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ROCK CRUSHER HAVING CONTAINED ROCK SCREENING AND COOPERATING GRATE MEANS

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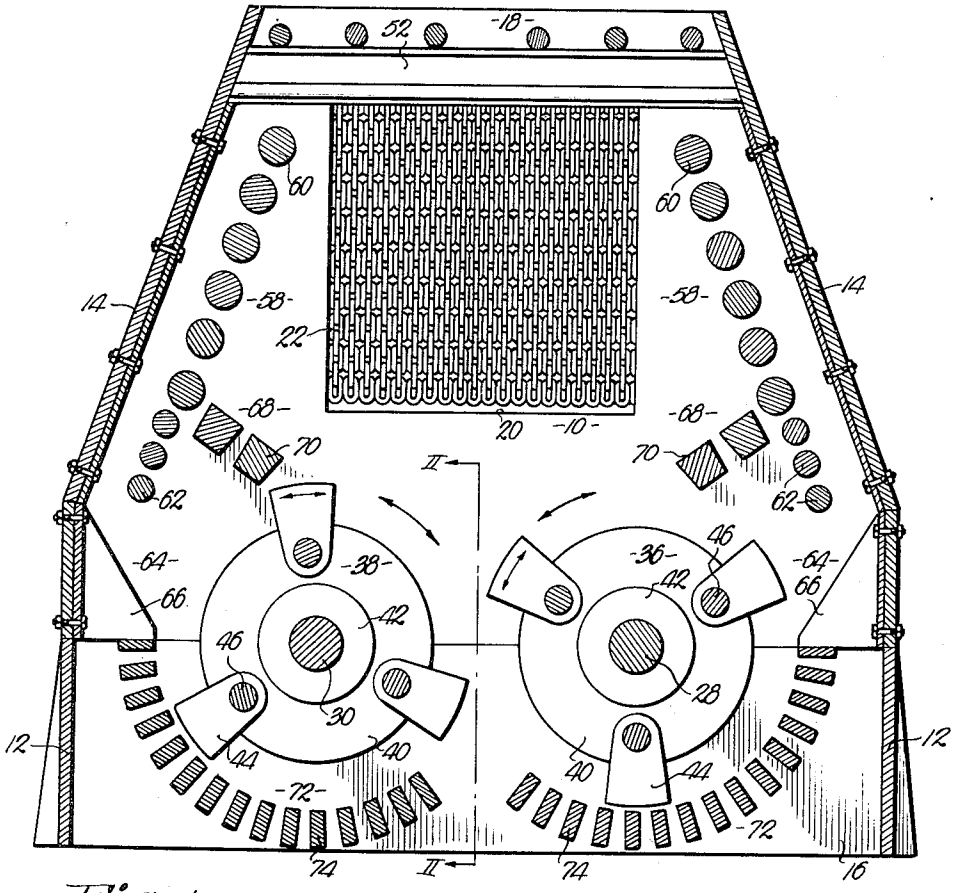


Fig. 1.

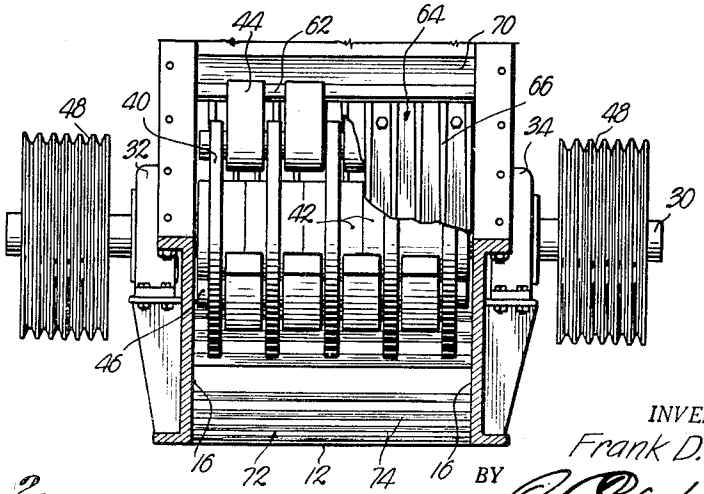


Fig. 2.

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ROCK CRUSHER HAVING CONTAINED ROCK SCREENING AND COOPERATING GRATE MEANS

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1 Claim. (Cl. 241—80)

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This invention relates to rock crushers, the primary object being to improve upon my U. S. Letters Patent No. 2,555,879, dated June 5, 1951, and entitled "Rock Crusher Having Contained Rock Screening and Redirection Means."

