No. 758,735. PATENTED MAY 3, 1904.

J. W. BOILEAU.

CRUSHER.

APPLICATION FILED JUNE 13, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

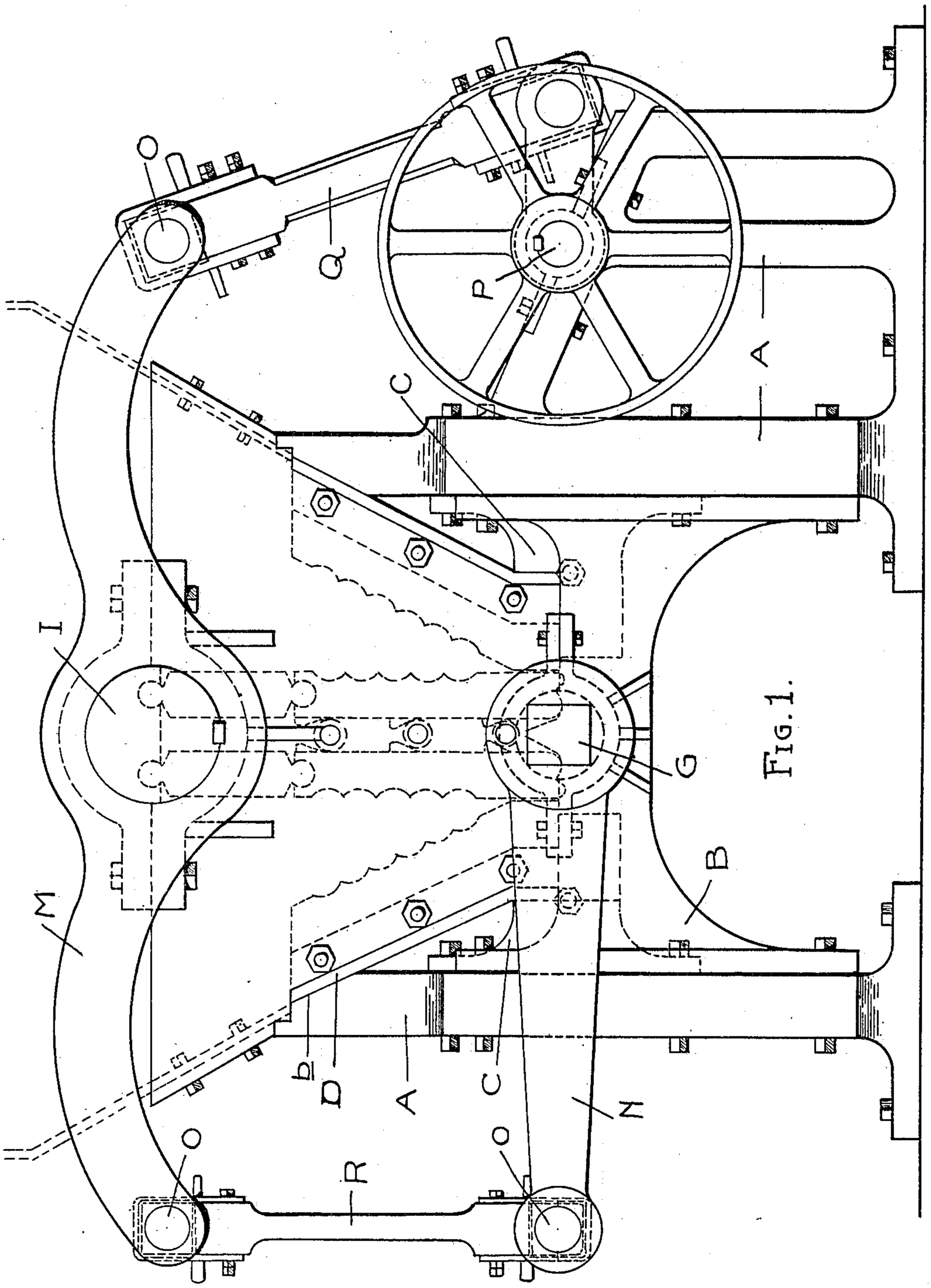

FIG. 1.

WITNESSES

Geo. H. Graves.

Jas. P. Barry

INVENTOR

JAMES W. BOILEAU.

