is being filled and the clay cut the follower S in the first mold is raised by its cams T, and the brick then pushed off by the push-bar Z.

The various cams mentioned are constructed in the following manner: The cam I, which forces the stop G inward, is shown in Fig. 7, and has a semicircle, a^2, concentric with the shaft *a*, and from each end of the semicircle is a straight side, b^2, extending radially inward for a suitable distance, and then a smaller semicircle, d^2, in the opposite direction, also concentric with the shaft *a*.

The cams T, for operating the followers S in the molds, are shown in Fig. 3, and consist simply of curved arms, having on their outer ends curved concentric flanges e^2 e^2, between which the rollers *i* on the followers are caught and pass as the cams revolve.

The cams J′, for operating the bars K′, are constructed, as shown in Fig. 9, with two quar-

ter-circles, f^2 f^2, of the same diameter, and concentric with the shaft O, upon which the cams are secured. The two quarter-circles f^2 are connected by curves h^2 h^2 and straight portions i^2 i^2 at each end of said curve.

The cam L′ on the knife-shaft W, for operating the hook w, is shown in Fig. 10, and has a groove, k^2, of nearly three-fourths of a circle, and concentric with the shaft; the two ends of said groove being connected by an irregular groove, m^2, which causes the hook to lift off of the pin v instantaneously, and returns it, in like manner, onto the pin, where it remains, while the roller x of the hook passes through the three-quarter circular groove k^2.

The cam N′, which operates the cams T, is shown in Fig. 8, and is constructed with a groove, n^2, about two-thirds of a circle, and concentric with the shaft O, on which said cam N′ is secured. From the ends of the groove n^2 extend two parallel grooves, p^2 p^2, the outer ends of which are connected by a curved groove, s^2. In these grooves work the rollers b^1 of the levers M′, for imparting the proper motion to them.

The cam O′, for operating the pusher-bars Z, is shown in Fig. 1, and has a two-thirds circular groove, t^2, connected by means of two inwardly-inclined grooves, v^2 v^2.

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

1. In a brick-machine, the pug-mill B, provided with the segmental false bottom D and the die or mouth-piece b, in combination with a mold placed against said mouth-piece, so that the clay is forced on a horizontal line directly from the pug-mill into the mold, substantially as herein set forth.

2. In a pug-mill for brick-machines, the combination of the pusher E and stop G, constructed and operating substantially as and for the purposes herein set forth.

3. The combination of the stop G, vertical rod d, arm H, with roller e, and the cam I, having semicircles a^2 d^2 and straight parts b^2 b^2, substantially as and for the purposes herein set forth.

4. The molds R R upon the ends of the movable carriage P, said molds being open on one side, a solid abutment, f, on the opposite side, and the ends and bottom slotted and grooved, substantially as and for the purposes herein set forth.

5. A series of knives, Y, attached to a revolving shaft, W, and operating in combination with the slat-work V and slotted molds R R, substantially as and for the purposes herein set forth.

6. The combination of the carriage P, having notches t, and the pointed bars K′, provided with studs and rollers s, and operated by means of the cams J′, having quarter-circles f^2, curves h^2, and straight parts i^2, all substantially as and for the purposes herein set forth.

7. The combination of the cam L′, having segmental and irregular grooves k^2 m^2, the pivoted hook w, with stud and roller x, and the pin v on the side of the carriage P, substantially as and for the purposes herein set forth.

8. The combination of the grooved follower S, with pins i i projecting from its sides, and the cams T, attached to a rocking shaft, y, and provided with concentrically-curved flanges e^2 e^2, substantially as and for the purposes herein set forth.

9. The combination of the cam N′, having curved and straight grooves n^2, s^2, and p^2, as described, the levers M′, with studs and rollers b^1, rods a^1, and arms z on the rocking shafts y, for operating the cams T, substantially as and for the purposes herein set forth.

10. The combination of the cross-bar Z, sliding heads A′, links h, and arms B′, attached to the rocking shaft C, substantially as and for the purposes herein set forth.

11. The combination of the cam O′, having segmental groove t^2 and inclined grooves v^2, the elbow-levers P′, with studs and rollers d^1, the links e^1, and arms f^1 on the rocking shafts C′, substantially as and for the purposes herein set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 16th day of October, 1875.

JOHN CRABTREE.
WM. H. MELCHER.

Witnesses:
FRANK WOLFE,
F. A. OSBOURN.