(No Model.)

T. A. BLAKE.

STONE CRUSHER.

No. 296,914. Patented Apr. 15, 1884.

Fig. 1

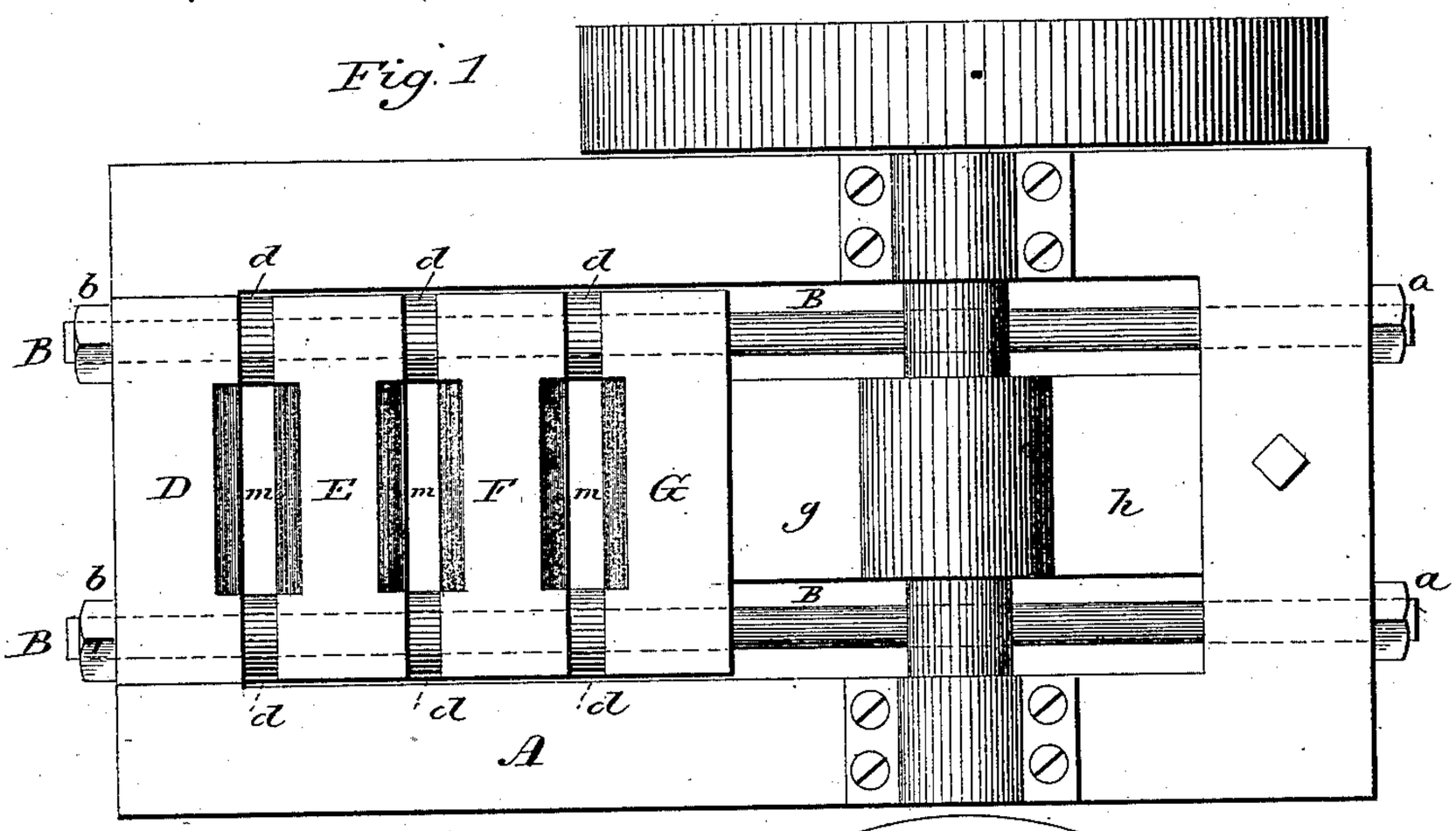
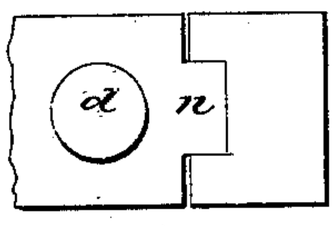


Fig. 3.



