

ARTHUR HOPE.
(3.) Improvement in Machines for Breaking Stone, &c..

No. 122,832.

Patented Jan. 16, 1872.

FIG. 1.

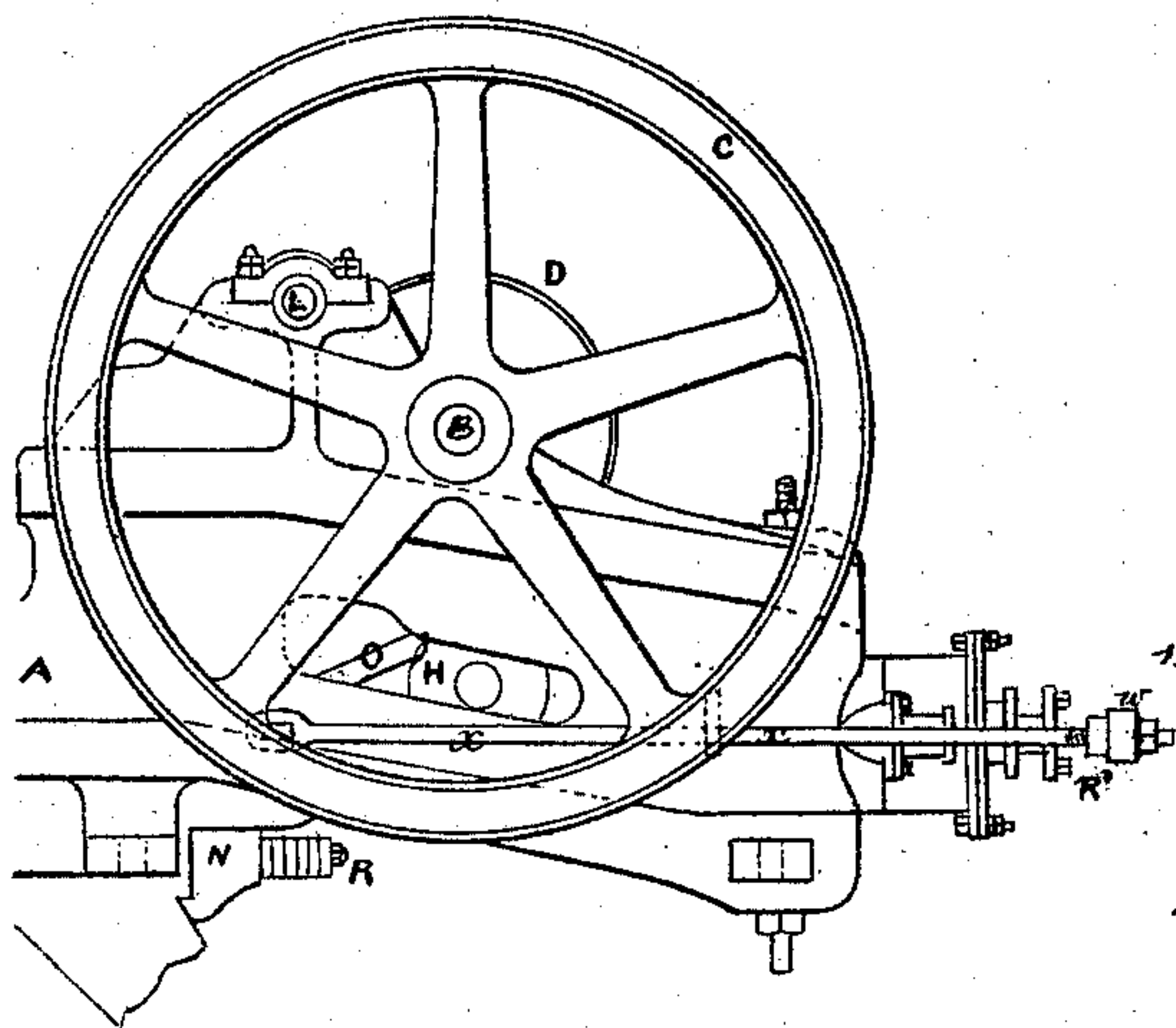


FIG. 2.

