(No Model.)

S. P. M. TASKER.

STONE CRUSHER.

No. 260,064. Patented June 27, 1882.

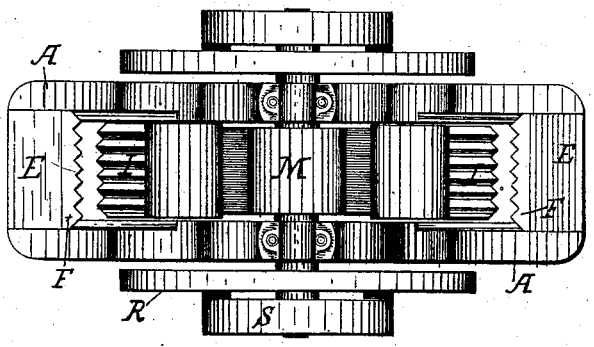

Fig. 1.

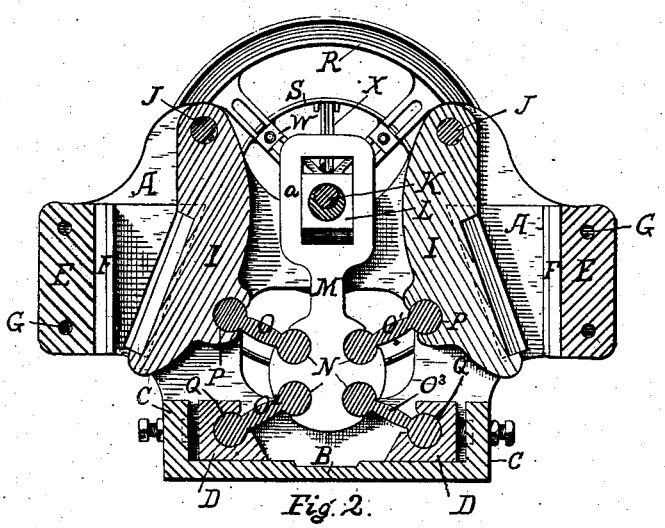

Fig. 2.

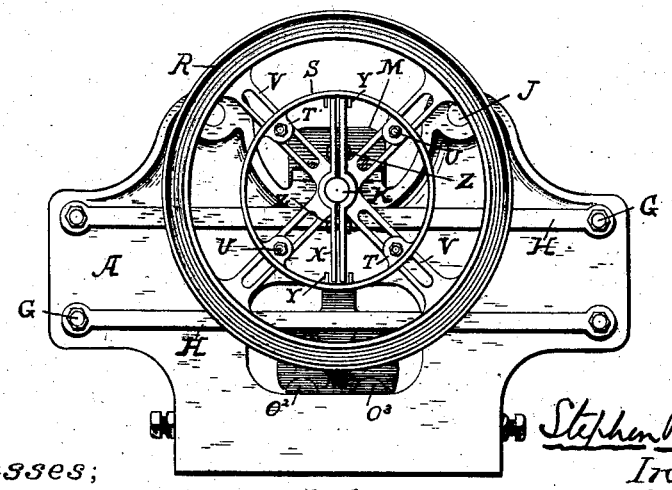

Fig. 3.

Witnesses;
J. Hutchinson Kay
John Dalleyson

Stephen P. M. Tasker
Inventor.
By his Attorneys,
W. C. Strawbridge
J. Bonsall Taylor.

UNITED STATES PATENT OFFICE.

STEPHEN P. M. TASKER, OF PHILADELPHIA, PENNSYLVANIA.

STONE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 260,064, dated June 27, 1882.

Application filed March 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN P. M. TASKER, of the city and county of Philadelphia, in the State of Pennsylvania, have invented an Improvement in Stone-Crushers, of which the following is a specification.

My invention relates in general to the machines employed to pulverize or disintegrate metalliferous ores, and which are known as "stone-breakers" or "ore-crushers."

It relates specifically to that well-known class of crushers in which the acting-faces of the jaws are upright, or so nearly so that the broken particles will descend and emerge from between them by their own gravity, in which said acting-faces are convergent to such extent that while the space between them at the top is sufficient to receive the stones that are to be broken, at the bottom it is only such as to allow the fragments broken to the required size to pass out; in which crushing is effected by giving a short vibratory movement to the movable jaw by means of toggles connected on the one hand to the said movable jaw and to an adjustable bearing, and on the other to a pitman or toggle-lever suitably oscillated, preferably by means of an eccentric shaft or kindred or equivalent device; in which, moreover, the point of support of the movable jaw is located above its acting-face; in which, again, adjustable toggle-blocks are employed for the more convenient and precise adjustment of the size of the opening betweeen the jaws, whereby the size of the fragments is determined; and in which, finally, the acting-faces of both the fixed and movable jaws are provided with a series of corrugations so oppositely arranged that a projection upon the one face registers in front of a recess between two projections upon the opposite face.