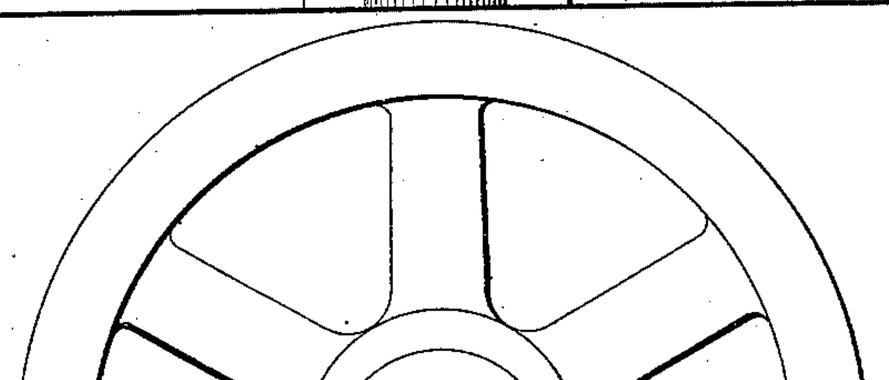


Fig. 2

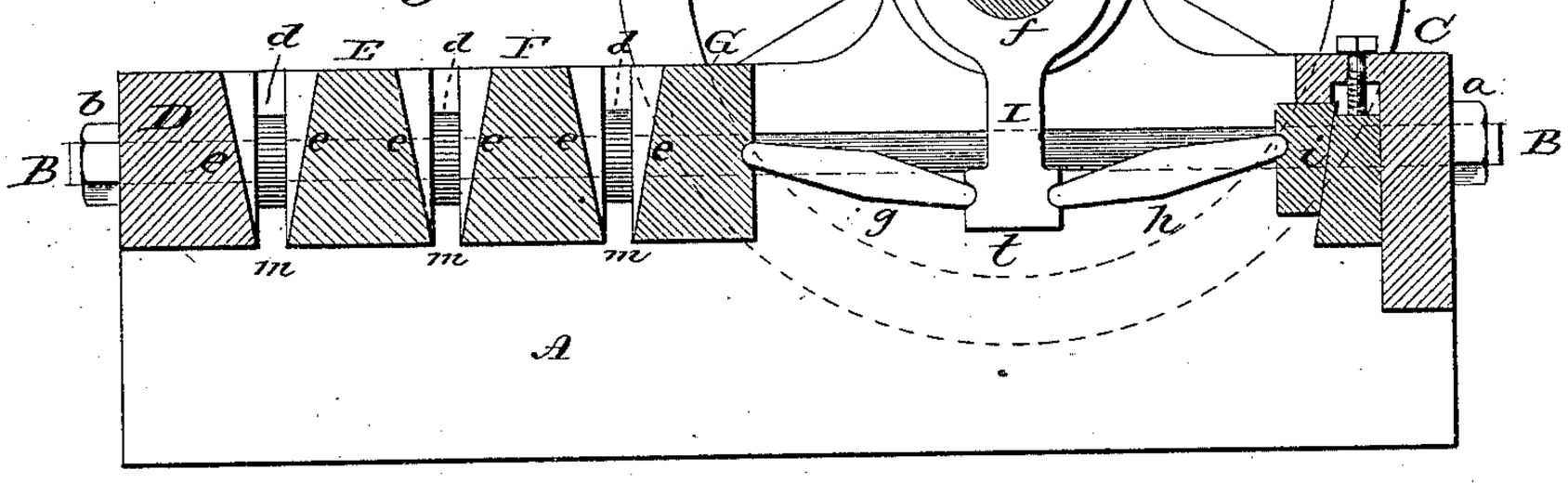


Fig. 4

Witnesses.
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UNITED STATES PATENT OFFICE.

THEODORE A. BLAKE, OF NEW HAVEN, CONNECTICUT.

STONE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 296,914, dated April 15, 1884.

Application filed January 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, THEODORE A. BLAKE, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Stone-Crushers; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a top view; Fig. 2, a sectional side view, showing the invention as arranged with one fixed jaw to produce the resistance; Fig. 3, a modification; and in Fig. 4 a sectional side view, showing all the jaws movable, the power applied at both ends of the series.

This invention relates to an improvement in machines used for crushing stone, ore, and like purposes, and is an improvement upon the machine for which Letters Patent of the United States were granted to me, dated April 25, 1882. The invention set forth in the said patent is the combination of several vibrating jaws hung upon axes parallel to each other, with a fixed jaw at one end of the series of vibrating jaws, and power applied to the rearmost jaw of the series, so that as the vibrating motion is imparted to the rear jaw it communicates that power to the succeeding jaws through the material interposed between the jaws, the last or stationary jaw serving as the resistance, and so that the material between the several vibrating jaws and the fixed jaw will be crushed, and whereby the capacity of the machine over a single vibrating jaw is greatly increased. In such vibrating jaws the movement of each jaw is nothing at its point of suspension, increasing to the lower end or most distant point of the jaws; hence the inclination of the faces of the jaws with relation to each other is constantly changing throughout their entire movement.

The object of my present invention is to give an advance movement to the jaws throughout their entire faces, whereby the faces of the jaws will retain the same inclination with relation to each other throughout the operation; and it consists in a series of two or more jaws arranged on guides, so as to slide in a horizontal plane, the space between each jaw and the next forming a mouth to receive the material to be crushed, combined with means for applying power to the jaw at one end of the series and a resistance at the other end, whereby an advance movement imparted to one of the extremes of the series will communicate an advance movement to the succeeding jaws through the material introduced between them to be crushed, as more fully hereinafter described.