BY James Whittemore

ATT'Y.

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NO MODEL. 2 SHEETS—SHEET 2.

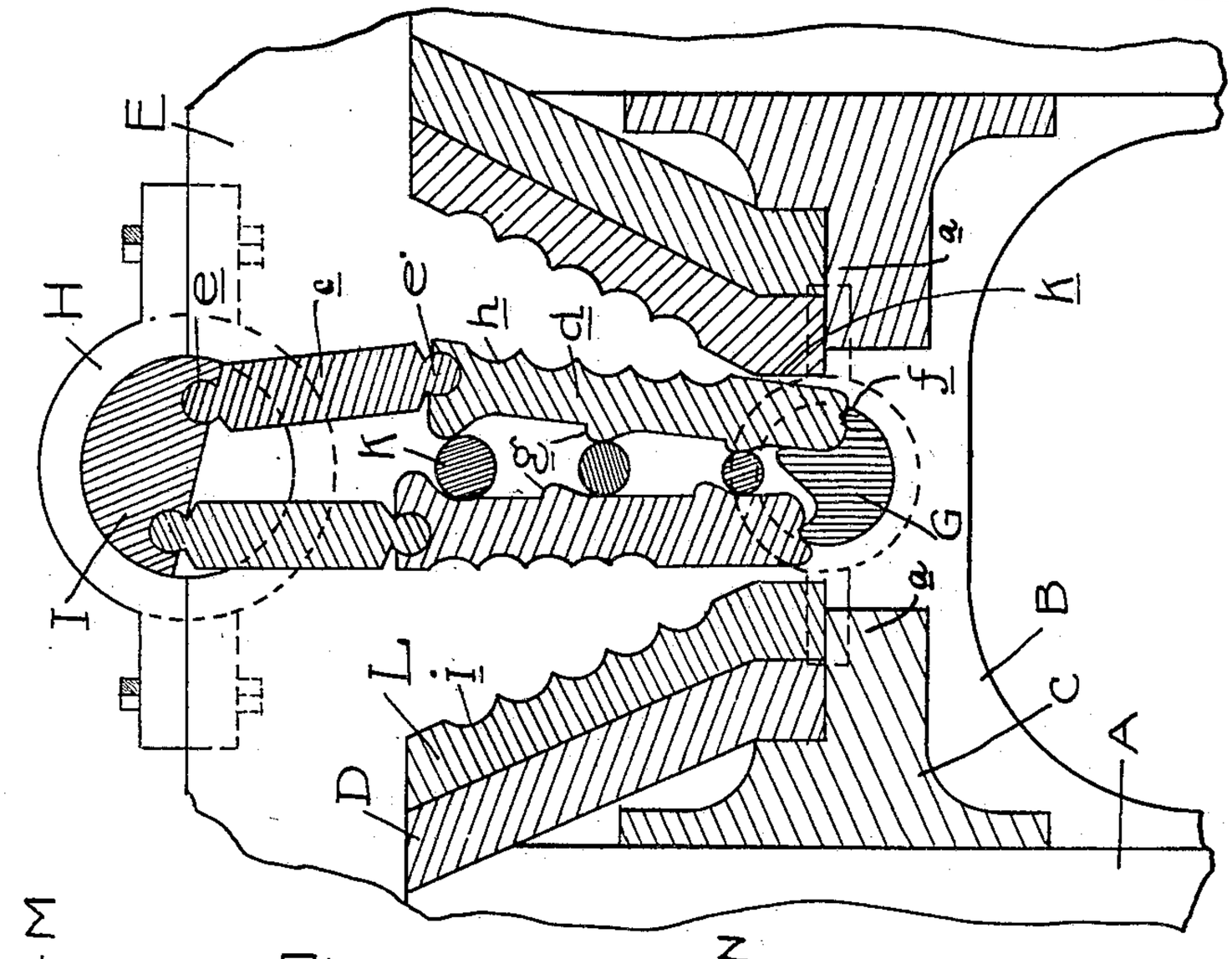

FIG. 3.