The most important object of this invention is to provide a rock crusher of the kind disclosed in my said patent having arcuate grates underlying the rotatable crushers and disposed to cooperate with the rock screening means thereof to more effectively produce rock of uniform, predetermined size.

Another important object of the present invention is to provide grate means as aforesaid capable of improving the rock crusher of my patent to the extent of making it possible to more effectively produce construction materials of many different sizes and grades.

Many more minor objects will be made clear or become apparent during the course of the following specification, reference being had to the accompanying drawings, wherein:

Figure 1 is a vertical, substantially central cross-sectional view of a rock crusher made in accordance with my present invention; and

Fig. 2 is a cross-sectional view taken on line II—II of Fig. 1.

In the drawings, the numeral 10 designates broadly a hollow chamber open at its bottom and provided with a pair of side walls 12, a pair of inclined side walls 14, end walls 16 and a closed top 18.

An inlet opening 20 is closed by a plurality of chains 22. A pair of shafts 28 and 30 extend transversely across the chamber 10 between the walls 16 thereof in substantially parallel relationship. These shafts 28 and 30 are rotatably mounted within bearings 32 and 34, in turn mounted exteriorly of the chamber 10 and attached to the walls 12 of chamber 10. Each of the hammer mills broadly designated by the numerals 36 and 38 have, in addition to the shafts 28 and 30 as a part thereof, a plurality of spaced-apart discs 40. The discs 40 are rigidly secured to the respective shafts 28 and 30 and are provided with a number of spacers therebetween designated by the numeral 42. A number of hammers 44 are journaled for free swinging movement upon a shaft 46 extending through openings provided in the discs 40 disposed outwardly from the respective shafts 28 and 30 and the spacers 42.

Shafts 28 and 30 are each provided with one or more sheaves 48 mounted exteriorly of the chamber 10 and having connection with a suitable source of power (not shown).

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Rock directed into the chamber 10 through the opening 20, falls by gravity upon the rotating hammer mills 36 and 38 and crushing action takes place as the hammers 44 of each of the mills 36 and 38 come into contact therewith. Such rock particles as come into contact with the top 18 of chamber 10 will be further broken into smaller particles by a plurality of side-by-side T-shaped rails 52. These rails 52 are disposed in transverse relationship to the shafts 28 and 30 and extend entirely across the chamber 10 between angled walls 14 thereof.

Much of the material which is moved upwardly by the mills 36 and 38 will be directed at an angle and laterally toward the side walls 14 of chamber 10. Segregation of the samller particles from the larger particles is accomplished by a row of beams 58 disposed along each of the inclined walls 14 of chamber 10. These rows 58 each constitute a plurality of beams 60 and a number of smaller beams 62. The beams 60 and 62 extend entirely across the side walls 14 of the chamber 10 and are in spaced-apart relationship. Each of the beams 60 and 62 passes through openings provided in the end walls 16 of chamber 10 and are held against displacement by a transverse pin passing therethrough exteriorly of the proximal end wall 16.

The rows 58 of beams 60 and 62 are spaced from the innermost face of the walls 14 and extend from a point immediately below the rails 52 to a point above the mills 36 and 38. The distance between the rails 52 governs the size of crushed rock which will pass from the chamber 10, such particles of rock as will not pass through the openings between beams 60 falling back upon the hammers 44 of mills 36 and 38 for further crushing and projecting upwardly until the same will pass through such openings. After the crushed particles of rock pass through the openings between beams 60, the same will fall downwardly by gravity between the beams 60 and the proximal side wall 14. The precise inclination shown for the rows 58 of beams 60 and 62, will cause such rock particles to roll downwardly without returning toward the center of the chamber 10. After these particles reach the smaller beams 62, those particles of desired size will fall between rails 62. Other rock particles will continue to roll downwardly along the innermost face of the rows 58 and be deposited upon a screening assembly broadly designated by the numeral 64. There is a screening assembly 64 underlying each of the rows 58.

A number of baffle plates 66 are triangular in shape and disposed in side-by-side relationship

throughout the entire length of the beams 62. These plates 66 are wedge-shaped, the widths thereof progressively decreasing as the lowermost ends are approached. Thus, any rock particles that fall upon the uppermost face of the assembly 64 and fall between the plates 66, will not become lodged therein since such spaces increase in width as the lowermost end of the assembly 64 is approached.

