S. Ilstick,

Brick Machine,

No. 17,759. Patented July 7, 1857.

Fig. 3

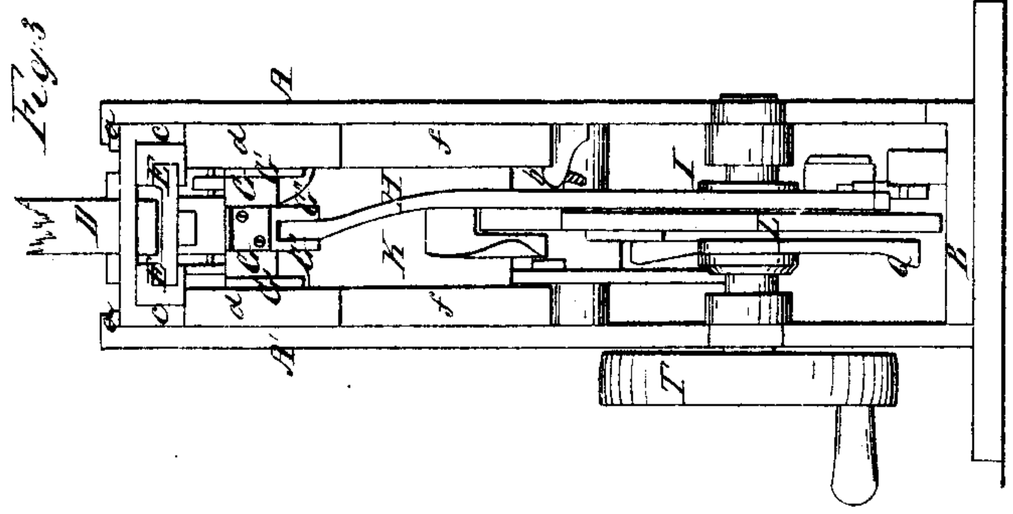


Fig. 8

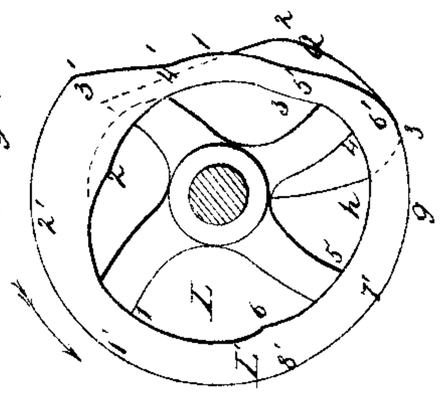


Fig. 7

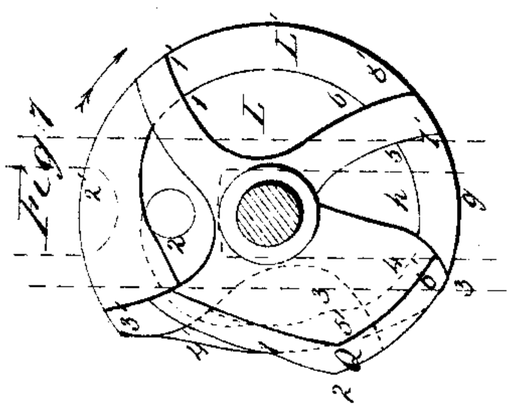


