June 9, 1925. 1,540,908

H. J. SHELTON

GRINDER AND BEATER

Filed Dec. 15, 1922 3 Sheets-Sheet 1

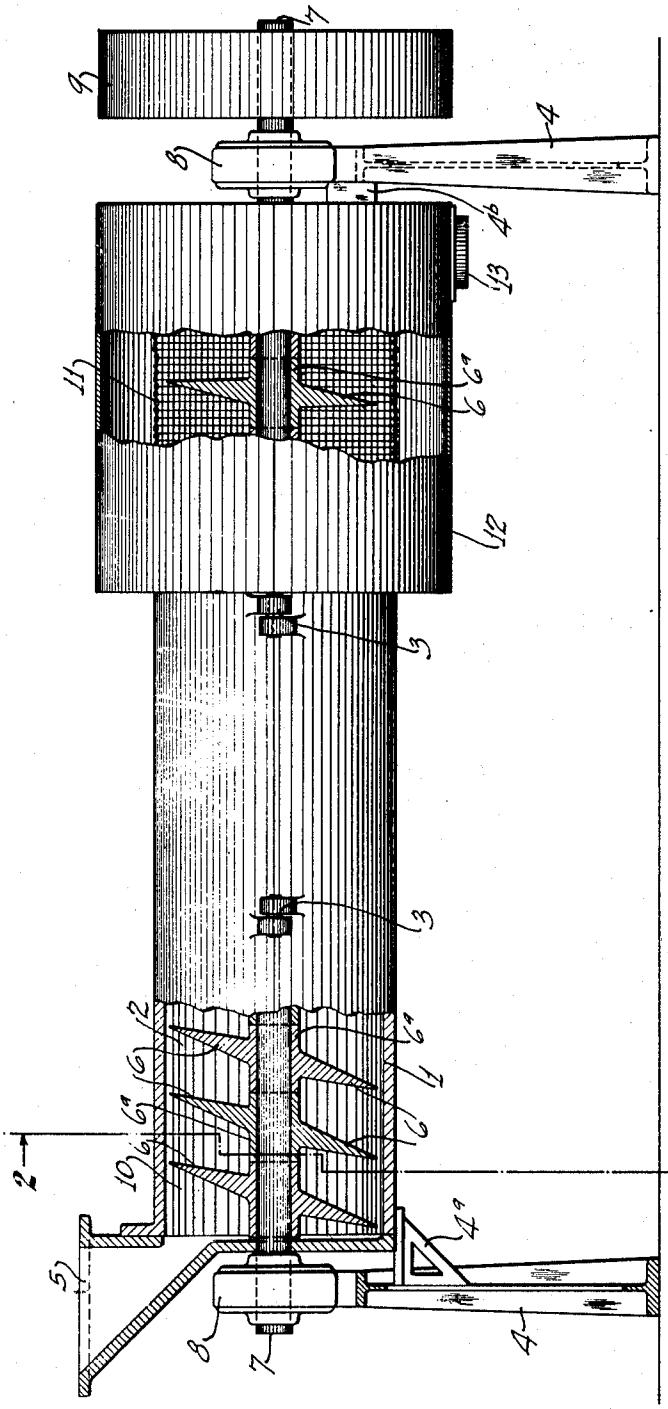


Fig. 1.