The triangular shape of the baffles 66 forming the assembly 64, presents an inclined uppermost surface and those particles of rock which will not pass between plates 66 will gravitate downwardly and be picked up by the hammers 44 of the mills 36 and 38 and either be crushed to a suitable size at the point of impact or be thrown upwardly against the beams 62 or into the center of crushing action within the chamber 10.

Also disposed within the chamber 10 is screening means 68. This screen 68 constitutes a pair of spaced-apart beams 70 interposed between the outermost path of travel of the hammers 44 and the rows 58 of beams 60 and 62. The rock being crushed and repeatedly falling upon the rotating hammers 44 and falling upon the uppermost face of the beams 68 will be directed into the hammer mills 36 and 38 for re-crushing. The beams 70 are mounted in substantially the same manner as are beams 60 and 62 and are coextensive in length with the rows of beams 58. It is also notable that much of the rock rolling from the top of the screens 68 and into the hammer mills 36 and 38 will be directed against the lowermost surfaces of the beams 70 for further crushing.

In accordance with the present invention, there is provided an arcuate, substantially semicircular grate 72 for each crushing means 36—38 respectively, each grate consituting a plurality of spaced, elongated bars 74. The uppermost bars 74 are in supporting relationship to corresponding screening apparatus 64, and it is noted that the inclination of the uppermost faces of apparatus 64 has been altered from that shown in my patent to the end that the screening means 64 effectively cooperate with grates 72.

It is preferred that bars 74 extend through the end walls 16 and be keyed or otherwise held in place for ready removal and/or replacement. Their longitudinal axes are horizontal and their transverse axes within planes extending radially through axes of rotation of corresponding crushers 36 and 38. Thus, proximal bars 74 converge as hammers 44 are approached, eliminating wedging of rock between bars 74. Both grates 72 are spaced from side walls 12, permitting some of the rock falling through the screening means 64 to gravitate through the open bottom of chamber 10. Larger rock will slide along the upper inclined edges of plates 66 toward grates 72 within the paths of travel of hammers 44 that are relatively close to grates 72 when extended as shown in the drawings.

One crusher 36 or 38 may be driven clockwise or anti-clockwise, while the other crusher remains stationary, to produce "rip-rap" or large stones.

Both crushers 36—38 may be driven simultaneously, both clockwise or both anti-clockwise, to produce stones of medium size.

Crushers 36 may be driven anti-clockwise and crusher 38 clockwise, or vice-versa, simultaneously, to produce rock of a still smaller size.

And, crusher 36 may be driven clockwise and

crusher 38 anti-clockwise, or vice-versa, simultaneously, to produce relatively fine sized rock.

Finally, depending on the nature of the rock being crushed and other conditions, the speeds of rotation of the crushers may be varied to produce differing sizes of construction materials. Such wide variance in the nature of the finished product is made possible through the cooperation of the grates 72 with the screening means 64 and the hammers 44 that are freely swingable on their respective pins 46.

Manifestly, many changes and modifications may be made in the rock crusher above described and herein illustrated without departing from the spirit of this invention or scope of the appended claim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

In a rock crusher having structure including a top wall, a pair of spaced side walls and a pair of spaced end walls and forming an open bottom, hollow chamber provided with an inlet opening, there being a pair of spaced, rotatable rock crushing means in the chamber below the inlet opening adapted to project the rock upwardly and laterally to the top and both side walls of said structure, the improvement of which comprises the combination of screening apparatus including a plurality of spaced-apart, vertical plates mounted on each side wall respectively above the axes of rotation of said crushing means and having the uppermost edges thereof inclined downwardly and inwardly toward said axes of rotation for directing toward said crushing means oversize rock rejected by said inclined edges of the plates; and a grate underlying each crushing means respectively, said grates being spaced apart and extending downwardly and inwardly from the inward and lower portion of a corresponding screening apparatus toward each other in spaced relationship to the proximal side wall for receiving a portion of the rock from said screening apparatus, each grate including a plurality of spaced, elongated bars interconnecting said end walls with their longitudinal axes horizontal and parallel with the axes of rotation of said crushing means, the bars of each grate being arranged in an arcuate row concentric with the axis of rotation of the corresponding crushing means, the bars being disposed with their transverse axes in a plane extending radially through the axes of rotation of corresponding crushing means.

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