

N. COOPER, Jr., T. McCONNEL & W. E. LUKENS.  
MACHINE FOR BREAKING STONE FOR THE PURPOSE OF MACADAMIZING  
ROADS AND OTHER PURPOSES.

No. 1,660.

Patented June 27, 1840.

Fig 2

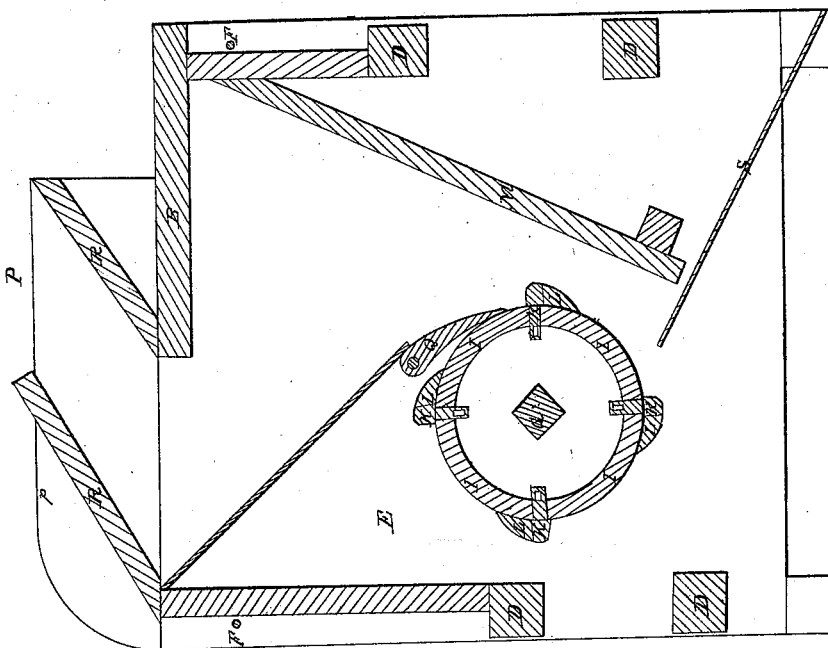
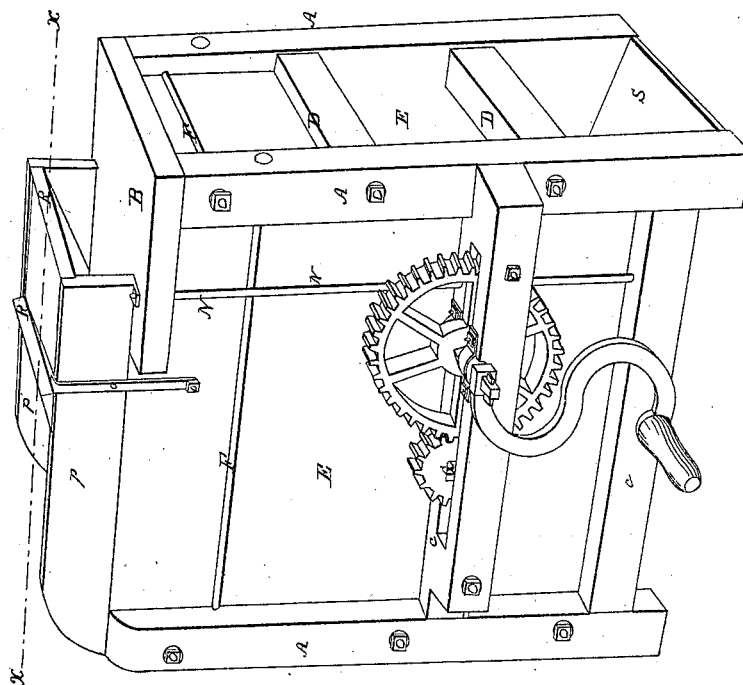