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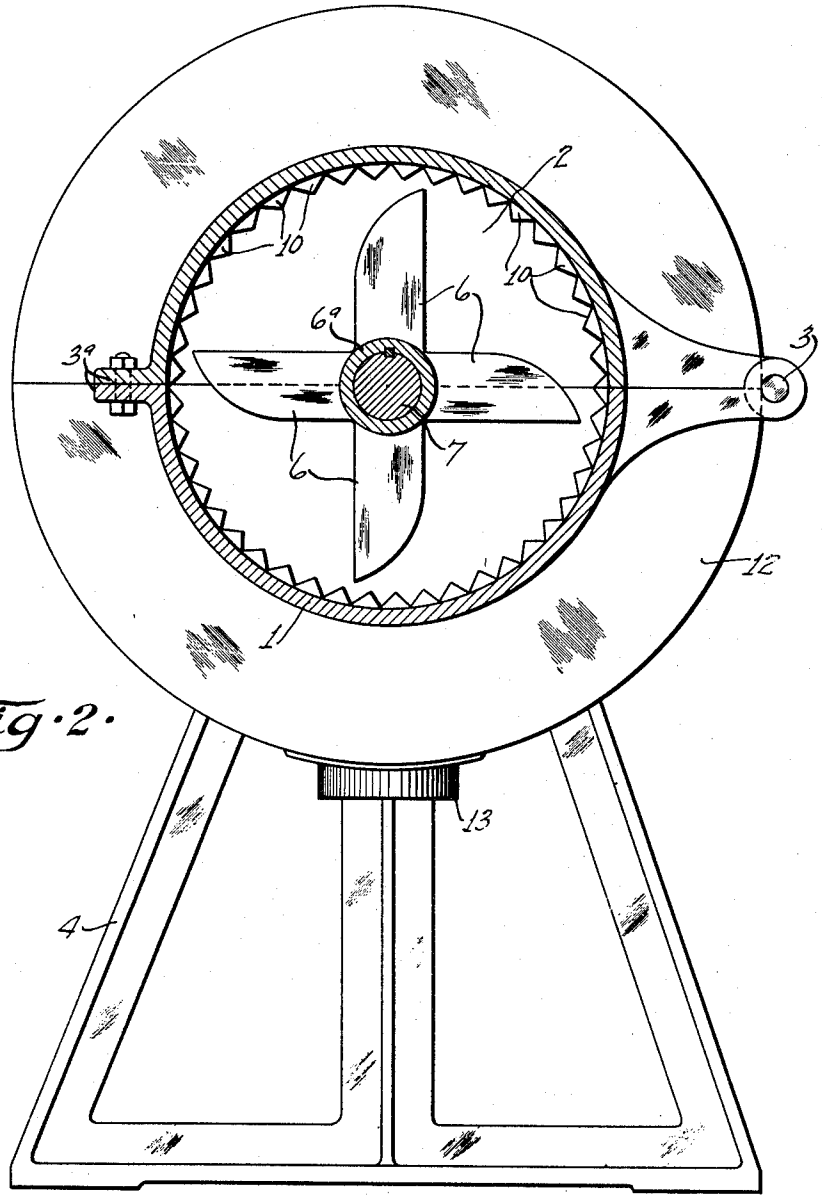


Fig. 2.

