May 27, 1969 H. C. KERN 3,446,444

ROTARY CRUSHER FEEDING AID

Filed Dec. 19, 1966

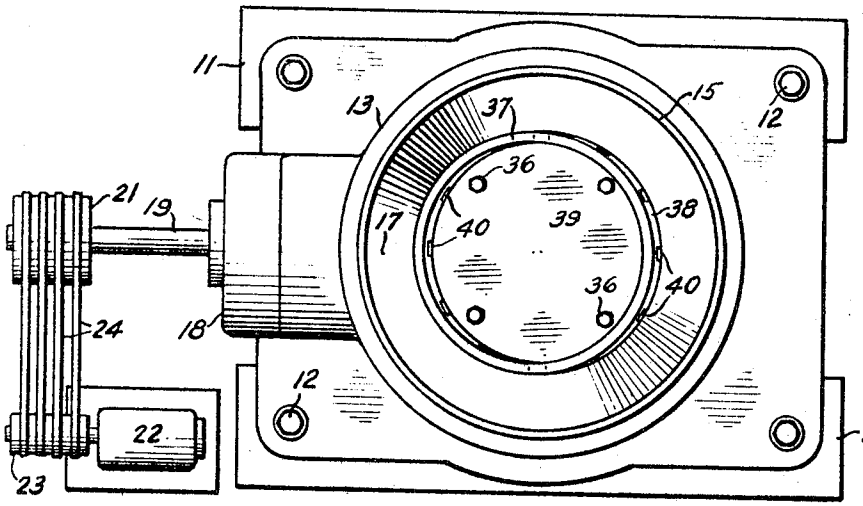


Fig. 1

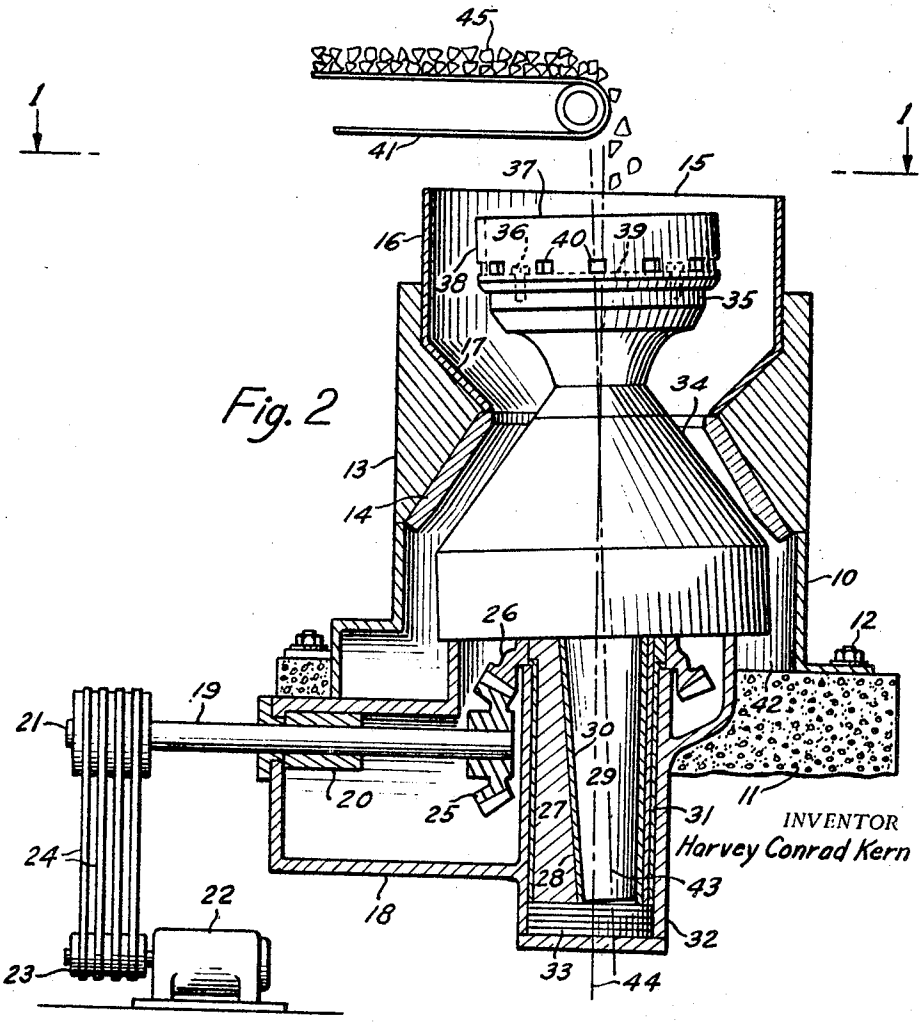


Fig. 2

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ROTARY CRUSHER FEEDING AID

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1 Claim

ABSTRACT OF THE DISCLOSURE

A rotary crusher has a receptacle, for receiving material to be crushed, fixed to the top of the revolving shaft of the crusher. The motion supplied to the receptacle by the shaft causes the heavier material to settle to the bottom of the receptacle while the lighter material passes over the side of the receptacle into the crusher.

Background of the invention

This invention relates to a rotary crusher having means to separate heavier material from the lighter material to be crushed.

It is often desirable to prevent heavy material, which is present in material to be crushed, from entering the crushing cavity of a crusher. For example, in the crushing of slag produced by steel plants where the heavy material may be a mixture of slag and iron or manganese, this mixture is difficult to crush and may cause damage to the crusher.