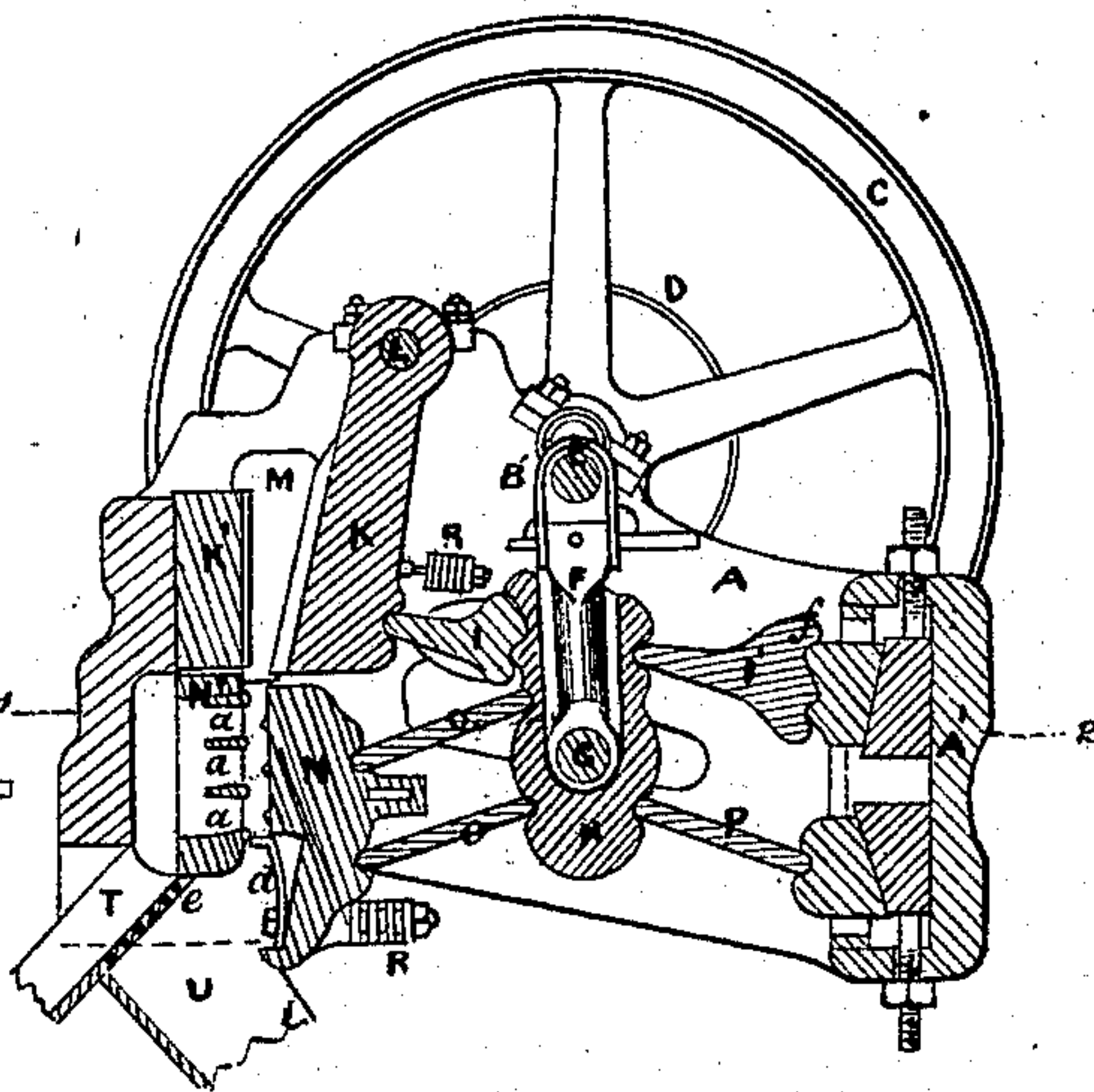


FIG. 3.