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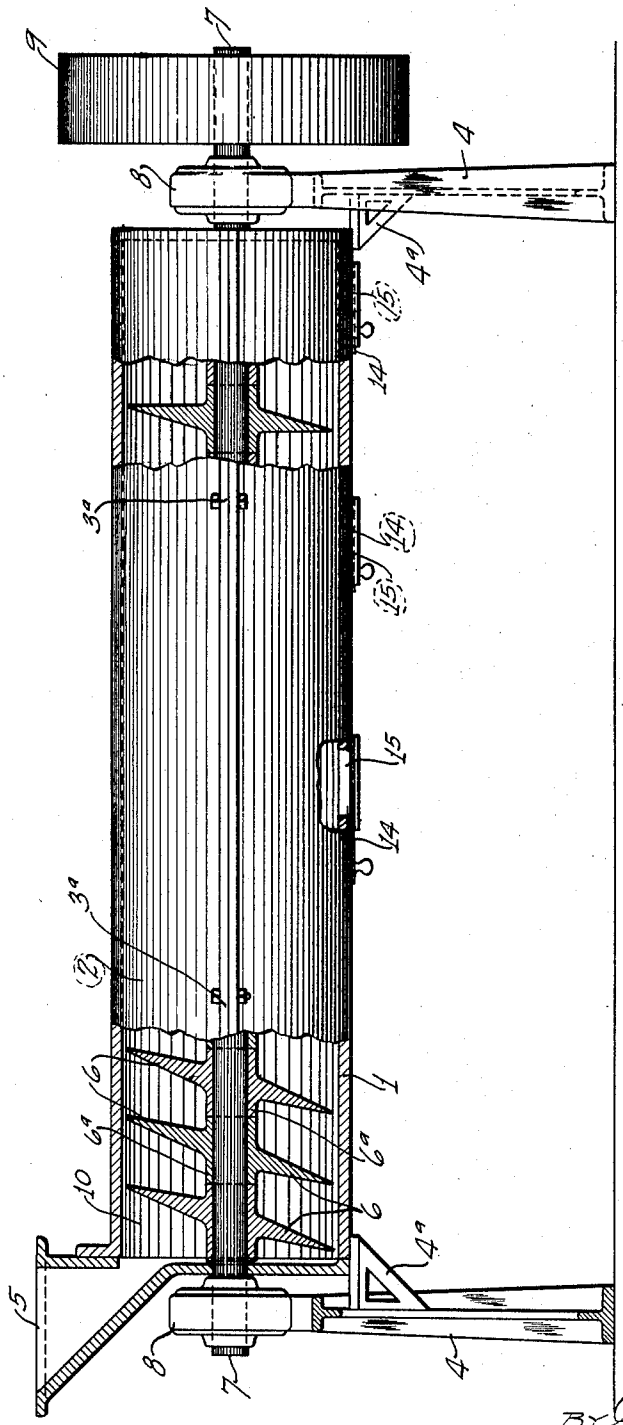


Fig. 3.

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Patented June 9, 1925. 1,540,908

UNITED STATES PATENT OFFICE.

HARRY J. SHELTON, OF ST. LOUIS, MISSOURI.

GRINDER AND BEATER.

Application filed December 15, 1922. Serial No. 607,117.

To all whom it may concern:

Be it known that I, HARRY J. SHELTON, residing in the city of St. Louis, in the State of Missouri, have invented a new and useful Improvement in Grinders and Beaters, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to grinders and beaters and more particularly to grinders and beaters adapted to reduce to a great degree of fineness material which requires a comparatively great amount of grinding and beating.

Heretofore, all beaters could generally be divided into two classes, namely, those having a grinding surface forming the upper circumferential wall thereof and a perforated plate or screen forming the lower circumferential wall thereof through which the material reduced was passed from the grinding chamber; and those having a grinding chamber with an inlet for material to be ground and an outlet therefrom which was normally closed but which was opened from time to time to allow the removal of the material reduced in the grinding chamber. In the first named type of grinder and beater the size of the perforations in the plate or screen governed the degree of fineness of the material reduced therein and it was impractical to reduce material to a great degree of fineness in such grinders and beaters since very small perforations in the plate or screen therein would become clogged during operation, thereby necessitating stopping the machine to open the perforations. In using grinders and beaters of the last type material was placed in the grinding chamber through the inlet, and was ground and beaten by revoluble hammers mounted in the grinding chamber. When the material has been ground and beaten enough to reduce it to the proper degree of fineness the outlet from the grinding chamber was opened and the reduced material was allowed to pass out of the grinding chamber. It is seen that this type of grinder and beater could not be operated continuously to reduce material but must be made to reduce one load of material and that load must be removed from the grinding chamber before the next load of material be inserted.

The objects of my invention are to provide a grinder and beater in which material may be submitted to the action thereof for any desired length of time and which may be continuously loaded without interfering with the reduction of such material; to provide a grinder and beater which will reduce material to a desired size in a comparatively short time; to provide a grinder and beater having a tubular housing with revoluble hammers mounted therein and in which the material being reduced moves longitudinally through said housing during the reduction thereof; and to provide a grinder and beater in which material may be quickly and easily reduced to a great degree of fineness.