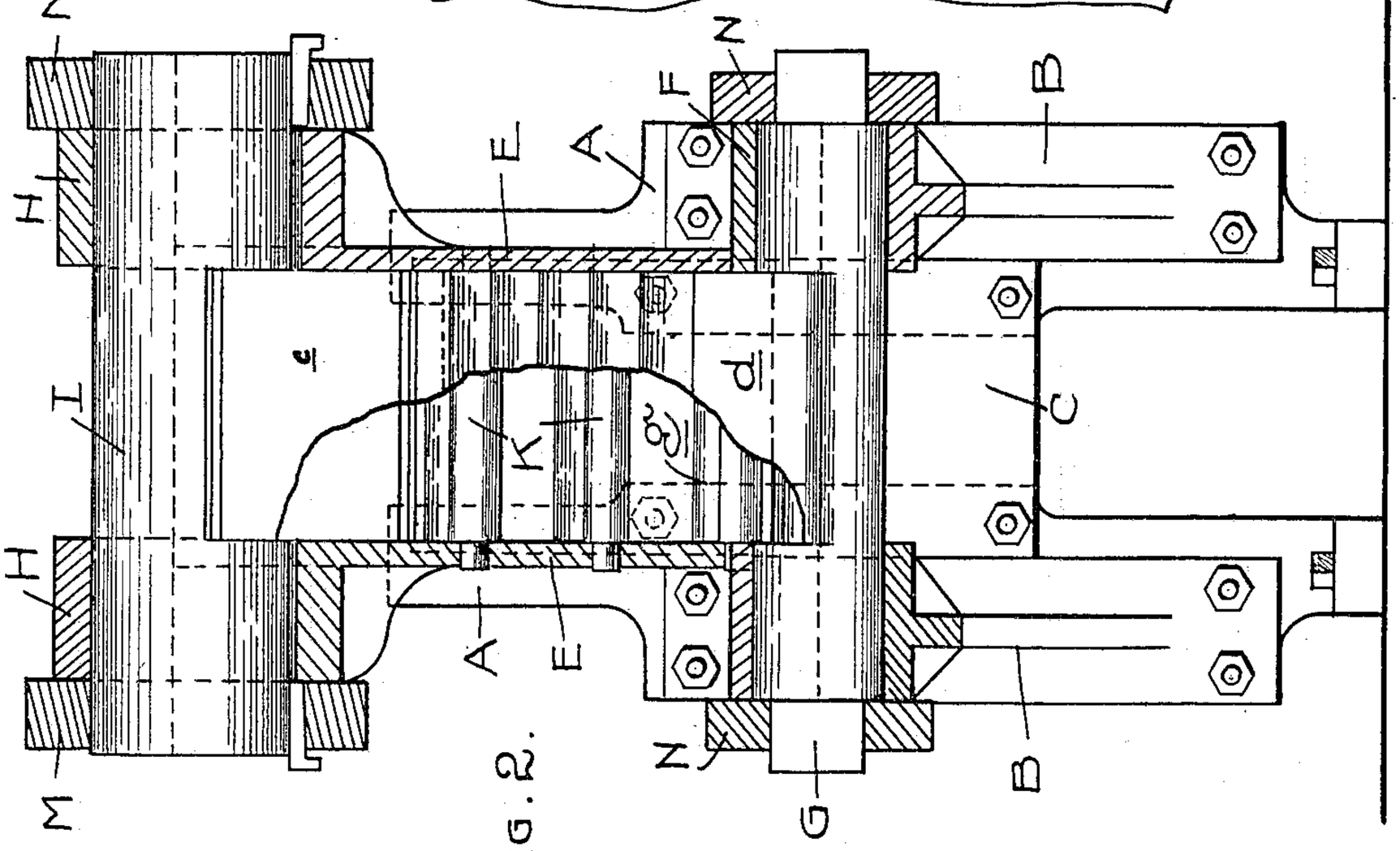

FIG. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES W. BOILEAU, OF DETROIT, MICHIGAN, ASSIGNOR TO LOUIS C. SHERWOOD, OF DETROIT, MICHIGAN.

CRUSHER.

SPECIFICATION forming part of Letters Patent No. 758,735, dated May 3, 1904.

Application filed June 13, 1903. Serial No. 161,248. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. BOILEAU, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Crushers, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to rock-crushers; and it consists in the peculiar construction, arrangement, and combination of parts, as hereinafter set forth.