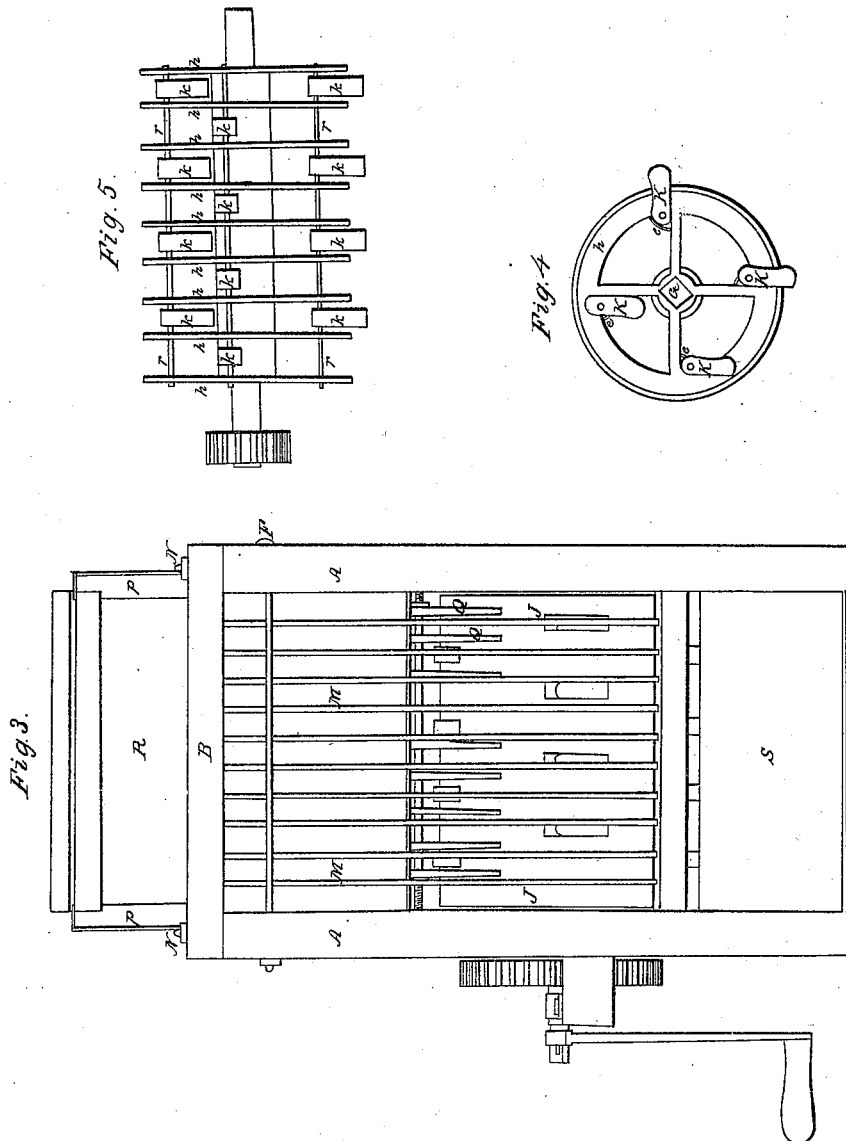
Fig 1



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# UNITED STATES PATENT OFFICE.

NICHOLAS COOPER, JR., AND TOWNSEND McCONNEL, OF WHEELING TOWNSHIP,  
BELMONT COUNTY, AND WM. E. LUKENS, OF SHORT CREEK, OHIO.

## MACHINE FOR BREAKING STONE FOR THE PURPOSE OF MACADAMIZING ROADS, AND FOR OTHER PURPOSES.

Specification of Letters Patent No. 1,660, dated June 27, 1840.

*To all whom it may concern:*

Be it known that we, NICHOLAS COOPER, Jr., and TOWNSEND McCONNEL, of Wheeling township, Belmont county, and State of Ohio, and WM. E. LUKENS, of Short Creek, Harrison county, and State aforesaid, have invented a new and useful Machine for Breaking Stone for the Construction of Macadamized Roads and other Purposes, and that the following is a full and exact description of the construction and operation of the said machine, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a perspective view of the machine. Fig. 2 is a cross section at the line *x x* of Fig. 1. Fig. 3 is a view of the rear end of the machine, the end ties and board being omitted in order to show the several parts. Figs. 4 and 5 another description of cylinder with swinging hammers. Fig. 4 is an end view and Fig. 5 a side view.

Similar letters refer to similar parts in the several figures.

*Description.*—The machine consists of the following principal parts, viz: the frame, the cylinder, the grate, the battery, the feeding plane, and the cap or hopper.

The following is the size and construction of a machine adapted to a four horse power. The machine however may be varied to suit any power.

Part 1st, the frame, consists of four posts A of suitable size—say 4 inches by 5—two of which are 5 feet high the remaining two 4 feet 9 inches, being 3 inches shorter, in order that the battery B, which rests thereon, may not rise higher than the top of the other posts. These are connected by four side ties C of the same size and 3 feet 6 inches long between the tenons (the two uppermost on which the cylinder rests) being placed 2 feet from their upper surface to the bottom of the machine, the other two at any convenient distance below; also four end ties D of the same size and 2 feet 1 inch between the tenons, the two front ones at the height of 19 and 38 inches from the bottom, the two back ones at the height of 14 and 30 inches, respectively. The spaces between the two side ties on each side are filled with plank E 2 inches thick and rabbeted into the corner posts at each end. The spaces above the ties are also filled with plank two inches thick

and inserted into the corner posts by plow and groove in such a manner that they may be easily drawn out. The whole is bound together by bolts of iron F, two running lengthwise and six crosswise of the frame.