Fig. 2

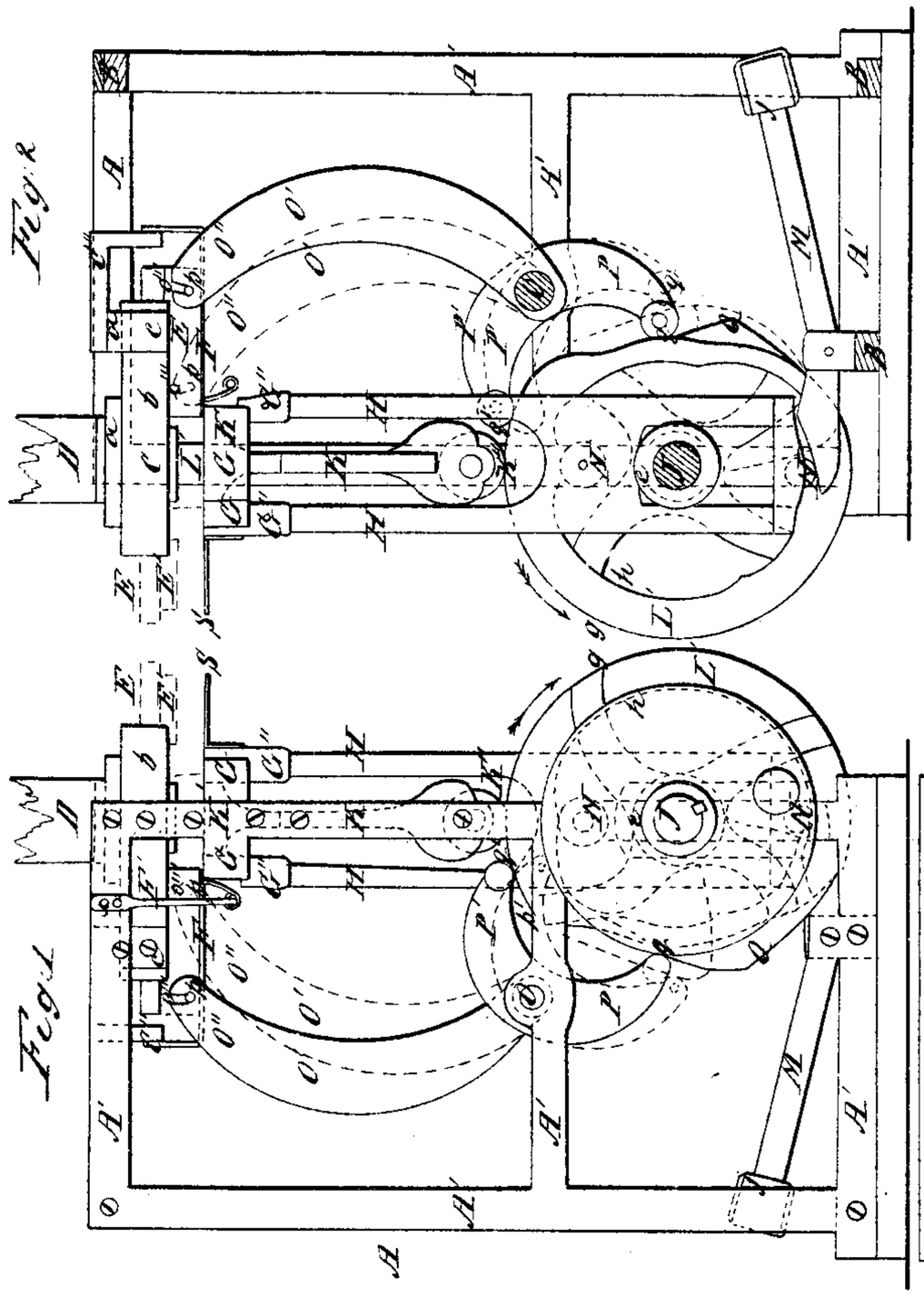


Fig. 5

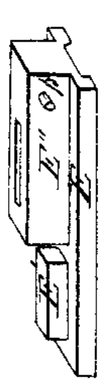
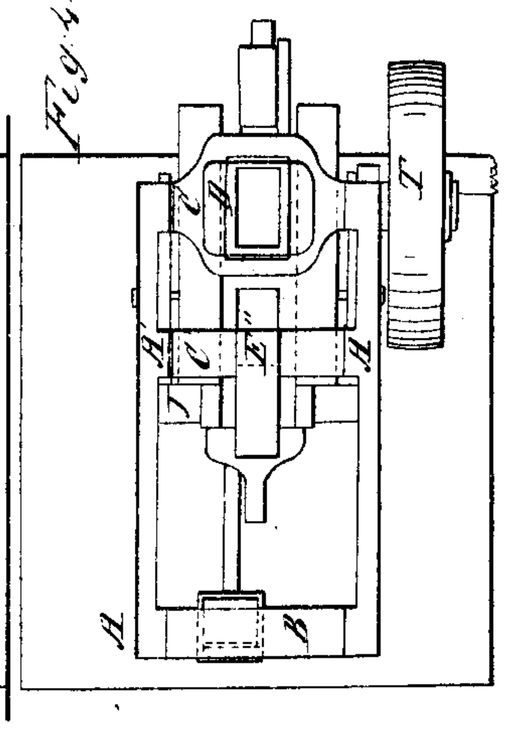


Fig. 6

Fig. 1

Fig. 4



UNITED STATES PATENT OFFICE.