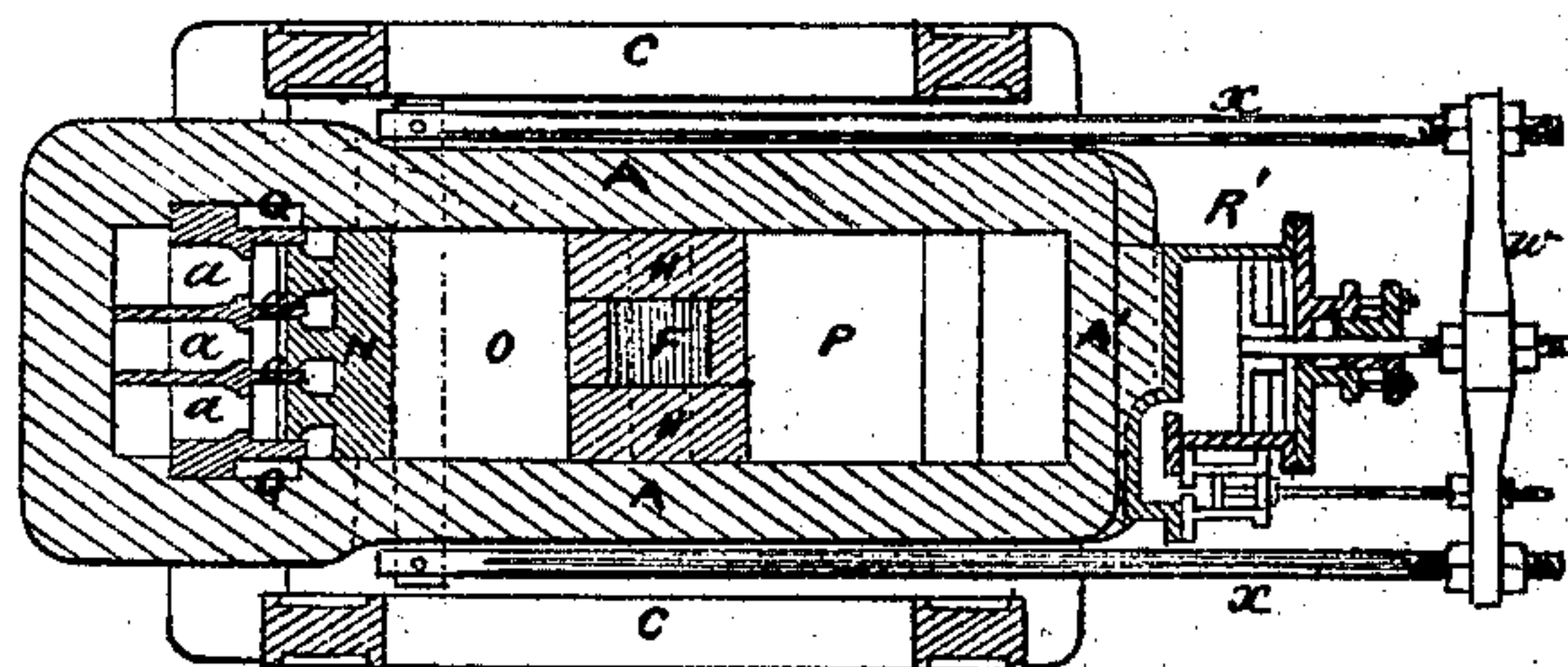


FIG. 4.



FIG. 5.

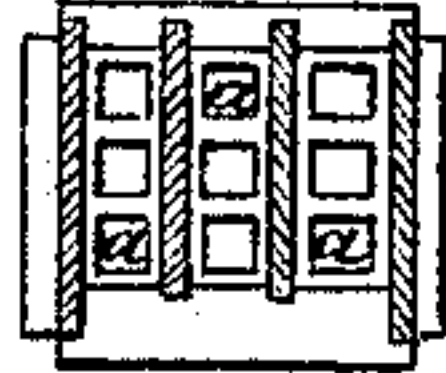


FIG. 6.



FIG. 7.

