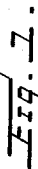


APPLICATION FILED NOV. 26, 1909.

2 SHEETS—SHEET 1.



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CRUSHING MILL.
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1,000,457.

Patented Aug. 15, 1911.
2 SHEETS—SHEET 2.

Fig. 3.

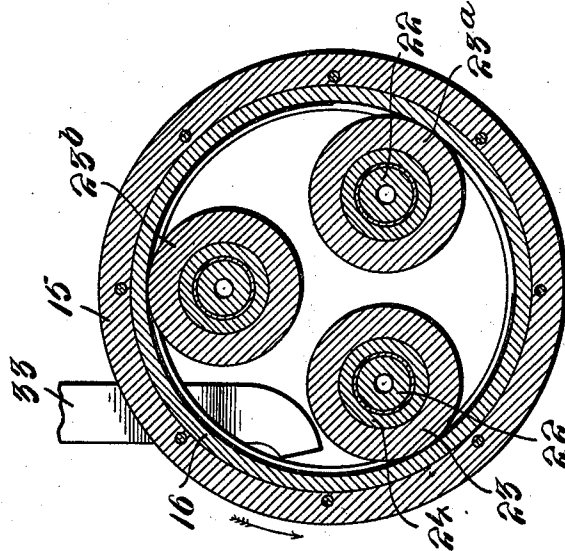
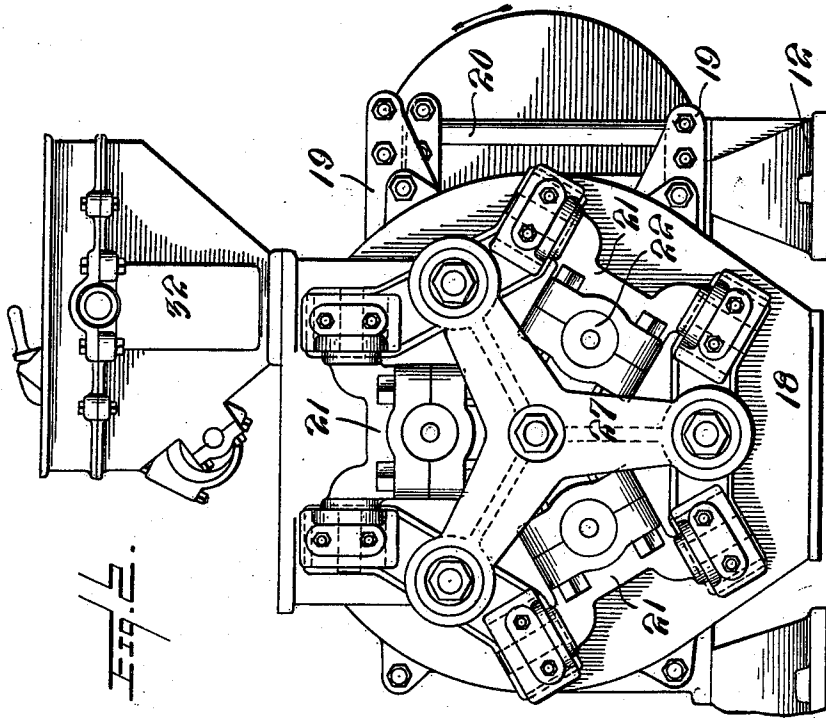


Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS LUGGETT STURTEVANT, OF QUINCY, AND THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, A CORPORATION OF MAINE.

CRUSHING-MILL.

1,000,457.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed November 26, 1909. Serial No. 530,016.

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States, residing, respectively, at Quincy and Wellesley, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Crushing-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of crushing mills, for crushing rocks, ores, etc., in which the material is reduced between an anvil ring and coöperating hammer rolls; and the present invention has for its object to provide an improved form of crushing mill, of the class referred to, in which a more efficient reduction of the material will be effected than in similar mills heretofore constructed.

In the operation of an anvil ring and hammer roll crushing mill the first roll which engages the crushing material just delivered to the anvil ring drives the coarse pieces of material just received down through the finer material on the ring, and which finer material has been subjected to the operation of the last preceding roll, and the reduction of which, to the desired degree, may be nearly completed. Then the next roll which takes up the work, and which will have less coarse material to crush, will be somewhat less effective than the first roll engaging such material, for the reason that the finer the material becomes the more difficult it is to effect its further reduction. Thus by the time the material comes to be acted on by the third crushing roll, (in a machine in which three crushing rolls are employed) the third roll is still less effective than the second roll. In order, therefore, to provide for an equally effective reduction of the material by the successive hammer rolls which act thereon, an increase of the surface pressure per square inch of such rolls must be provided for, and we have found that this desideratum can best be arrived at by providing crushing rolls having crushing faces of different widths, this being effected by making one or more of the hammer rolls thinner or narrower than the other or others.