One embodiment of my invention is fully shown in the accompanying drawings wherein similar letters are used to designate similar parts: Fig. 1 of the drawings is a view partly in section of a grinder and beater; Fig. 2 is a section along the lines 2—2 in Fig. 1; and Fig. 3 is a view of a grinder and beater embodying a modified form of my invention.

Referring to the figures, the grinder and beater comprises a housing 1 having the tubular grinding chamber 2 therein. The housing 1 is, preferably, divided into an upper and a lower section, hinged together as at 3 and normally held in closed position by bolts passing through the longitudinal flanges 3^a. The housing is carried by the brackets 4^a and 4^b formed on the standards 4. The inlet 5 is provided for the introduction into the grinding chamber of the material to be reduced and is, preferably, formed at one end of the housing, as shown in Figs. 1 and 3. The revoluble hammers 6, preferably made integral with the hubs 6^a, and, preferably inclined so that the peripheries of the circles inscribed by their outer edges merge into a spiral, are mounted on and adapted to be rotated by the shaft 7 which is journaled in the bearing boxes 8 carried by the standards 4. Motive power for the shaft is applied to the pulley 9 which is keyed on one end thereof. In the form of the grinder and beater shown in Fig. 1, the circumferential wall of the grinding chamber is formed with two sections. The section nearest the inlet 5 is provided with a circumferential wall having ridges 10 whose cross section is, preferably, substantially triangular with sharp vertexes pointing outwardly as shown in Fig. 2, to form the

grinding surface whereby the material is reduced. The section of the grinding chamber farthest from the inlet 5 has the wall thereof formed by the perforated plate or screen 11. The shell 12 which is of greater diameter than the grinding chamber 2 is arranged around the plate or screen 11 so as to provide a receiving space between the outside periphery of the perforated plate or screen 11 and the inside wall of the shell. The outlet 13 is provided in the lower wall of the shell 12.

The operation of the machine to reduce material is as follows: The material is introduced into the grinding chamber through the inlet 5 and is subjected to the action of the revoluble hammers 6 and the ridged grinding surface. Since the hammers are arranged spirally, as described above, the material is thereby carried longitudinally through the grinding chamber and when it has reached the end of the grinding chamber opposite the inlet, and has been reduced to a sufficient fineness to conform to the size of the openings in the perforated plate or screen 11, it will pass outwardly therethrough into the receiving shell 12 from whence it is removed through the outlet 13. The material to be reduced does not reach the screen until it has passed longitudinally through that part of the grinding chamber having the ridged grinding surface and has thereby been entirely reduced to the proper size. I prefer to have the hammers 6 sharply inclined at the front end of the grinding chamber nearest the inlet, with the angle of inclination of the hammers reduced towards the rear of the grinding chamber, nearest the outlet 13, as shown in the figures.

In the modified form of a grinder and beater embodying my invention shown in Fig. 3 the grinding chamber 2 has the circumferential wall thereof provided throughout with the ridges 10, and the screen 11 is dispensed with. A plurality of outlets 15, which are normally closed by the sliding doors 14, are provided in the wall of the grinding chamber, preferably on the lower side thereof. In this form of my grinder and beater the material is introduced through the inlet 5 into the grinding chamber to be submitted to the action of the revoluble hammers 6 against the ridges 10, as in the first form of grinder and beater, described above, and is carried through the grinding chamber by means of the spirally inclined hammers, by the suction of air, or by any other means, and is allowed to pass out through one of the outlets 15. If the material is to be ground to only a small degree of fineness it is allowed to pass out of the outlet 15 nearest the front or inlet end of the grinding chamber; if it is to be ground to a slightly greater degree of fineness it is allowed to pass out of the middle outlet; and if it is to be ground to a great degree of fineness the front and middle openings 15 are closed and the material is passed out of the grinding chamber through the outlet 15 nearest the rear end of the grinder and beater and farthest away from the inlet 5. In this way the tie during which the material is submitted to the action of the grinder and beater may be varied.

