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SINGLE ROTOR HIGH EFFICIENCY CRUSHER

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Fig. 1

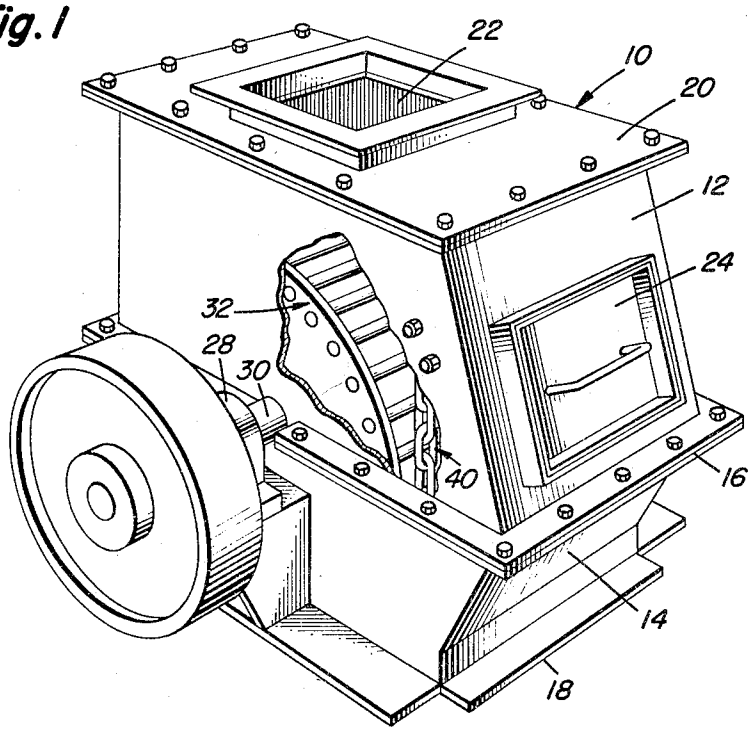