STEPHEN USTICK, OF PHILADELPHIA, PENNSYLVANIA.

BRICK-MACHINE.

Specification of Letters Patent No. 17,759, dated July 7, 1857.

To all whom it may concern:

Be it known that I, STEPHEN USTICK, of the city and county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Machines for Molding and Pressing Bricks from Untempered Clay, and that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the improved machine; Fig. 2 is an opposite side view with one side of frame A off; Fig. 3 is a front elevation of the machine; Fig. 4 is a top view of the machine; Fig. 5 is an inverted view of the reacting piston E′ and filling box E², combined; Fig. 6 is a direct view of ditto; Fig. 7 is a side view of the cam wheel L, as seen in Fig 1; Fig. 8 is the opposite view of said wheel as seen in Fig. 2.

Where the same letters occur in the several figures they indicate the same parts of the machine.

The nature of my invention consists in the peculiar construction and combination of parts for pressing and discharging brick, which will be hereafter more fully described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a rectangular frame of suitable size and strength to support the several parts of the machine.

A′, A′, are the side pieces of the frame A.

B, B, B, are cross stretchers which are bolted to and between A′, A′. C, C′, are cross stretchers similarly secured, but which are adjustable by means of the double wedges *a*, *a*, to elevate or depress the reacting piston block E, hereinafter described, for the purpose of regulating the thickness of the brick.

D is a hopper for supplying the mold with clay. It is bolted fast to the stretcher G, its lower end extending through an opening in the latter until it reaches the reacting piston block E. Said block has at its front end and on the lower side of the same a reacting piston E′, which in its reacting position is shown in the general views Figs. 1 and 2; and then it is directly over the mold, and an opening or filling box E″, (in the rear end of said block) is in the rear of the mold; but when moved forward, as will be hereafter described, the piston is represented by red lines in front of the mold, the filling box being directly over the same. The grooved guides *b*, *b*, of the reciprocating block E are bolted to the arms *c*, *c*, *c*, *c*, of the stretchers C, C′. The flat plate F forms a bottom to the box E″, when in the rear of hopper D, to prevent the surplus clay falling out of said box when in rear of the mold. Said plate is secured at its front end by the bent rod F′, which is inserted in an eye of the same; the ends of said rod, which are bent upward, being bolted fast to the side pieces A′ A′ of frame A. The rear end of said plate is bent upward and is bolted to the elbow C″ of stretcher C′.

G is a condensing mold, which, during the operation of pressing the clay to form the bricks, moves upward and over the reacting piston E′ with about one-half the velocity of the condensing piston K′, hereafter described, and has a downward motion after the brick is formed to discharge the same.

G′, G′, are slides of the mold G which fit in the guides *d*, *d*, that are bolted to the pieces A′, A′, of the frame A.

H, is a double yoke, or frame, connected at its upper end by means of pins, with the double cheeks G″, G″, of condensing mold G; the lower end of the yoke H, being guided by the annular groove *e*, in the swell I, of main driving shaft J, whose journals turn in boxes in the sides A′, A′, of the frame A. The block or frame K, has grooved guides *f*, *f*, which are bolted to the sides A′ A′, of frame A. It has on its upper end a piston K′ for condensing the clay; and in its lower end a friction roller K″ that rests on the outer periphery of the rim L′, of cam wheel L, situated on the driving shaft J. The said periphery in its course around as the cam wheel L revolves, by its elevations and depressions, causes upward and downward motions of the piston block or frame K, to which the friction roller K″, is attached, and thus to the piston K′, to condense the clay; and afterward to descend into the mold G, to form the bottom of the latter to receive the clay. The inner periphery *h*, of the rim L′ of cam wheel L, recedes from the center of the driving shaft J, in such a manner as to allow the friction wheel N, of mold yoke H to ascend with the yoke and mold G, so that the latter moves upward, and over the reacting piston E′ while the condensation of the clay is effected by the pressure on it of the condensing piston K′. The lever M, has