What I claim as new and desire to secure by Letters Patent, is:

1. A grinder and beater comprising a housing having a tubular grinding chamber with a plurality of revoluble hammers spirally mounted therein, said chamber having an inlet for material to be reduced and an outlet, the pitch of some of said hammers being greater than that of other of said hammers.

2. A grinder and beater comprising a housing having a tubular grinding chamber with revoluble hammers spirally mounted therein, said chamber having an inlet for material to be reduced and an outlet, the pitch of said hammers being greater at the inlet end of said grinding chamber than at the outlet end thereof.

3. A grinder and beater comprising a housing divided into upper and lower sections hinged together along one side at adjacent marginal edges, said housing having a tubular grinding chamber therein provided with an inlet at one end thereof and an outlet at the opposite end thereof, and revoluble hammers spirally mounted in said grinding chamber, the pitch of said hammers being greater at the inlet end of said grinding chamber than at the outlet end thereof.

4. A grinder and beater comprising a housing having a tubular grinding chamber with revoluble hammers spirally mounted therein, said grinding chamber having an inlet at one end thereof for material to be reduced therein, a portion of the length of the circumferential wall of said grinding chamber at the end thereof opposite said inlet being formed of foraminous material, and the pitch of said hammers being greater at the inlet end of said grinding chamber.

5. A grinder and beater comprising a housing having a tubular grinding chamber with revoluble hammers mounted on a shaft extending in said chamber and said hammers being arranged on said shaft at an acute angle thereto, said grinding chamber having an inlet at one end thereof for material to be reduced therein and having also an outlet arranged longitudinally thereof from said inlet.

6. A grinder and beater comprising a tubular housing having a single grinding chamber extending substantially the length thereof with a plurality of revoluble hammers mounted on an axially disposed shaft

extending in said chamber and said hammers being arranged on said shaft at an acute angle thereto, said grinding chamber having an inlet at one end thereof for material to be reduced therein and having also an outlet arranged longitudinally thereof from said inlet, and ridges arranged on the circumferential wall of said grinding chamber.

7. A grinder and beater comprising a tubular housing having a single grinding chamber extending substantially the length thereof with a plurality of revoluble hammers mounted in pairs on an axially disposed shaft extending in said chamber and said hammers being arranged on said shaft at an acute angle thereto, said grinding chamber having an inlet at one end thereof for material to be reduced therein and having also an outlet arranged longitudinally thereof from said inlet.

8. The combination of a grinder and beater, a tubular housing having a single grinding chamber extending substantially the length thereof with a plurality of hammers mounted therein, said grinding chamber having an inlet for material to be reduced therein, the circumferential wall of said grinding chamber for a portion of its length having ridges arranged thereon and the remainder of the length of said circumferential wall being formed of foraminous material, and some of said hammers being mounted in that part of said grinding chamber having the circumferential wall thereof formed of foraminous material.

9. The combination with a grinder and beater of a housing having a tubular grinding chamber therein, a plurality of revoluble hammers mounted on a shaft extending in said chamber, and said hammers being arranged on said shaft at an acute angle thereto, said grinding chamber having an inlet for material to be reduced therein, and the circumferential wall of said grinding chamber for a portion of its length being formed of foraminous material.

10. The combination with a grinder and beater of a housing having a tubular grinding chamber with revoluble hammers mounted on a shaft extending therein and said hammers being arranged on said shaft at an acute angle thereto, said grinding chamber having an inlet at one end thereof for material to be reduced therein, and the circumferential wall of said grinding chamber for a portion of its length having ridges arranged thereon and a portion of said wall at the end of said grinding chamber opposite the end having said inlet therein being formed of foraminous material.

In witness whereof I have signed my name to this specification.

HARRY J. SHELTON.