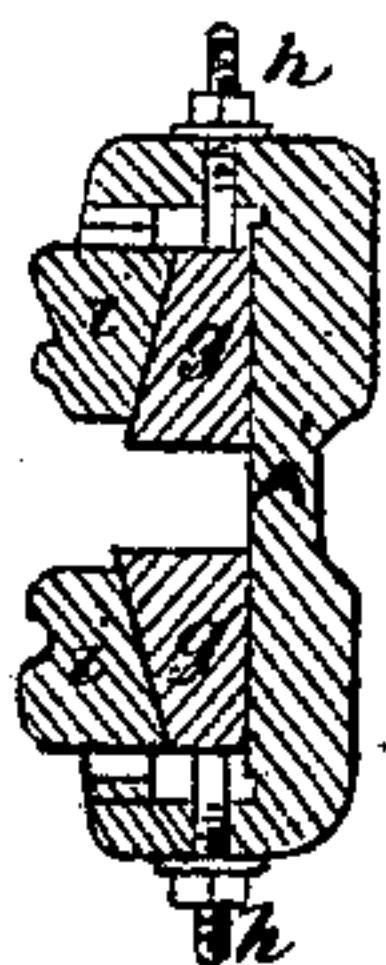
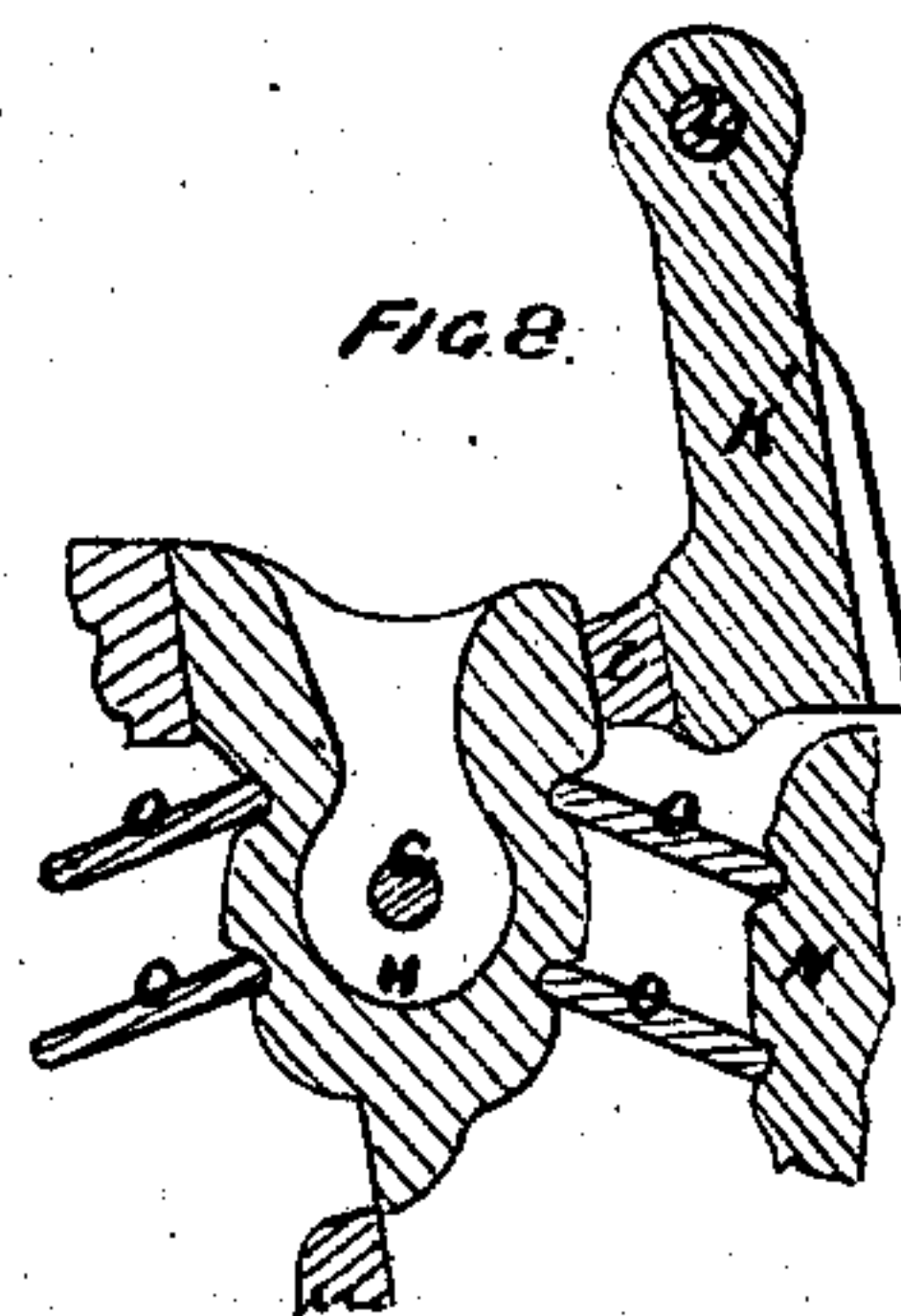


FIG. 8.



Witnesses:
Harry Smith
Thos. McSwain

Scale 1/2" to a foot.