In the past, machines have been used to separate or classify material according to weight. The machines utilized vibratory or rotary tables or cylinders or conveyor and baffle arrangements. Generally, these machines are a separate unit apart from a crusher. As such, the unit requires its own motion producing means. In addition, such units occupy a relatively large floor space and are expensive to maintain and operate.

Summary of the invention

It is an object of this invention to provide a single machine which economically crushes and separates material according to weight.

The foregoing object can be attained by attaching a suitable receptacle to the rotating member of a rotary crusher and positioning the receptacle to receive material prior to crushing.

Brief description of the drawings

FIG. 1 is a top view taken on the line 1—1 of FIG. 2.
FIG. 2 is a side view, partly in section.

Description of the preferred embodiments

Referring to the drawings, the machine includes a rotary cone type crusher, well known in the art. The crusher comprises a frame **10** which is attached to a foundation **11** by bolts **12**. Secured to and extending upwardly from the frame **10** is a bowl **13**. A wear resistant circular bowl liner **14** is secured to the lower interior surface of bowl **13**. A hopper **15** is secured to the upper interior surface of the bowl **13**. Hopper **15** extends above the bowl **13** and has an upper cylindrical portion **16** and a lower conical portion **17**.

Attached to the lower portion of the frame **10** is a gear housing **18**. A countershaft **19** extends through the gear housing **18** and countershaft bearing **20**, attached to gear housing **18**. One end of countershaft **19** has a pulley **21** secured thereto. Motor **22** through motor pulley **23** and belts **24** drive pulley **21** and countershaft **19**. The other end of countershaft **19** has a pinion **25**

attached thereto. Pinion **25** drives a gear **26** which is secured to eccentric **27**. Eccentric **27** has an opening **28** extending therethrough for receiving a tapered shaft **29**. The opening **28** in eccentric **27** tapers to a smaller diameter at its lower end and has its longitudinal axis **43** inclined with respect to the vertical axis **44** of the crusher. An inner eccentric bearing **30** is positioned between shaft **29** and eccentric **27** to allow the shaft **29** to rotate relative to the eccentric **27**. An outer eccentric bearing **31** is positioned between eccentric **27** and eccentric housing **32** fixed to frame **10** to allow eccentric **27** to rotate relative to the frame **10**. Step bearing **33** is positioned beneath eccentric **27** and shaft **29** to sustain the load of the shaft **29** and the components attached thereto.

Secured to shaft **29** near its upper end is a conical mantle **34**. Positioned above the mantle **34** and secured to shaft **29** is a feed plate **35**. The outer surface of mantle **34** is spaced from the inner surface of the bowl liner **14**. The spacing between the mantle **34** and bowl liner **14** defines the crushing cavity. The amount of spacing varies from one side of the mantle **34** to the other side according to the position of shaft **29** and eccentric **27** due to the inclination of the axis **43** of the shaft **29** with respect to the vertical axis **44**.

Secured to feed plate **35** by bolts **36** is a receptacle **37** having a circular side wall **38**, inclined with respect to vertical axis **44**, and a bottom portion **39** perpendicular to side wall **38**. Openings **40** may be provided in side wall **38**. Also, bottom portion **39** may be eliminated and side wall **38** secured directly to feed plate **35**. In this case, feed plate **35** would be the bottom portion of the receptacle **37**.

Positioned directly above the receptacle **37** is the end of a conveyor **41** which discharges material **45** to be crushed into the receptacle **37**.

In operation, material **45**, such as slag and a mixture of slag and iron or manganese, is delivered to conveyor **41** which discharges the material into the receptacle **37**.

Motor **22** through motor pulley **23** and belts **24** drives countershaft **19** and pinion **25**. Pinion **25** drives gear **26** and eccentric **27**. Since shaft **29** is positioned in opening **28** of eccentric **27**, shaft **29** revolves with eccentric **27**. This motion is passed to receptacle **37** which is fixed to the upper end of shaft **29**. Thus, the material to be crushed in receptacle **37** is subjected to an eccentric motion causing the heavier material to settle to the bottom **39** of the receptacle **37** and the lighter material to be displaced over the side **38** of the receptacle **37** into the crushing cavity formed by bowl liner **14** and mantle **34**. The introduction of material to the crushing cavity causes the mantle **34** to rotate due to the resistance of the material to be crushed. This rotation is passed to the shaft **29** and receptacle **37**. Thus, in addition to revolving about a vertical axis **44**, receptacle **37** also rotates about its own inclined avis **43**. After the material is crushed in the crushing cavity between mantle **34** and bowl liner **14**, the crushed material passes downwardly and out of the crusher through an opening **42**.

The rate of flow of material **45** from conveyor **41** should be regulated to be approximately equal to the rate of flow of material from receptacle **37**.

If openings **40** are provided in side wall **38** of receptacle **37**, the size of such openings **40** should be substantially equal to the size of material desired after crushing. This size opening assures that all pieces of heavy material, which may damage the crusher, will be retained in the receptacle **37**.

From time to time, the above operation is stopped and the heavy material which has been trapped in the receptacle **37** is removed therefrom.

I claim:

1. In a rotary crusher embodying a crushing cavity, an upwardly extending member adapted to rotate about an axis inclined relative to the vertical axis of said crusher, to revolve about said vertical axis, and to crush material in said crushing cavity, and

means to so move said member,

the improvement comprising:

a receptable having a side wall and a bottom fixed to the upper end of said member and positioned to receive material to be crushed and to discharge the lighter material of said material to be crushed to said crushing cavity, said side wall having a plurality of openings therein of

a size substantially equal to size of the material after crushing.

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U.S. Cl. X.R.

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