In the drawings, Figure 1 is an end elevation of the machine. Fig. 2 is a longitudinal section therethrough, and Fig. 3 is a cross-section.

The machine belongs to crushers of that type in which the material is placed in a wedge-shaped chamber, one side of which is stationary and the other side movable, the movement being imparted to the latter by a walking-beam.

In the present invention improved results are obtained, first by forming the crusher-plates which constitute the sides of the wedge-shaped chamber with serrations of laterally-extending ribs adapted to engage with the fragments of rock and to hold the same from slipping during the crushing operation.

A further improvement is that the movable pressure-plate is longitudinally reciprocated by engagement with rocking bearings in constant fixed relation to each other, said plate being deflected laterally during its longitudinal reciprocation by a cam-bearing.

As shown in the drawings, the frame of the machine comprises the vertical standards A, arranged in pairs, which are cross-connected to each other by the bars B, bolted or otherwise secured to said standards. The pairs of standards are secured to each other by longitudinal plates C, bolted thereto, said plates having inwardly-projecting portions *a*, which form bearings for the lower end of inclined side plates D. These plates D bear at their upper ends against the inclined bearing *b* on the standards.

E represents end plates, which are bolted to the ends of the plates D, and together therewith form a hopper or receptacle for receiving the material to be crushed.

Centrally of the cross-bars B are formed the bearings F, having a shaft G journaled therein in the central plane of the machine.

H represents bearings formed on the end plates E, in vertical alinement with the bearings F, and adapted to receive the rock-shaft I. Shafts G and I, between their respective bearings F and H, are partially cut away, as shown in Fig. 3, to form bearings for the reciprocating pressure-plates *d*. These members *d* in normal position are arranged in parallelism, and arranged thereabove are struts *e*. The struts *e* have formed at the upper ends the rounded rib *e'*, which engages with a corresponding socket formed in the lower face of the shaft I. The lower end of the portion *e* has a similar engagement with the upper end of the member *d*. Thus the shaft I is free to be rocked through a limited angle, and in so doing will impart a vertical reciprocating movement to the member *d*, the rib *e* turning in its socket. The lower member *d* is grooved and rests upon a rib *f* on the shaft G.

K represents rolls extending beyond the members *d*, said rolls being journaled at their ends in the end plates E.

g represents cams formed on the inner faces of the member *d*, which are adapted to engage with the rolls K in the reciprocation of the members *d*, so as to cause a lateral deflection of the said members *d* at the same time that it is moved longitudinally. This lateral deflection is permitted by reason of the hinge connection *e'* between the members *e* and *d*.

The members *d* have formed on their outer faces the laterally-extending serrations *h*. L represents stationary crusher-plates, which are provided with corresponding serrations *i*, said plates being seated upon the plates D and extending at their lower ends in proximity to the members *d*.

M represents walking-beams arranged upon opposite ends of the shaft I adjacent to the bearings H.

N represents rock-arms secured to the opposite ends of the shaft G and extending laterally therefrom. The opposite ends of the

walking-beams M and the free end of the rock-arms N are cross-connected by shafts O.

P is a crank-shaft journaled in bearings upon the standards A at one side of the machine.

Q is a connecting-rod extending from the crank to the shaft O of the adjacent end of the walking-beams. R is a similar connecting-rod connecting the shafts O at the opposite ends of said walking-beams and of the rock-arms N.

The machine being constructed as described, in operation rotary motion is imparted to the crank-shaft P by any suitable drive connection. The rotation of the crank causes the reciprocation of the walking-beam through the connecting-rod Q, and a similar reciprocating movement is imparted to the rock-arm N by the rod R. Thus both the shaft I and the shaft G are rocked. The rocking of the shafts I and G will cause the opposite vertical reciprocation of the plates *d*, one being moved upwardly, while the other is moved downwardly. This vertical reciprocation will cause the cams *g* to travel on the rolls K, with the result that the members *d* will be deflected laterally toward the inclined crusher-plate L. The fragments of rock to be crushed are first thrown into the hopper or wedge-shaped receptacle formed by the plates D and E and will drop therein into the space between the plates L and the member *d*. Here in the reciprocation of the members *d* the serrations thereupon will engage with the rock, drawing the same downward and also pressing it outward against the plate L. As this movement contracts the space in which the rock is held, it will cause a crushing of the latter. In the reverse movement of the member *d* the serrations thereupon will be moved to gain a new hold upon the crushed fragments of rock, so that in a succeeding downward movement they will be still further crushed. The result is that the rock is broken into smaller and smaller fragments until the lower end of the wedge-shaped chamber is reached. Here the crushed fragments will pass between the adjacent parallel faces *j* and *k*, respectively, on the members *d* and the plate L. These faces are caused to approach and recede from each other by the rocking of the shaft G. Between these faces the fragments crushed in the wedge-shaped chamber are given the final crushing, which will reduce them to powder.

