No. 669,465. Patented Mar. 5, 1901.

B. T. MURPHY.

GRANULATING MACHINE.

(No Model.) (Application filed Mar. 13, 1900.)

2 Sheets—Sheet 1.

Fig. 1.

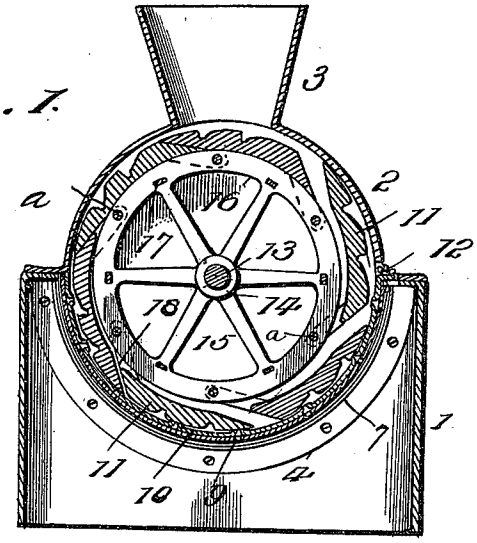


Fig. 2.

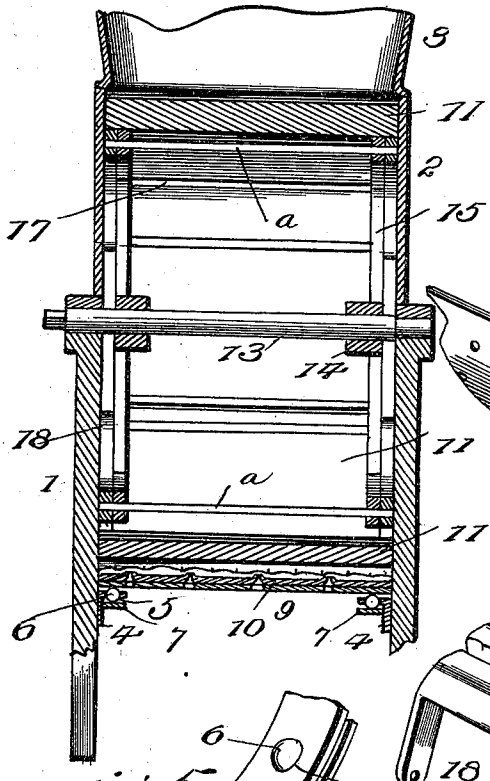


Fig. 3.

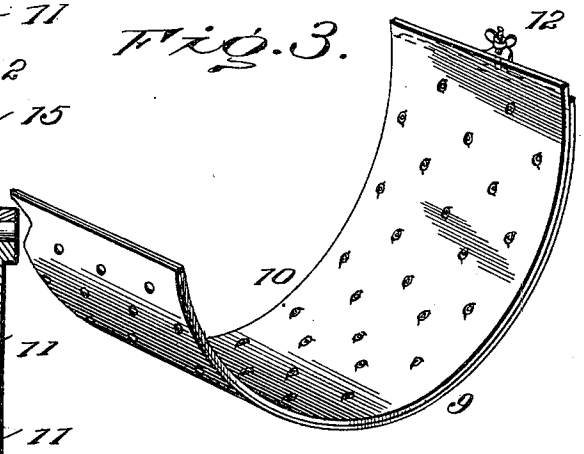


Fig. 4.

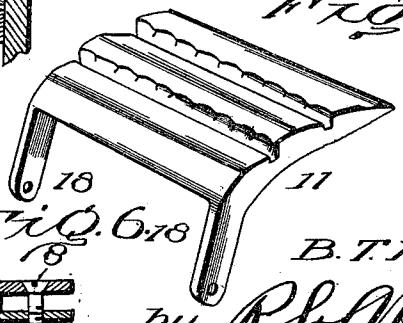


Fig. 5.