Fig. 7

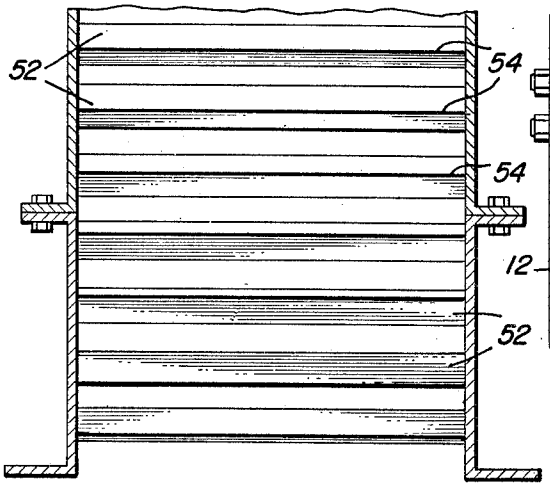

Fig. 4

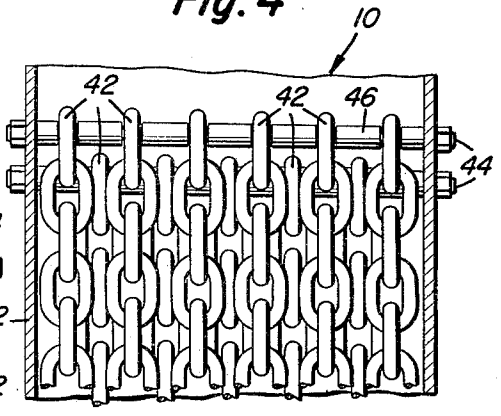

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Fig. 2

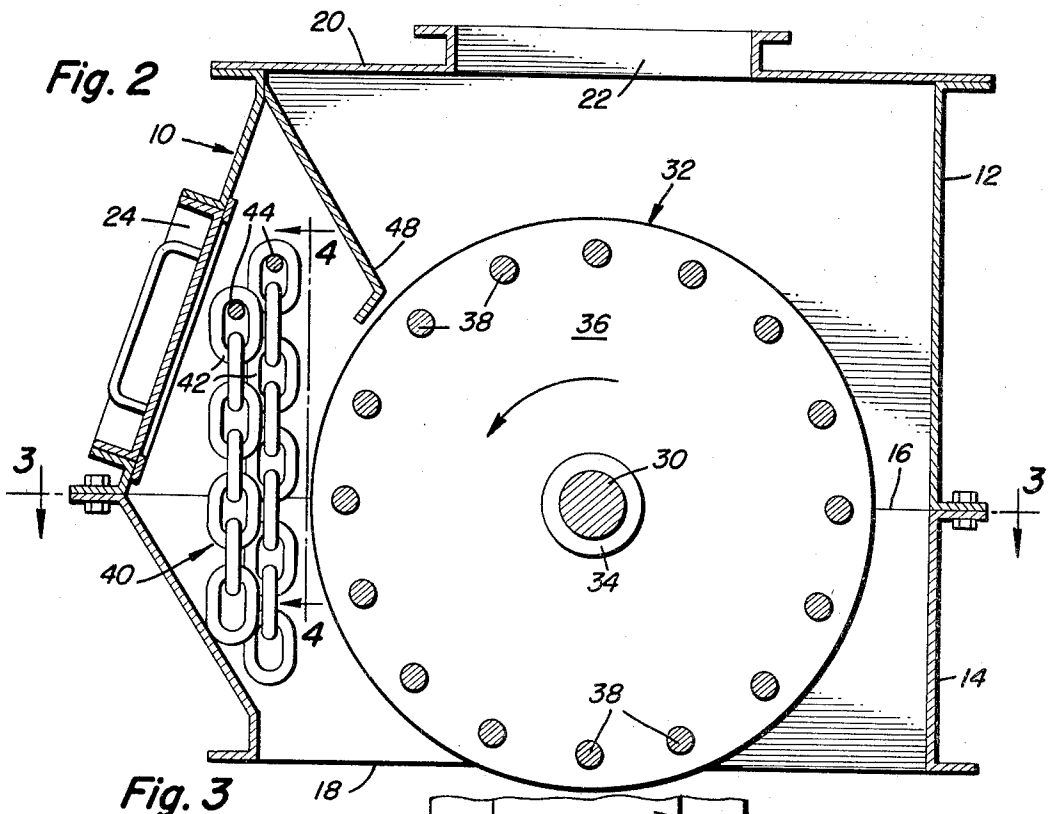