The object of my invention, broadly stated, is the improvement of that class of stone-crushing machines in which two movable jaws are employed in connection with two fixed jaws, and are operated by a common pitman, by the application of double sets of toggles as a means of connection between the pitman and the movable jaws.

To the above ends my invention consists in a duplex stone-crushing machine, a convenient embodiment of which is hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents in top plan view a machine conveniently embodying my invention. Fig. 2 represents the same machine in longitudinal vertical central section, and Fig. 3 represents the same in side elevation.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings, A represents the side frames or housings of the machine, which are connected together at the bottom by a base, B, formed as a part thereof, and which base is provided with transverse cross-heads, C, designed to receive the adjusting or setting-up devices employed to control the position of the adjustable bearings D of the lower toggles.

E are beds or cross-bars connecting together the longitudinal extremities of the side frames, and against which the stationary jaws or jaw-plates F are set. These beds are tied within the standards by means of bolts G, passing through them and the side plates, projecting upon the exterior faces of both side plates, and connected together by tie-bars H, applied upon the exterior faces of the side frames. By this construction great tensile strength is secured to the frame-work endwise, and the stationary jaws are bound together, so to speak, and rendered of greater resisting capacity than would be theirs were they cast as a portion of the frame.

It is of course manifest that in the case of machines intended for light work or the crushing of soft material it will be unnecessary to make the beds of the jaw-plates as separate members of the frame, but it will be competent to cast them with the frame. In the latter construction, however, it will be advisable to drill from side to side and apply the bolts and tie-bars as an additional strengthening device.

I are movable jaws, suspended free for a short vibratory movement from axial rods J, suitably and fixedly placed transversely between the side frames at the upper portions thereof, or from pillow-blocks projected upwardly from the frame. These jaws are preferably curved upon their acting-faces, as represented in the drawings.

K is the driving-shaft of the machine, journaled between the side frames in any preferred manner, and between said side frames eccen-

tric with its journals. Upon the eccentric portion is mounted a pitman-journal, L, being a sleeve or thimble surrounding the eccentric, and externally of the shape of a parallelopipedon.

M is the pitman or toggle-lever, whose width is equal to the space between the side frames, and which is well made when of the form represented in the drawings—that is to say, provided at its upper portion with a head, *a*, which is transversely cored or slotted out to fit it to receive the pitman-journal, which plays vertically within such slot, and at its lower portion of cylindric contour, so as to adapt it to be formed into seats for the toggles, the centers of which seats shall be on the radii of a vertical circular plane projected across said cylindric bottom portion.

The seats for the toggles are denominated by the letter N, and are channeled transversely through the cylindric base portion of the pitman, near the periphery of such portion, being of such shape as to adapt them to receive the inner extremities of the toggles.

O, O′, O^2, and O^3 are the toggles, whose form may be well described by saying that in transverse section they resemble the sectional outline obtained by longitudinally dividing a spherically-ended dumb-bell. These toggles are of the width of the space between the side frames of the machine, and are at their inner extremities entered within the seats formed for them in the lower cylindrical extremity of the pitman, while at their outer extremities the two upper ones, O O′, are entered within seats P, formed in the rear portions of the movable jaws, and the two lower ones, O^2 O^3, entered within seats formed in the adjustable bearings located in the base of the framework. This construction and application of the toggles render each toggle operative, not only as a toggle-bar proper, but as a link, as it will be readily comprehended that after the toggles are entered within their respective seats, and are put in position in the setting up of the machine, it will be impossible to displace or remove any one of them without unsetting the machine.

The driving-shaft projects beyond the side frames of the machine on both sides, and is next to said frames provided with fly-wheels R, snugly fitted but not keyed upon its projecting extremities.

Exterior to each fly-wheel, and connected therewith, is a rim or operative face of a pulley, the connection being conveniently effected by bolting on the rim through the instrumentality of lugs T, projected radially inward from the under face of the rim, through which lugs bolts U pass through the slotted spokes V of the fly-wheel and are connected thereto by means of keepers W, applied upon the opposite side of the slotted spokes. By means of this attachment, and especially of the slotted (or, if desired, perforated) structure of the spokes referred to, pulley-rims of various sizes may be applied to the driving of the fly-wheel and of the shaft.

X are a pair of clamp-plates or false spokes to the pulley-rim, which are shaped to surround and be clamped upon the outer extremity of the driving-shaft, and which are compelled to revolve with the pulley-rim and so revolve the shaft by reason of being entered at their opposite ends between studs Y, formed upon and projecting from the inner face of the rim.