Part 2nd, the cylinders: This consists of an axle G, 2 inches in diameter, on which are fastened two strong metal heads H, 14 inches in diameter, having four holes drilled in each. On these are placed four metal staves I,  $24\frac{1}{2}$  inches long, 2 inches thick, and of such a width as for each to form one fourth of the circumference of the cylinder. These are fastened to the heads by bolts passing through holes corresponding with those in the heads and by two strong iron bands J, Fig. 3, received in rabbets formed for the purpose on each end of the cylinder. Along the center of each stave are four rectangular holes  $2\frac{1}{2}$  inches long and  $1\frac{1}{2}$  inches wide at the surface and somewhat less at the inner side of the stave in which the hammers K are inserted. The hammers K are  $2\frac{1}{2}$  inches wide,  $1\frac{1}{2}$  inches thick at the base, and about 1 inch at the point and rise about 4 inches from the surface of the cylinder, having the front edge faced with steel and of an oval shape. They are inserted into the staves at an inclination backward of 15 degrees from the center of the cylinder and are firmly fastened by means of a key passing through the shank on the inside of the stave. At the back of each hammer is a triangular brace L, molded with the stave, rising about  $3\frac{1}{2}$  inches from the surface and extending from the base of the hammer to the edge of the stave, against which the hammer rests for additional security. The hammers are so arranged that those only which are on opposite sides of the cylinder run in the same orbit or circle. The most suitable velocity is about 350 revolutions of the cylinder per minute.

Part 3rd, the gate M: This is situated in front of the cylinder and is formed of straight bars of iron, one half inch thick and one and three fourths or two inches wide, having their inner edge laid with steel to prevent its wearing and extending from the battery B down to some distance below the center of the cylinder at an inclination from the perpendicular of about 35 degrees, the ends being inserted into pieces of metal made fast to the sides of the frame. The

bars of the grate should be placed at such a distance from the points of the hammers and from each other as to allow the stone to pass out of the machine when sufficiently broken and not before.

Part 4th, the battery, is a rectangular plate B, 24 by 28 inches and three inches thick, placed on the top of the frame to stop the stones as they are thrown up and cause them to fall back on the hammers, the under side being plain, or set with knobs, or projections of the size and shape of half a hen's egg to facilitate the operation of breaking. It is held in its place by bolts N, passing from the top to the bottom of the frame.

Part 5th, the feeding plane. This is situated directly over the cylinder and consists of a plate of rolled or cast iron O, having an inclination of 45 degrees, over which the stones pass from the hopper P to fall upon the revolving hammers, and having attached to it bars Q, of iron, passing downward between the hammers, so as to prevent the stone from touching the body of the cylinder. The bars have such a curvature that they always form an obtuse angle with the face of the hammers thereby removing all liability of the stones being caught between the bars and hammers.

Part 6th, the cap or hopper P: This is merely an addition to the feeding plane, and consists of two planks *p p*, 3 feet long, 10 inches wide, and 2 inches thick, extending lengthwise of the frame from the middle of the battery to the back part of the frame, connected by two planes R, inclines to 45 degrees in the opposite direction from that of the feeding plane, with which one of them forms a right angle (nearly) so thereby preventing the stone being thrown out by the hammers. The other lies directly over the battery, and forms with the sides a kind of hopper P, into which the stones are thrown. It is fastened on by small iron bars extending down the sides and bolted through the sides of the frame.

Every part of the machine exposed to the action of the stones must be covered with thick sheet, or boiler iron.

The following is a description of a cyl-

inder with flexible hammers, which in some respects is preferable to that before described and may be substituted therefor; it is this: Having on a wrought iron shaft G, Fig. 4 a sufficient number of cast iron rings *h*, about 18 inches in diameter and  $1\frac{1}{2}$  wide (each ring being banded with wrought iron bands) to make the desired length of the cylinder by leaving an inch space between them. The hammers are placed in these spaces and are held in their places by rods *r* of iron  $\frac{3}{4}$  inch in diameter, which pass through them from one end of the cylinder to the other immediately under the rim of the rings and through ears *e* molded in the angles between the rim and the arms, a hammer K being placed in every other space on each rod. That part of the hammer which presents itself outside the cylinder is made in the same form as the stationary ones, with the exception of their being one inch instead of one and a half inches thick. The hammers swing loose on the rods and are thrown out by centrifugal force.

*Operation:* The stones to be broken are thrown into the hopper on the top of the machine, pass thence along the feeding plane to fall on the revolving hammers, which move in such a manner as to strike the stones upward, throwing them against the battery, their escape being prevented by a grate in front of the cylinders until they are broken sufficiently small to pass between the bars or at the point of the hammers from whence they are conducted to the rear end of the machine by an inclined board *s*, Figs. 1, 2, and 3.

What we claim as our invention and desire to secure by Letters Patent is—

The combination of the rotary hammers, fixed or swinging, with the bars Q as herein described, and in combination therewith the grating M and battery B for the purpose and in the manner described.

NICHOLAS COOPER, JR.  
TOWNSEND McCONNEL.  
WM. E. LUKENS.

Witnesses:

ENNAR BALES,  
JOHN WARFIELD.