Fig. 3

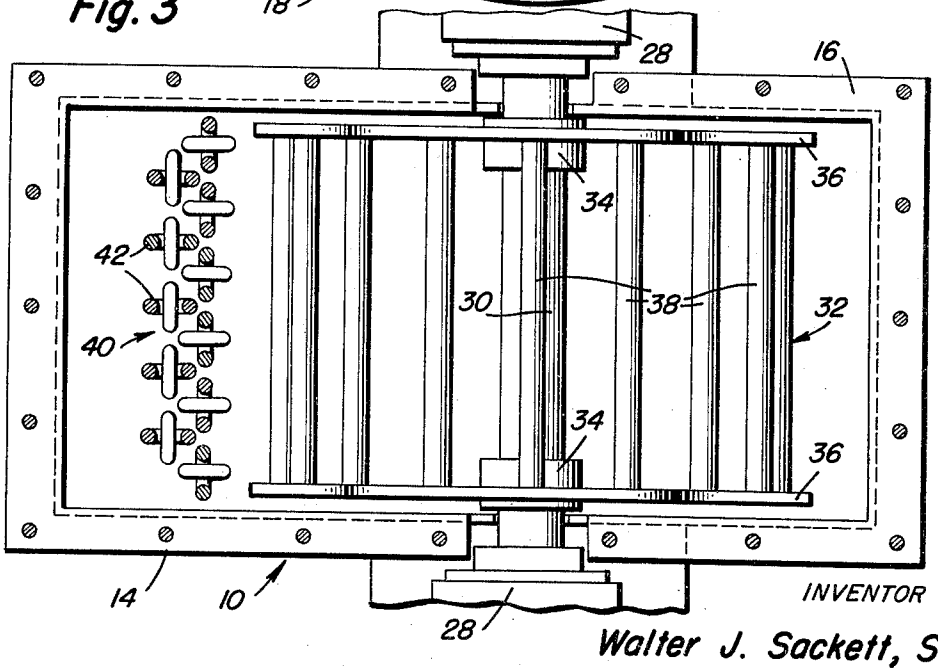

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Fig. 5

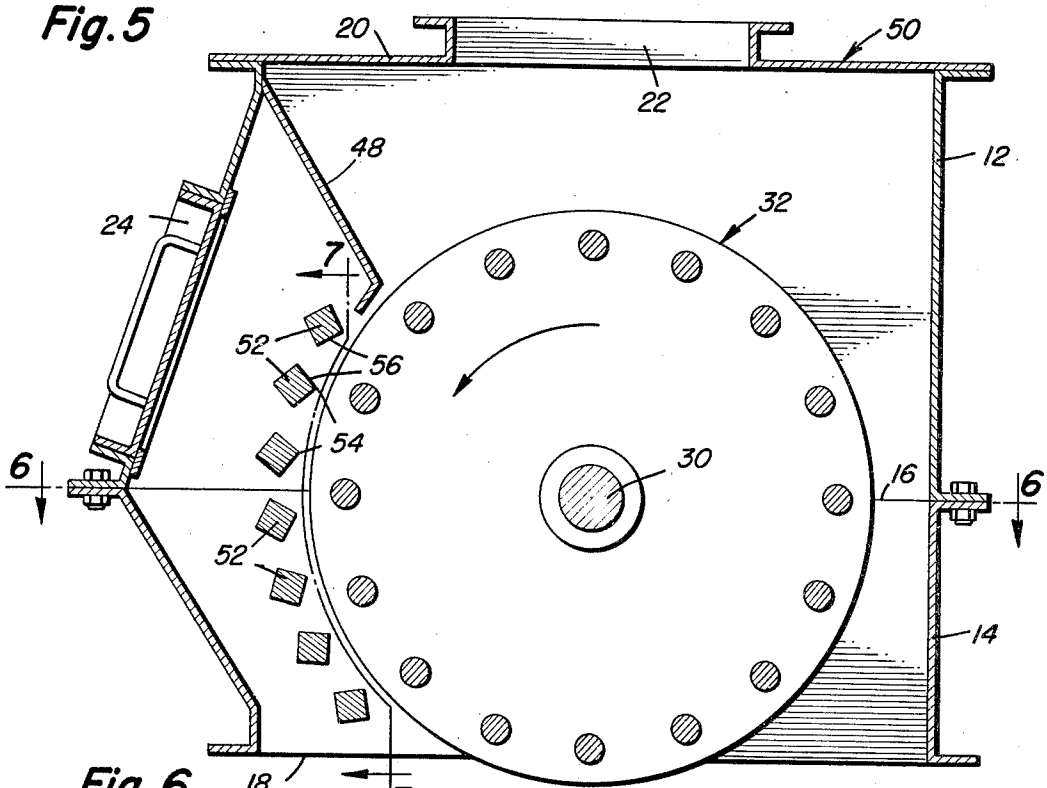
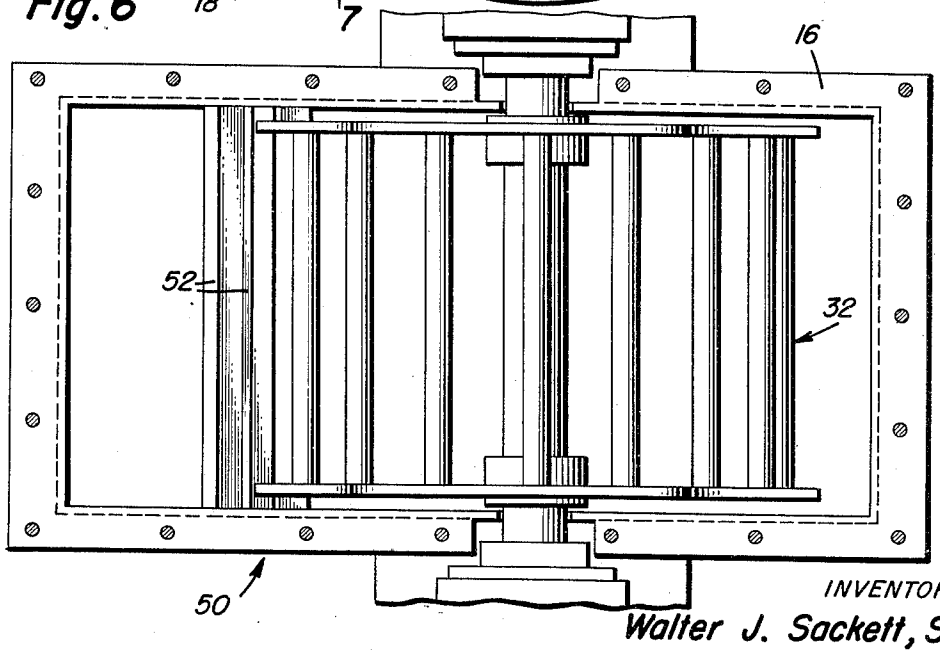