Z are bolts which pass through both clamp-plates and are provided with nuts to bind the clamp-plates together upon the shaft with so tight a frictional pressure that motion imparted by a driving-belt to the pulley-rim will be transmitted through the clamp-plates to the shaft and the shaft and fly-wheel be caused to revolve with the pulley. This arrangement constitutes the means which I have provided for preventing undue strains or jarring upon the operative parts of the machine in the event of the clogging of either of the jaws with a fragment of material which cannot be crushed, and any mechanic will understand that while the clamping of the pulley and fly-wheel upon the shaft may be made sufficiently tight to cause the normal operation of the machine, yet it will not be so tight as to prevent the impetus of the fly-wheel from carrying it around in a partial revolution in the event of the enforced stoppage of the eccentric.

Such being a preferred construction of a convenient embodiment of my machine, the alternate operation of its movable jaws will be understood to result from the oscillation of the pitman under the actuation of the eccentric shaft revolving within the pitman-journal, as while the pitman-journal is free to move up and down within the slotted head of the pitman, such head is also vibrated thereby endwise of the machine, and said pitman is so caused to come under the control of the two lower toggles so as to take on a combined motion of oscillation and revolution about the axis of its cylindrical lower portion, which motion alternately throws the right-hand upper toggle to the right and the left-hand upper toggle to the left, (said toggles invariably operating oppositely,) or causes one toggle to throw in and the other toggle to throw out the movable jaws with which they are respectively connected. By this construction the entire power of the machine is transmitted through the pitman upon one movable jaw at a time, the energy requisite to retract the other jaw being a minimum quantity.

The extent of vibratory movement imparted to the movable jaws is controlled by means of the adjustable bearings of the lower toggles, which may be separately or together set in such predetermined position so as to vary the axial center of the cylindric lower portion of the pitman, which variance in position the unrestrained arrangement of the movable jaws and the vertical depth of the slot in the head of the pitman enable.

I have now specified certain detailed mechanical arrangements, and have represented them in the drawings. I desire to state that while I believe the mechanical contrivances referred to are capable of carrying my improvements into practical operation in a very perfect manner, I yet do not intend to restrict myself to the precise forms represented, as I am well aware that many allied mechanical devices, when assembled in the relation and combination invented by me, will operate to effectuate in perhaps an equally perfect manner the results which I have first attained by the employment of the elements themselves. Thus, while I have represented a specific form of pitman and of toggles, and a specific method of connection of the same together, and of the toggles with the movable jaws and with their adjustable bearings, it is yet very manifest that such relation of parts as is described being preserved, even if the equivalent parts are substituted, the same operation as such can be effected. Thus the form of the toggles and of the pitman may be essentially varied without departing from the vital dual relationship between them first established by me.

The gist of the invention resides in the fact that by a single movement of the pitman or toggle-lever two movable crushing-jaws are actuated, one to an operation of crushing the material and the other to an operation of releasing the crushed material from compression against the jaw-plate, such double action being synchronously performed with an expenditure of only the energy heretofore requisite to operate a single machine, or one not having the double capacity of this machine of mine. The construction of opposite sets of toggles, resorted to by me, of course occasions the operation of but a single set at a time, as when one set is straightening to operate the movable jaw contiguous to such set the other set is crooked to draw out of crushing contact the opposite movable jaw, the two actions, although opposite in nature, yet taking place at the same time.

The entire machine and its various parts or members may be made of suitable material and faced or formed as to its operative parts with chilled iron or with steel, in the usual manner.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a duplex stone-crushing machine, the combination, with two movable crushing-jaws, operative in connection with fixed crushing-jaws, of a pitman and a double set of toggles, the arrangement being such that upon the vibration of the pitman in either direction one set of toggles is straightened and one movable jaw thrown into action and the other set of toggles crooked and the other movable jaw thrown out of action.

2. In a duplex stone-crushing machine, the combination, with two sets of toggles, adjustable toggle-seats, and movable crushing-jaws, of a toggle-lever or pitman common to and operative of both sets of toggles and the movable crushing jaws and means for actuating said toggle-lever.

3. In a stone-crushing machine, in combination with the driving-shaft, a fly-wheel free to revolve upon said shaft, a band-wheel fixedly connected with the fly-wheel, and a friction-clutch device for connecting said band-wheel to the shaft.

In testimony whereof I have hereunto signed my name this 24th day of December, A. D. 1881.

STEPHEN P. M. TASKER.

In presence of—
JOHN JOLLEY, Jr.,
HENRY V. BUCKLEY.