Arthur Hope
by his attor.
Horsen and Son

UNITED STATES PATENT OFFICE.

ARTHUR HOPE, OF PRAHRAN, COLONY OF VICTORIA, ASSIGNOR TO HIMSELF
AND HUGH JUNOR BROWNE, OF MELBOURNE, AUSTRALIA.

IMPROVEMENT IN MACHINES FOR BREAKING STONES, &c.

Specification forming part of Letters Patent No. 122,832, dated January 16, 1872.

SPECIFICATION.

I, ARTHUR HOPE, of Prahran, in the Colony of Victoria, engineer, have invented Improvements in Machinery or Apparatus for Breaking Stone and other Hard Substances, of which the following is a specification:

This invention relates to certain improvements upon and additions to the machinery or apparatus for which Letters Patent in Great Britain were granted to John Henry Johnson, on behalf of Eli W. Blake, of New Haven, in the county of New Haven and State of Connecticut, United States of America, bearing date the 14th of June, 1858, No. 1,346; and has for its object the preparing of road-metal, the improved machinery not only breaking the stones, but also, if desired, cubing or squaring the same, the result being obtained by the aid of two sets or pairs of jaws—the one serving to give the primary break, and the other serving to complete the operation by breaking the stone into a cubical form.

According to one arrangement of the improved machinery two pairs of jaws are employed, disposed one above the other, one jaw being fixed and the other movable in each pair. The fixed jaws are secured in position by wedges, and opposite to these are the corresponding moving jaws. The stone to be operated upon is fed into the space between the upper pair of jaws, and, having been reduced in size by their action, it falls thence into the space between the lower pair of jaws, and is by their action broken across at right angles and forced through orifices or dies formed in the lower fixed jaw, which we call the cubing-jaw, and passes away in the cubic form through a chute, the screenings and dust being led away clear of the cubed and gauged metal by means of a second chute. One or more pawls prevent the stone escaping from the action of the lower movable jaw, while at the same time allowing the screenings or smaller fragments to escape. The upper moving jaw is worked by a cam movement, acted upon by a guide-block or its equivalent. A buffer-spring draws the jaw back after each forward motion. The guide-block also, by its action upon toggles, gives the forward motion to the lower sliding jaw, the backward motion being produced by the action of buffers, springs, an air-cylinder, or

other appliance. It will be observed that, in the upward movement of the guide-block, the action of the upper part of the higher back toggle causes a check after the forward motion of the upper jaw, while the motion of the lower jaw is backward. The guide-block is worked by a connecting-rod or link attached to a crank-shaft upon which are fitted fly-wheels and fast and loose pulleys. As the dust has a tendency to accumulate behind and fill up the space in which the pawls in the lower movable jaw work, cores are put in which afford relief and escape for such dust. If desired, power may be applied to the upper portion of the machine only, which portion may be worked separately from the cubing process.

And in order that the said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheet of drawing, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 of the drawing represents a side elevation of one arrangement of my improved stone-breaking and cubing machine. Fig. 2 is a longitudinal vertical section of the same taken through the center thereof. Fig. 3 is a horizontal section of the same machine taken along the line 1 2 in Fig. 2, and Figs. 4, 5, and 6 are separate details of the fixed and movable jaws of each pair.

A A is the main frame of the machine; B, the driving-shaft, working in bearings in the said frame and provided with a pair of fly-wheels, C C, and the ordinary fast and loose driving-pulleys D. A crank, E, on the driving-shaft, gives motion to a connecting-rod or link, F, which is coupled at its lower end by the pin G to the guide-block H, the said block thus receiving a vertical reciprocating motion from the crank. On the left-hand side of the guide-block, (looking at the drawing, Fig. 2,) and near its upper end, there abuts the cam end of a toggle, I, the opposite end of which bears against the back of the movable jaw of the upper pair of jaws. This jaw K vibrates on the center L, carried in suitable bearings in the side of the frame, and is situate opposite to its corresponding fixed jaw K', which is secured in its place between the sides of the