Fig. 6



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SINGLE ROTOR HIGH EFFICIENCY CRUSHER

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U.S. Cl. 241—189 3 Claims

ABSTRACT OF THE DISCLOSURE

A single rotor high efficiency crusher is provided which consists of a housing having a charging port at its upper face and a discharging port at its lower face. A cage rotor is mounted for rotation in the housing. In addition, a chain blanket is provided proximately tangential to the rotor consisting of a double wall of chain strands having their upper ends fixed and their lower ends free to move, with the chain strands being laterally displaced in one wall compared to the other wall and with the chain blanket being positioned in a plane substantially parallel to the axis of rotation of the rotor. In addition, the cage rotor is provided with a circular array of spaced rods and it is arranged to rotate, with the circular array of spaced rods of the cage rotor and the chain blanket being positioned in close proximity. When a quantity of coarse, lumpy material is introduced through the charging port, it impinges on the circular array of spaced rods of the rotating cage rotor and is thrown against and dragged against the chain blanket to be reduced to fine particles which discharge from the discharging port at the lower face of the housing. In another embodiment of the invention, the double wall of chain strands is replaced by an array of spaced rods which rods are arranged parallel to the rods of the cage rotor and being in a conforming configuration therewith.

This invention relates generally to comminuting devices, and more particularly it pertains to a single rotor high efficiency crusher for hard lumpy materials.

Mills have been provided in the past for grinding, pounding, and otherwise breaking up lumps in fertilizers, feeds, chemicals and the like. Among these are machines for powdery consistency material, or sticky, lumpy, granular materials, reference is made to my U.S. patents namely "Pulverizing Mill," Patent No. 3,342,426, issued Sept. 19, 1967 and "Twin Rotor High Efficiency Crusher," Patent No. 3,412,945, issued Nov. 26, 1968.

A primary object of the present invention is to provide a high efficiency crusher especially for use on hard rock-like materials, for example, dried oversize lumps of fertilizers.

Another object of this invention is to provide a crusher using, in combination, a rotating, material casting, cage rotor and a chain curtain or blanket in opposition therewith.

Still another object of this invention is to provide a crusher which employs a rotating, material transporting and urging cage rotor which cooperates with an array of sharp-cornered, faced bars.

Further, still another object of this invention is to provide a single rotor type crusher for hard lumpy materials which has a higher overall efficiency in the use of a cage type rotor utilizing bars over use of chains in a rotor.

To provide a single rotor high efficiency crusher which due to its construction, passes tramp metal, such as iron, without damage to the crusher, is still another object of this invention.

Even still another object of this invention is to provide a single rotor high efficiency crusher which is easy to install, and which, due to the low number of parts, is more economical to maintain, thus reducing maintenance costs.

Other objects and attendant advantages of the invention will become more readily apparent from the following detailed specification and accompanying drawings in which:

FIG. 1 is a perspective view, partly broken away, of a crusher machine incorporating features of this invention;

FIG. 2 is a vertical section taken on the longitudinal centerline of the crusher machine of FIG. 1;

FIG. 3 is a horizontal section taken on line **3—3** of FIG. 2;

FIG. 4 is a fragmentary vertical section taken on line **4—4** of FIG. 2 showing details of the chain blanket;

FIG. 5 is a view similar to FIG. 2 but illustrating another embodiment of the invention;

FIG. 6 is a horizontal section taken on line **6—6** of FIG. 5; and

FIG. 7 is a fragmentary vertical section taken on line **7—7** of FIG. 5 showing details of the stationary bar array.

Referring now to the details of the invention, FIG. 1 shows generally a crusher machine **10** embodying features of this invention. This crusher machine **10** consists of an essentially rectangular housing of metal which comprises a pair of halves **12** and **14** which are flanged and bolted together at a junction **16**.

The upper half **12** of the crusher **10** is flanged at the top and provided with a cover **20**. The cover **20** has a materials feed aperture **22** where the hard lumpy, coarse material for crushing is introduced. A hatch **24** for access to the interior of the crusher **10** is provided in the side of the half **12**.

The lower half **14** of the crusher **10** is flanged and open on the bottom to provide a discharge port **18**. Support brackets **26** are provided on the opposite sides for journals **28**.

These journals **28** carry a drive shaft **30** which is centered at the flanged junction **16** and extends completely through the crusher **10** from one side to the other.