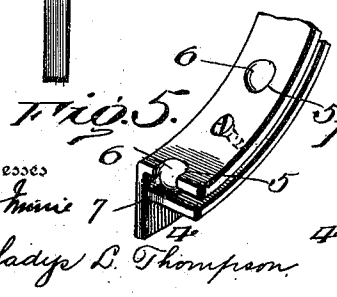
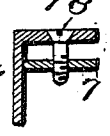


Fig. 6.



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2 Sheets—Sheet 2.

FIG. 7.

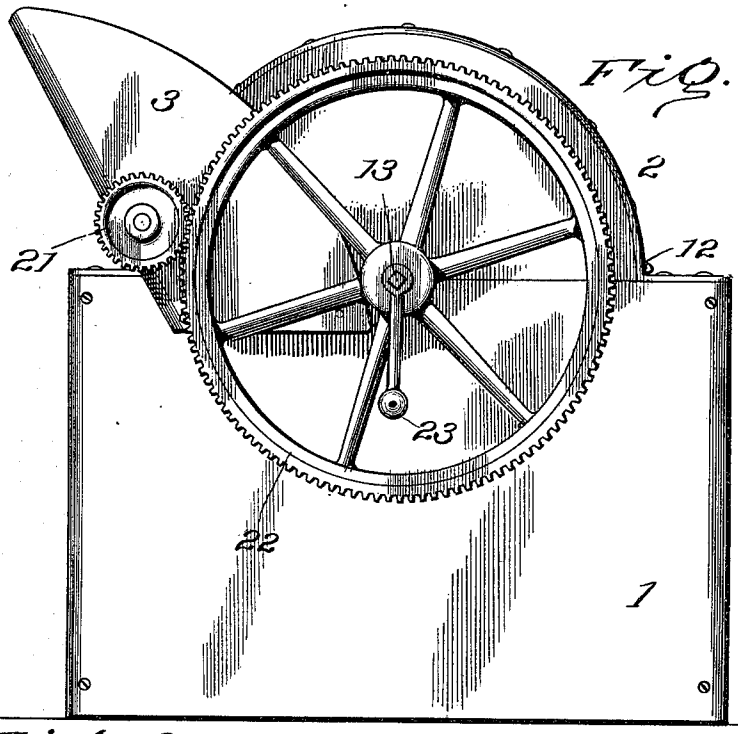


FIG. 8.

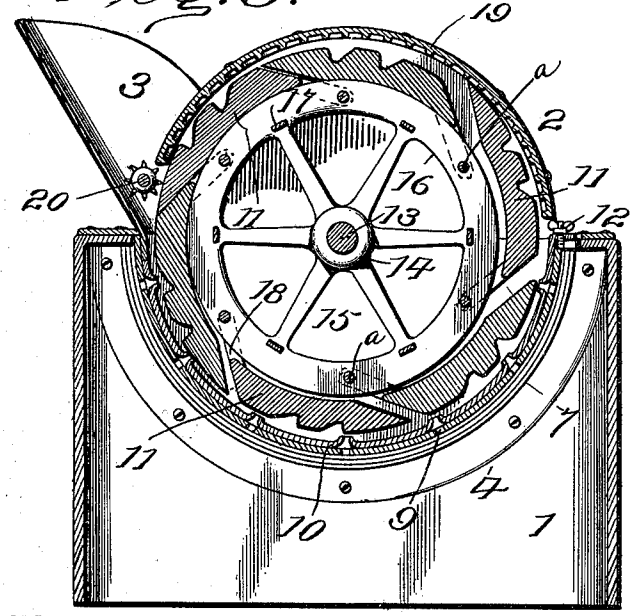
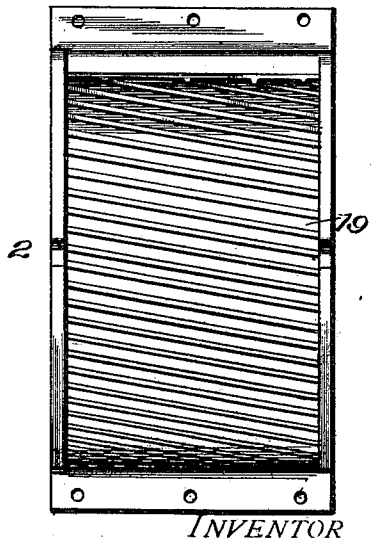


FIG. 9.