In the accompanying drawings Figure 1

is a vertical section of a crushing mill embodying our present invention. Fig. 2 is an end view of the same looking from the right of Fig. 1, and Fig. 3 is a section through the anvil ring, its carrier, and the hammer rolls, on line 3—3, Fig. 1.

Referring to the drawings, 12 denotes a suitable base provided with standards 13 in which are journaled a rotating shaft 14 to which is secured a rotating head 15 (preferably of open construction or spider form) to which is attached the anvil ring 16. The said rotating head is mounted within a casing 17, which may constitute a portion of the fixed frame-work of the mill, and the chamber of which casing is closed at its end by a removable head 18 which will preferably be formed as a swinging door, as more fully described in our application Serial No. 441,857, filed July 3, 1908. To this end the said end head will be provided with extensions or projections 19 hinged upon a vertical rod 20, so that it may be opened or swung aside when access to the chamber of the mill is desired.

Pivotaly mounted on the head 18 are carriers 21 to which are attached bearing pins or shafts 22 which support the hammer rolls 23, 23^a and 23^b, the said hammer rolls being preferably attached to sleeves 24 rotating on said pins or shafts 22, as in the construction shown by our application above referred to. The bearing carriers are provided with inwardly extending lugs or projections 25 to which a yielding spring crushing pressure is applied for the purpose of forcing the hammer rolls outward toward the inner or crushing face of the anvil ring. In the present instance this crushing pressure is derived from springs 26 bearing on a three-armed spider 27 in which is tapped a central pressure screw 28 which impinges at its inner end against a disk 29 between which and the said lugs or projections 25 are interposed anti-friction balls 30 inclosed between suitable bearing parts 31, mounted on the said disk and in said lugs or projections, respectively. By virtue of the construction just described the pressure of the several springs 26 acting on the spider 27 may be equally distributed between the three anvil rolls 23, 23^a and 23^b, and the connections just described between the said disk 27 and the lugs 25 on the bearing-car-

riers 21 is such as to permit the slight freedom of movement of these parts relative to each other such as is necessary in the operation of the machine. The hammer roll 23^b is made thinner or narrower than the roll 23, so that the former presents a narrower crushing face than the latter. Owing to the fact that the pressure of the springs 26 is or may be made practically equal on the several hammer rolls, it is obvious that the crushing pressure per square inch on the surface of the hammer roll 23^b will be greater than the crushing pressure per square inch on the roll 23.

The material to be crushed will preferably be delivered to the mill from the automatic feeder 32 through the feed spout 33, and in the rotation of the anvil ring such material will first be acted on by the hammer roll 23, next by the hammer roll 23^a, and lastly by the hammer roll 23^b; and as the last-named roll will exert a greater crushing pressure per square inch of surface on the material than the roll 23 the greater crushing force per square inch of the face of the roll necessary to effect a further reduction of the partly-reduced material will thus be provided for.

If desired, the roll 23^a may be made slightly narrower than the roll 23, and the roll 23^b may be made narrower than the roll 23^a, thus providing for a successive increase of crushing pressure per square inch on the surface of the successively-operating rolls, to compensate for the successive increase of resistance to crushing action offered by the material successively acted on by these rolls. If a greater or lesser number of rolls than three be employed the last roll to act on the material will preferably have the narrowest face.

The invention is not to be understood as being limited to the detailed construction herein disclosed, as other means than those herein shown and described may be em-

ployed for carrying our invention into effect.

It is evident that if the pressure screw 28 be not centrally positioned relative to the lugs 25 on the carriers 21 somewhat unequal pressures may thereby be given to the rolls; but very great differences between the roll surface pressures per square inch are preferably secured by making the faces of one or more of the rolls narrower than the other or others.

In crushing mills of the class to which this invention relates slightly different crushing pressures of crushing rolls acted on equally by springs will result from the action of gravity, but this difference, due to gravity, is practically a negligible one, and in securing different crushing pressures per square inch for the different crushing rolls it will be understood that we secure these differences irrespective of the action of gravity.

Having thus described our invention or discovery we claim and desire to secure by Letters Patent:

1. In a crushing mill, the combination with an anvil ring, of a plurality of hammer rolls operating in the same track and having crushing faces of varying widths, and a common means for forcing all of the said rolls yieldingly outward toward said ring.

2. In a crushing mill, the combination with an anvil ring, of a plurality of hammer rolls operating in the same track and having crushing faces of varying widths, and means for pressing all of said rolls toward said ring with practically equal force.

In testimony whereof we affix our signatures, in presence of two witnesses.

THOMAS LUGGETT STURTEVANT.

THOMAS JOSEPH STURTEVANT.

Witnesses:

W. V. ELLIS,

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