its front end bearing against the under side of the roller N′, and has a weight *j*, on its rear end sufficiently heavy to sustain the mold G, and its connections, to allow said mold to ascend over the reacting piston E′, to insure an equal pressure on the upper and lower surfaces of the bricks; the said inner periphery *h*, of the rim L′, of cam wheel L, inclines toward the center of the driving shaft J, in such a manner as to draw the mold G, off of, and discharge, the brick. To effect these several movements, of the mold G, and condensing piston K′, the inner and outer peripheries of the rim L′, of cam wheel L, is shaped as follows: From the point 1 to the point 2, of the inner periphery *h*, the surface is curved inward, and toward the center of the driving shaft J, as to make the point 2, nearer enough to the center of said shaft to draw the mold G, down, and off of the brick, that it may be removed from the face of the condensing piston K′. The outer periphery *g*, from the point 1′, to the point 2′, is a concentric curve, scribed from the center of the driving shaft J, to keep the face of the piston K′, hard against the lower flat surface of the brick until the latter is partly out of the mold G, that any condensed air which may be in the brick may escape from its edges before the pressure is removed, to prevent its cracking. At the point 2′, there is a depression of the periphery *g*, to allow the piston K′, to descend with the brick and clear the upper flat surface of the latter from the face of the reacting piston E′; from the point 2′, to the point 3′, the depression is continued with a concentric curve, scribed from the center of the driving shaft J, to keep the piston K′ stationary until the brick is removed. From the point 3′, to the point 4′, the periphery takes a rapid turn inward, and approaches toward the center of the driving shaft J, far enough to allow the piston K′, to descend low enough in the mold G, for the latter to receive its charge of clay; the adjustable screw bolt *t*, being regulated with its head at the proper elevation for the lower end of the piston block or frame K, to rest upon it. From the point 4′, to the point 5′, the surface is a concentric curve, and is enough depressed to prevent its touching the friction roller K″, as it passes under the same. From the point 2, to the point 3, of the inner periphery *h*, the surface assumes a similar curve, and serves to keep the mold G, in a state of rest until the reacting piston block E, is moved backward, and the piston E′, is brought directly over the mold. From the point 3, to the point 4, of the inner periphery *h*, and from the point 5′, to the point 6′, of the outer periphery *g*, both peripheries take a rapid curve outward, and from the center of the driving shaft J, receding far enough from the same to force the piston K′ upward and permit the mold G, to ascend, with the same velocity, until the top of the mold reaches the face of the reacting piston E′. From the point 6′, to the point 7′, of the outer periphery *g*, the surface is of such form, and extended at the point 7′, far enough from the center of the driving shaft J, as is required to elevate the piston block K, until the piston K′, is within $\frac{1}{4}$ of an inch of the height required for the perfect consolidation of the clay; and from the point 4, to the point 5, of the inner periphery *h*, the surface recedes from the center of the driving shaft J, more than one half the distance the outer periphery *g*, recedes in reaching the corresponding point 7′, for the purpose of keeping the said inner surface as it passes under the friction wheel N, from touching it, as the mold is inclined upward by the force of the condensing piston K′, upon the clay within the mold. From the point 5 to the point 6, of the inner periphery *h*, the surface is curved inward, and far enough toward the center of the driving shaft J, as is required to draw the top of the mold G, even with the face of the reacting piston E′. And from the point 7′, to the point 8′, of the outer periphery *g*, the surface of the rim is slightly depressed, for the purpose of widening the distance between the faces of the condensing and reacting pistons, and thereby exposing the face of the brick for the escape of any condensed air which may be in the latter. From the point 8′ of the outer periphery *g*, to point 1′, the surface is curved outward, and from the center of the driving shaft J, in such a manner as to make the point 1′, so much farther from the center of the shaft than the point 8′, as is required to completely consolidate the clay; and from the point 6, to the point 1, of the inner perliphery *h*, the surface inclines outward, more than one-half the inclination of the outer periphery to allow the mold G, to freely ascend by the pressure of the piston K′, and equalize the pressure of the two pistons. The pressing surfaces from the point 6′, to the point 7′, and from the point 8′, to the 1′, of the outer periphery *g*, are of such form, and recede from the center of the driving shaft J, in such a manner, as to give a progressive pressure as the condensation of the clay increases and give a proper distribution of the power, applied in pressing the bricks.