As shown best in FIGS. 2 and 3, a cage rotor **32** is mounted for rotation with shaft **30** intermediate the ends thereof. The cage rotor **32** consists of two circular end plates **36** spaced and secured for rotation by shaft bosses **34**. A drum-like array of spaced bars **38** on a radius of the rotor **32** extend between the end plates **52** and are secured thereto.

Near the top of the upper half **12** of the crusher **10** and to one side of the cage rotor **32**, there is provided a pair of rods **44** which extend horizontally thereacross as shown best in FIGS. 2 and 4. Lengths of chain **42** are hung on these rods **44** and are held in spaced relationship by spacers **46**. The spacers **46** on one rod **44** are such as to displace the chains **42** a half link relative to those on the other rod **44**, thus making up a dense curtain or blanket **40** hanging close to the periphery of the cage rotor **32**.

In operation, coarse or hard lumpy materials to be reduced are introduced to the crusher **10** through the feed aperture **22**. A deflector plate **48** mounted therebelow directs the coarse materials to fall against the bars **38** of the cage rotor **32** (rotating in the direction of the curved arrow in FIG. 2). The material is struck sharply by the bars **38** and the small or reduced pieces fall through the interstices while the larger pieces are flung and dragged against the curtain or blanket **40** for further breakup to finally all exit from the discharge port **18**. If there is any tramp metal, such as iron, in the materials being reduced, it is thrown by the bars **38** in the cage rotor **32** against the yielding chain blanket **40** and passes downwardly in the space between the chain blanket **40** and the cage rotor **32** through the crusher **10** without damage thereto.

Referring now to the details of the other embodiment

of the invention as shown in FIGS. 5, 6 and 7, reference numeral **50** indicates generally a crusher. This crusher **50** while somewhat similar to the crusher **10** previously described differs in employing a fixed sector array of a plurality of spaced sharp-cornered breaker bars **52** instead of the blanket of chains. These bars **52** are preferably of polygonal cross section having sharp corners **54**. Thus, the material thrown against the bars **54** is fractured as well as crushed.

The bars **52** are secured at their ends to the walls of both the upper half **12** and lower half **14** and extend entirely across within the housing as best shown in FIG. 7. Additionally, as noted from FIG. 5 the bars **52** are arranged in a semi-circular manner close to but on a larger radius from the periphery of the cage rotor **32**.

The faces of the bars **52** are inclined generally in the direction of incidence of the impinging pieces of material which attitude also directs a sharp corner **54** toward the rotor cage.

Large material which is not thrown is accordingly dragged from one bar **52** to the next in sequence in a downwardly direction until reduced to small size and falls out of the crusher **10** at the open bottom or discharge port **18**.

Although not shown, however, it will be obvious in the ilght of these teachings, means can be provided, if desired, at the ends of either bars **38** and **52** of both embodiments of the crusher for repositioning them axially to present new surfaces in bars **38** or faces **56** and sharp corners **54** in bars **52** as they become eroded and dulled in use. Also, if desired, the bars **38** and **52** in the rotors can preferably be formed of stainless steel material, which material improves in strength due to the work hardening thereof by the hard lumpy materials being reduced in size striking against the bars.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a single rotor high efficiency crusher, structure defining a housing having a charging port at its upper face and a discharging port in its lower face, means including a cage rotor mounted for rotation in said housing, a chain blanket consisting of a double wall of chain strands having their upper ends fixed and their lower ends free to move, with said chain strands being laterally displaced in one wall compared to the other wall, said chain blanket being positioned in a plane proximately tangential to the cage rotor substantially parallel to the axis of rotation of said rotor, said cage rotor having a circular array of spaced rods and arranged to rotate, said circular array of spaced rods of cage rotor and said chain blanket being positioned in close proximity, whereby when a quantity of coarse lumpy material is introduced through said charging port, it impinges on said circular array of spaced rods of said rotating cage rotor and is thrown against and dragged against said chain blanket to be reduced to fine particles which discharge from said discharging port at the lower face of said housing.

2. In a single rotor high efficiency crusher as recited in claim **1**, and additionally deflector plate means for directing material onto said rotor.

3. A single rotor high efficiency crusher for the comminution of coarse material, comprising, structure defining a housing, rotating means including a cage rotor having a circular array of spaced rods positioned within said housing, and means having chains spaced from said cage rotor tangentially thereto in a double wall, with each said chain being fixed at its upper end and free to move at its lower end, with the chains in one wall being laterally spaced from the chains of the other wall, said rods of said cage rotor and said chains convergingly striking and thereby comminuting said coarse material when passing through said housing.

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