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UNITED STATES PATENT OFFICE.

BERNARD T. MURPHY, OF MARENGO, IOWA.

GRANULATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 669,465, dated March 5, 1901.

Application filed March 13, 1900. Serial No. 8,545. (No model.)

To all whom it may concern:

Be it known that I, BERNARD T. MURPHY, a citizen of the United States, residing at Marengo, in the county of Iowa and State of Iowa, have invented certain new and useful Improvements in Granulating-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for granulating, comminuting, triturating, or reducing substances to a relatively fine condition, the purpose being the provision of a machine of this character which is light-running, positive in operation, rapid and effective in action, utilizing gravitative and centrifugal forces in the performance of work, easily operable, and satisfactory in result.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and the drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a machine for attaining the ends of this invention. Fig. 2 is a transverse section. Fig. 3 is a perspective view of the concave. Fig. 4 is a detail view in perspective of the drag. Fig. 5 is a detail view in perspective of a portion of one of the rests for the concave. Fig. 6 is a transverse section of the parts shown in Fig. 5. Fig. 7 is a side elevation of a modification. Fig. 8 is a longitudinal section thereof. Fig. 9 is a view of the top or cover of the cylinder as seen from the inner side.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The casing 1 is of box form, and the upper half or cover 2 is of semicircular form to fit close to the rotary head and is provided with a hopper 3, which receives the material or substance to be granulated, the location of the hopper being immaterial. The concave is the complementary part of the cover and together therewith encircles the rotary head and is supported by or attached to the opposite sides of the casing in any substantial manner, so as to withstand the action of the rotary head and support the material under treatment. Curved rests 4, of angular formation in transverse section, are attached to the inner walls of the sides and receive the concave, which is placed thereon. Openings 5 are provided in the horizontal portions of the rests 4 for the projection of antifriction devices 6. Strips 7 have adjustable connection with the horizontal portion of the rests and have seats in coincident relation with the openings 5 to receive the antifriction devices 6, said seats being openings, which prevent accumulation of the material therein. Set-screws 8 have a swivel connection with the rests and screw-thread connection with the strips 7 and can be turned to vary the distance between the strips 7 and the horizontal flanges of the rests 4 to cause the antifriction devices 6 to project to a greater or less distance from the side of the rests subjacent to the concave, whereby the drags or pressure elements of the rotary head are prevented from injurious contact with the cutting edges of the concave when the machine is empty.

The concave consists of superposed plates 9 and 10, having openings or perforations in coincident relation and formed to provide cutting edges at the side adjacent to the rotary head. These plates are relatively adjustable the one upon the other to vary the size of the openings in the concave and make provision for coarse or fine comminution. The size and shape of the openings in the plates will vary and depend upon the specific use of the machine and the substance or material to be reduced. Either one of the plates can be adjusted with reference to the other; but it is preferred to have the upper plate 10 fixed and the lower plate 9 movable, as it can be shifted more easily, because resting upon the antifriction devices 6 and relieved of direct contact of the drags 11, the adjustment being effected by means of set-screws 12, cooperating with lugs, ears, or offstanding parts of the plates.

The rotary head comprises a skeleton cylinder or drum and drags or pressure elements

11, pivoted thereto, and is secured upon a shaft 13, journaled to the casing. The cylinder or drum is composed of supports having the form of a wheel—*i. e.*, made up of a hub 14, spokes 15, and a rim 16, and connecting-bars 17.