O is a rock shaft whose journals turn in the side pieces A′, A′, of frame A. The arm O′, has cheeks O″, O″, with oblong openings O‴, O‴, that play on pins *p*, *p*, in the rear end of the reacting piston block E; and the arms P, P′, have friction wheels *q*, *q*′. The piece Q, on the side of the cam L, has an eccentrically curved surface, or cam R, extending from the point 1 to the point 2, and a concentric surface from the point 2 to the point 3. The eccentric surface or cam R is

for the purpose of giving a reciprocating motion to the reacting piston block E by acting alternately on the friction wheels q, q', of the rock shaft arms p, p', to bring the filling box E'' forward and over the mold G, and open the communication between it and the hopper D; and remove the brick in said forward motion from the face of the piston K', on the table S, in front of the molds; and there return said filling box in the rear of the mold, and the piston E', to its former position over the same. The eccentric curve from the point 2 to the point 3 is to keep the piston block E in a state of rest while the said surface bears against the friction wheel q', the rear end of the block bearing against the elbow C'' of the stretcher C', until the said piston E', shall have entered the mold G, previous to the commencement of the condensation of the clay.

T is a pulley on the driving shaft J, which communicates by means of a belt with the steam engine.

The operation of the machine is as follows: Power being applied to the driving shaft J, the cam wheel L is made to revolve in the direction of the arrow, and as the inner periphery h of the rim L' of the cam wheel L, from the point 1 to the point 2 passes over the friction wheel N on the lower end of the mold yoke H, the point 2 being nearer the center of the driving shaft J than the point 1: the yoke being drawn downward pulls the mold off of the previously made brick; and as the outer periphery g from the point 1' to the point 2', passes under the friction roller K'', the surface being concentric with the driving shaft J, the piston K' is kept hard against the lower flat surface of the brick to retain the pressure on it until it is partly out of the mold; and the condensed air in the brick escapes from its partly exposed edges to prevent its cracking. At the point 2' the outer periphery being depressed the friction roller K'' is allowed to descend to lower the face of the piston K', with the brick and relieve the latter from the face of the piston E'; and as the surface from the point 2' to the point 3' passes under the friction roller K'' the said surface being concentric with the driving shaft the piston is kept in a state of rest, for the removal of the brick. By the time the point 2 of the inner periphery has reached the friction wheel N the point 1 of cam R, on the periphery of piece Q on side of cam wheel L has reached the friction wheel q on arm P of rock shaft O; and as the cam wheel L revolves the surface from the point 1 to the point 2, bearing against said wheel q, pushes the arm P backward far enough to cause the arm O' to move the reacting piston block E' forward until the filling box E'', in the rear end of the block is brought over the mold and the front end of the box has pushed the brick from the face of the piston K' on the table S in front of the mold. The point 3' of the outer periphery g of rim L', having now reached the friction roller K'', while the latter is allowed to descend as the rapid depression of the periphery from the point 3' to the point 4' passes under it, until the lower end of friction block K has reached the head of the adjustable screw bolt t on which it rests. The mold G, now being opened the whole weight of clay in the hopper D, presses downward and completely fills it. The point 1 of cam R has now reached the friction roller q' on arm P' of rock shaft O, and as the surface of said cam from the point 1 to the point 2 bears against the roller q', a reverse motion is given to the rock shaft, and the reacting piston block E is brought back to its former position with the filling box in rear of the mold; and the piston E' directly over it, and is kept firmly in its place by rear end of the block bearing against elbow C'' of stretcher C' and the concentric curve from the point 2 to the point 3 of piece Q bearing against the friction roller q' until the piston E' has entered the mold G caused by the upward motion of the latter.