frame by means of wedge pieces M, Fig. 2. The faces of these jaws K K' are grooved, as shown in the detail horizontal section at Fig. 4, in order to facilitate the fracture of the stones. On the right-hand side of the guide-block, and opposite to the toggle I, there abuts one end of another toggle, I', the opposite end of which exerts its thrust against the fixed portion A' of the framing, as is clearly shown in Fig. 2. Immediately beneath the upper pair of jaws K K' there are fitted the lower pair of jaws N N', of which N is the sliding jaw and N' the fixed or cubing-jaw. The movable jaw N slides to and fro, with its acting face always parallel, or nearly so, to the face of the fixed jaw N', it being actuated by the pair of parallel toggles O O bearing against the guide-block H, and the back toggles P and I' bearing against the stationary part A' of the frame. The fixed or cubing-jaw N' is secured by wedges Q Q, Fig. 3, into recesses in the sides of the frame, and has orifices or dies *a a* made therein, as shown clearly in the detail, Fig. 5, through which orifices or dies the cubed road-metal is thrust, as hereinafter explained. On the face of the movable jaw N, and in positions corresponding to the openings in the fixed jaw, is formed a series of projections or swells, *b b*, Fig. 6, which break and force the stone through the orifices or dies *a a* in the fixed jaw N'. A set of projecting ribs, *c c*, Fig. 3, stands out from the face of the fixed jaw N' and works into corresponding grooves in the movable jaw N, so as to form a guide for the stone to such jaw when working, as is clearly shown in Fig. 3. In order to prevent the stone from escaping the action of the jaw N, by dropping down beyond it, I attach to the lower portion of the face of the said jaw one or more pawls or catches, *d d*, shown at Fig. 2, and in front elevation in the detail, Fig. 6. These catches *d* each work in a recess behind, as shown in Fig. 2; and in order to prevent any accumulation of stone-dust in such recesses I form apertures or cores therein to allow of its escaping freely. The return or back-stroke of the upper movable jaw K is accomplished by means of the India-rubber spring R, the back-stroke of the lower movable jaw N being effected by means of the air-cylinder R', which is connected with the movable jaw N by the rods *x x* and cross-head *w*, for which may be substituted buffers or springs.

The action of this machine is as follows: The stone to be operated upon is fed in between the two upper jaws, and, having been reduced in size by their combined action, it falls between the two lower jaws, and, by the action of the movable jaw N, is forced through the orifices or dies *a a* in the fixed jaw N', and passes away in the cubic form through the chute T, the screenings and dust being separated from the gauge or cubed metal by the screen at *e* and conveyed away by the separate chute U. During the upward movement

of the guide-block H the action of the upper part *f* of the toggle I' causes a check after the forward motion of the upper jaw K, while the motion of the lower jaw N is backward, the two pairs of jaws being made to open and close, not simultaneously, but alternately.

In Fig. 2 we have shown the lower jaw worked on the down-stroke of the guide-block H, and the upper jaw worked on the up-stroke of the same block. This action may obviously be reversed, if desired.

Fig. 7 is a sectional detail of the back portion A' of the frame, showing the application thereto of adjusting-wedges *g g*, worked by screws and nuts *h h*, for regulating the positions of the bearing or abutment pieces *i i*, against which the rear ends of the toggles I and P exert their thrust. By this arrangement the machine may be regulated so as to break the stones to any desired size, the jaws being thereby caused to work nearer to or further from each other.

Fig. 8 is a sectional view of a modified form of motion for working the jaws. The lower jaw is worked by toggles O O, while the upper jaw is worked by inclines *i' i'* on the guide-block H.

Having now described and particularly set forth the nature of my said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I lay no claim to the use of movable and fixed jaws combined with toggle-joints for the purpose of breaking stones for road-metal; neither do I confine or restrict myself to the precise modes of carrying out my invention as herein set forth and illustrated by my drawing, as it is obvious that slight variations may be made therefrom without deviating from the essential features of our said invention; but

What I do claim, and desire to secure by Letters Patent, is—

1. The combination, in a stone-breaking machine, of a fixed jaw having orifices or dies therein with a sliding jaw, for the purpose of gauging or crushing the stone, substantially as herein described.
2. The combination of the said fixed and sliding jaws and the crushers K K', substantially as and for the purpose set forth.
3. The combination of the jaws K N, reciprocating block H, and toggles, substantially as described.
4. The combination of the guide-blocks and toggles and adjusting-wedges, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR HOPE.

Witnesses:

H. W. MARBENSON,
Clerk, Registrar General's Office, Melbourne.
RICH'D. TOPE,
Law Clerk, Melbourne.

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