What I claim as my invention is—

1. An ore-crusher comprising a pair of rock-shafts connected for synchronous movement, a crushing-plate, a strut, one end of the plate and strut pivotally abutting, and the opposite ends pivotally engaging bearings upon said rock-shafts whereby said plate may be reciprocated, a coöperating stationary plate arranged at an angle to said movable plate to form a wedge-shaped chamber therebetween, and a cam in rear and intermediate the pivotal bearings of said reciprocating plate adapted to cause a lateral deflection thereof during the longitudinal movement.

2. An ore-crusher comprising a pair of rock-shafts connected for synchronous movement, a crushing-plate, a strut, one end of the plate and strut pivotally abutting and the opposite ends respectively engaging bearings upon the rock-shafts whereby said plate may be reciprocated, a cam on the rear of said plate intermediate its bearings, a bearing with which said cam engages to laterally deflect said plate during the longitudinal movement thereof, and a stationary coöperating plate arranged in front of and at an angle to said movable plate to form therebetween a wedge-shaped chamber.

3. An ore-crusher comprising a pair of rock-shafts connected for synchronous movement, a crushing-plate, a strut, one end of the plate and strut pivotally abutting, and the opposite ends respectively engaging bearings upon the rock-shafts, cams on the adjacent rear faces of said plates, an intermediate stationary bearing with which said cams are adapted to alternately engage in the reciprocation of said plates, stationary plates arranged upon opposite sides of said movable plates and at an angle thereto, so as to form wedge-shaped chambers therebetween.

4. An ore-crusher comprising a pair of rock-shafts connected for synchronous movement, said shafts being partially cut away upon adjacent sides, oppositely-disposed crushing-plates engaging at one end the cut-away portions upon one of the shafts, oppositely-disposed struts abutting with the inner ends of the plates and engaging the cut-away portions of the opposite shaft, stationary plates upon opposite sides of said movable plates and arranged at an angle thereto, so as to form wedge-shaped receptacles therebetween and means intermediate said movable plates and intermediate their shafts for alternately deflecting the same laterally during the longitudinal reciprocation thereof.

5. An ore-crusher comprising a frame provided with end plates, a pair of rock-shafts journaled in said frame and extending between said end plates, means connecting said shafts for rocking the same synchronously, a crusher-plate, a strut, one end of the plate and strut pivotally abutting, and the opposite ends respectively engaging bearings upon the rock-shafts, a duplicate plate and strut, one end of which pivotally abutting, and the opposite ends respectively engaging bearings upon the rock-shafts, stationary plates extending between said end plates upon opposite sides of said movable plates at an angle thereto so as to form wedge-shaped chambers therebetween, a roll mounted in stationary bearings between said end plates intermediate said movable plates and cams on the rear of said movable plates for alternately engaging said

roll during the reciprocatory movement of the plates adapted to deflect the same laterally.

6. An ore-crusher comprising a pair of rock-shafts connected for synchronous movement, a strut, one end of the plate and strut pivotally abutting and the opposite ends respectively engaging the rock-shafts, a duplicate plate and strut, one end of which pivotally abutting, and the opposite ends respectively engaging the rock-shafts, both of said plates having serrations upon their outer surface, stationary plates arranged at an angle to said movable plates and having transverse serrations upon their inner surface complementary to the serrations on the movable plates, and means intermediate the movable plates and intermediate the end shafts for alternately engaging said movable plates during their reciprocatory movement to deflect the same laterally.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES W. BOILEAU.

Witnesses:

JAS. P. BARRY,

H. C. SMITH.