During the time the outer periphery from the point 4' to the point 5' has passed under the friction wheel K, the surface being concentric with the driving shaft J, the piston K' has remained at rest; and during the passage of the inner periphery from the point 2 to the point 3, said surface also being concentric with the shaft, the mold has remained at rest. When the point 3, of the inner periphery has reached the friction wheel N, the piston E', being in its reacting position, the mold G, is allowed to ascend until its upper edges reach the face of said piston, by the friction wheel N, of mold yoke H, being borne against the rapidly receding surface, from the point 3, to the point 4, while it passes over the same; said wheel being kept up against the rim by the front end of the weighted lever M bearing against the under side of friction wheel N', the lever keeping the roller N at all times against the inner periphery except when the clay in the mold is being condensed; at which time the periphery clears the friction roller, so as to allow the mold G to ascend freely, and keep in a state of equilibrium, between the active and reactive forces of the two pistons, to insure an equal condensation on both sides of the brick. The condensing piston K', has been elevated at the same time as the mold G, and a corresponding distance, by the eccentric surface of the outer periphery g, from the point 5', to the point 6', passing under the friction roller K'', said surface being scribed from the same center as the surface from the point 3, to the point 4, of the inner periphery. As the eccentric surface of the outer periphery, from the point 6', to the

point 7′, passes under the friction roller K″, the piston K′, is forced upward, and condenses the clay in the mold G; and the mold at the same time ascends with its upper edges over the reacting piston E′, by being brought into a state of equilibrium, by the weighted lever M, bearing against the friction wheel N′ of mold yoke H, and thus counteracting the weight of the mold and its connections; and by the relief given the wheel N, by the periphery *h*, so far receding from the center of the shaft J, as to clear said wheel in its passage over the same. As the eccentric surface of the inner periphery *h*, from the point 5, to the point 6, passes over the friction wheel N, the mold G, is drawn downward until its upper edges are even, or nearly so, with the face of the reacting piston E′; and as the outer periphery from the point 7′ to the point 8′, passes under the friction roller K″, the surface being slightly depressed, the piston K′, is allowed to descend and free the upper flat surface of the brick from the face of the piston E′, and allow any condensed air that may be in the brick to pass out of it through the surface thus exposed. The condensed air being thus let out of the brick, and its edges being much relieved of adhesion to the sides of the mold, by the latter sliding over them in the downward motion of the mold the brick is in a suitable state to be completely consolidated. As the eccentric surface of the outer periphery *g*, from the point 8′, to the point 1′, passes under the friction roller K″, the point 1′, being farther from the center of the driving shaft J, than the point 8′, a second pressure is given to the brick. During this, as in the first pressure exerted, by the pressure of the outer periphery *g*, from the point 6′, to the point 7′, the mold has been allowed to ascend freely by the inner periphery *h*, receding from the center of the driving shaft J, far enough in its course to prevent its touching the friction wheel N, as the surface from the point 6, to the point 1, passes over said wheel.

The operation of the machine has been explained during the whole revolution of the cam wheel L, involving the making of a single brick, as but one mold is represented in the machine. But as it is intended to have two or more molds there will be a corresponding number of bricks during each revolution of the cam wheel L, in a two mold machine, I intend placing both molds together and to have the same arrangement of parts as described above. And with two or more sets of molds, I design having the cams all on the same shaft; and thus have the molds all on one side of its machine; or to have the cams on two shafts; and on opposite sides of the machine, and the molds arranged accordingly, as may seem most desirable.

Having thus fully described the construction and operation of the brick-machine, as invented or improved by me, what I claim as new and desire to secure by Letters Patent, is:

The piston E′ and filling box E″, when connected together as described, in combination with the movable and weighted mold box G′, and lower piston K′, when said parts are constructed and arranged to operate in relation to each other in the manner and for the purposes set forth.

In testimony that the above is my invention I have hereunto affixed my hand and seal this twentieth day of May, 1857.

STEPHEN USTICK. [L. S.]

Witnesses:
JNO. B. KENNEY,
CHARLES THOMPSON.