The drags 11 are pivoted to the cylinder, and their longitudinal edges overlap, and unitedly the drags completely inclose the said cylinder. Each drag is of segment form, and its longitudinal edges are beveled to form a scarf-joint, which gives the best results. The outer face of the drags is corrugated, roughened, or otherwise formed to engage positively with the material or substance and insure its movement over the concave. In the preferable construction the grooves, extending lengthwise of the drags, have their forward walls obliquely disposed and their rear walls radial to form abutments. Oblique arms 18 are rigidly attached at one end to the drags and are pivoted at the opposite end to the rims of the cylinder. By reason of the obliquity of the arms the drags can move bodily outward from the cylinder, so as to get the full advantage of the combined action of their weight and centrifugal force. It is desirable in some instances to notch the edges formed by the grooves to interrupt their continuity and provide a series of edges in straight lines. The arms 18 embrace the ends of the cylinder and are connected to the rims 16 by rods *a*, which supplement the action of the bars 17 in securing the rims. The end portions of the segments 11 are adapted to bear against the rims 16 and limit the inward movement of the segments when passing up and over the cylinder.

In operation the head is rotated with the pivoted edges of the drags foremost, and as the drags pass below the plane of the axial line of rotation they move outward toward the concave under the combined action of gravitative and centrifugal forces, and as the drags move upward past the said plane on the ascending side of the head they fold close to the cylinder and close up ready to receive the material or substance to be granulated and prevent its entrance into the cylinder. Any substance not passing through the openings of the concave is carried upward and again forward until comminuted sufficiently to escape through the perforations of the concave. The skeleton form of the cylinder enables the machine to be of a minimum lightness, compared with its capacity and the diameter of the rotary head, it being desirable to have the head and the concave of as large a radius as possible. The degree of fineness of granulation can be regulated by shifting the plate 9 in the manner stated.

The space between the concave and the cylinder can be varied by the relative radial adjustment of the strips 7, which is effected by means of the set-screws 8. The antifriction devices 6 being supported by the strips 7 move therewith and are projected to a greater or less distance beyond the top sides of the rests 4. The variation of the space between the cylinder and concave affords a greater or less play to the drags and increases their efficiency when the machine is operated at a given speed.

In the modification shown in Fig. 7 the hopper 3 is located at one end of the machine instead of centrally, as shown in Fig. 1, and the substance to be granulated is caused to travel nearly the entire circumferential length of the cylinder, which is of material advantage. The inner side of the cover or top 2 is formed with a plurality of ribs 19, having parallel and oblique disposition, whereby the comminuting action is effected by a shear or draw operation.

In order to give an initial reducing action to the substance to be granulated, a reducer 20 is located at the delivery end of the hopper 3 and consists of a roller or shaft having a series of teeth, the latter serving to lighten and break up the substance as it passes from the hopper into the cylinder. This reducer is rotated at a much higher rate of speed than the drag and in an opposite direction thereto, and this result is attained by providing the projecting end of the shaft with a pinion 21, which meshes with a gear-wheel 22, secured to the projecting end of the shaft 13, the latter receiving a crank 23, by means of which the machine is adapted to be manually operated.

Having thus described the invention, what is claimed as new is—

1. In a granulating-machine, a rest, a concave supported upon the rest and composed of superposed correspondingly-perforated plates, means for relatively adjusting the plates, and antifriction-bearings for the movable plate, substantially as described.

2. In a granulating-machine, a rest, a concave supported upon the rest and composed of superposed correspondingly-perforated plates, means for adjusting the lower plate to vary the size of the openings, and antifriction-bearings between the rest and lower plate of the concave, substantially as described.

3. In a granulating-machine, a rest having openings, a concave, a strip arranged beneath the rest and having seats registering with the openings therein, antifriction devices placed between the rest and strip, and means for adjusting the strip to project the antifriction devices through the rest to a greater or less extent, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BERNARD T. MURPHY. [L. S.]

Witnesses:
M. T. BEEM,
H. E. OLDAKER.