I first describe the invention as having the resistance produced by a fixed jaw at one end of the series, the power being applied at the other.

A represents the bed of the machine; B B, two parallel rods running longitudinally above the bed from end to end. Outside the rear end, C, a nut, *a*, is applied to each of the rods, and at the other end of the machine the rods run through the fixed jaw D, with like nuts, *b*, on those ends of the rods. On these rods the several sliding jaws E, F, and G are arranged, so as to slide freely on said rods as guides. The adjacent faces of the end portions of the jaws are parallel, and they are arranged so as to leave a small space between them, and between those faces springs are applied, (here represented as india-rubber collars *d*,) the power of the springs being sufficient to force the jaws rearward to their normal position. The central portions of the adjacent faces of the jaws are reduced so as to form converging crushing-faces *e*. These faces are prepared in any of the usual methods of preparing faces of jaws for crushing material. To the rearmost jaw, G, the power is applied, (here represented as by an eccentric, *f*, on the driving-shaft H.) This eccentric operates a toggle composed of two toggle-bars, *g h*. The forward end of the bar *g* takes its bearing on the back of the jaw G. The rear end of the bar *h* in like manner takes its bearing on a stationary seat, *i*, at the rear. The adjacent ends of the two bars take their seat on opposite sides of the toggle-block *t*, from which a connecting-rod, I, extends to the eccentric, the eccentric imparting a reciprocating movement to the toggle-block *t*, moving it up and down, and thereby operating the toggles in the usual manner for such toggles, as in the well-known Blake crusher. The movement produced by the extension of the toggle is imparted di-

rectly to the jaw G, causing it to slide upon its guides and maintain the same relation of its face to the face of the next jaw.

When the machine is in operation, the material to be crushed is introduced between the several jaws, in like manner of introducing it into my previous machine, or the common Blake crusher. The advance or forward movement of the jaw G under the action of the toggle brings that jaw to bear upon the material between its face and the adjacent face of the next jaw. The resistance to being crushed communicates a corresponding movement to the jaw F against the material between it and the next jaw, and then to the jaw E upon the material between it and the fixed jaw, so that the crushing force from the first jaw to the fixed jaw is communicated through the material between the respective jaws, and it being crushed passes downward through the deliveries *m* in like manner as through the jaws of the Blake crusher. In such forward sliding movement of the jaws the springs *d* are compressed. Then as the toggle relaxes the springs react and force the respective jaws rearward preparatory to the next forward or crushing movement. By this construction the adjacent faces of the jaws always maintain their same relative position to each other and have the same extent of movement throughout. Power is applied to operate the toggles in the usual manner of applying power to stone-crushers, and the toggle is made adjustable in the usual manner, as seen in Fig. 2.

Instead of producing the resistance by a fixed jaw, as above described, power may be applied at both ends of the series, as seen in Fig. 4. In this figure I show four movable jaws, substantially the same as in the preceding figures, and the power is applied through toggles at both ends, as clearly seen in said Fig. 4, whereby the power applied at one end of the series forms a resistance against the movement of the jaws from the direction of the other end of the series.

While I prefer to arrange the jaws upon the horizontal rods B as guides, it will be evident to those skilled in the art that they may be otherwise guided, as, for illustration, each end of each jaw may be constructed with a projecting tongue, *n*, to work in a corresponding groove in the frame, a suitable spring, *d*, being arranged between the jaws.

While I prefer the toggle mechanism illustrated for imparting reciprocating movement to the series of movable jaws, any of the known mechanisms for imparting movement to the movable jaws of stone-crushers may be substituted therefor.

I claim—

1. The combination of a series of jaws, (two or more,) parallel guides, upon which said jaws are arranged and made movable in a path parallel to said guides, and mechanism, substantially such as described, to impart movement to the said series of jaws, the said guides serving to support the said jaws in the same inclination with relation to each other throughout their entire movement, substantially as described.

2. The combination of a series of jaws, (two or more,) parallel guides upon which said jaws are arranged and made movable in a path parallel to said guides, a stationary jaw at one end of the series, and mechanism, substantially such as described, to impart reciprocating movement to the said series of jaws toward and from the fixed jaw and upon their guides, the said guides supporting the said jaws in the same inclination with relation to each other throughout their entire movement, substantially as described.

3. The combination of a series of jaws, parallel guides therefor, a fixed jaw at one end of said series, a toggle at the other end arranged to bear upon the jaw at that end, the adjacent faces of the said jaws diverging from their lower edges upward, whereby a crushing-mouth is formed between each pair of jaws, said toggle serving to impart a crushing movement to said jaws, and the guides serving to retain the jaws in the same inclination with relation to each other throughout their movement, substantially as described.

4. The combination of the fixed jaw D, the movable jaws E F G, &c., rods B, springs *d* between the jaws, and a toggle arranged to bear against the rear jaw and operate to force it, with the intermediate jaws, toward the said stationary jaw, substantially as described.

THEODORE A. BLAKE.

Witnesses:
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