July 18, 1939. L. ZINSSER 2,166,652.

MACHINE FOR WORKING OR DISINTEGRATING MATERIALS OF ALL KINDS, ESPECIALLY FOR HUSKING GRAINS

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Fig. 4.

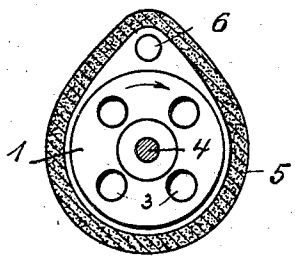


Fig. 1.

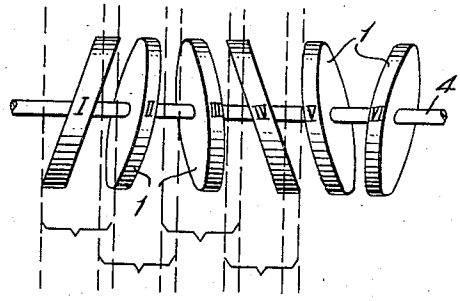


Fig. 5

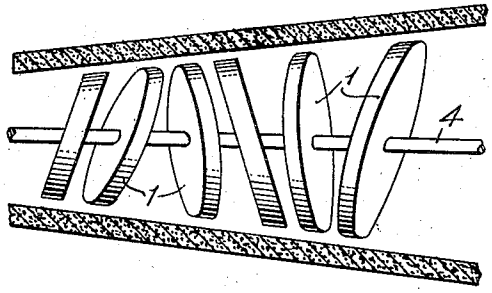


Fig. 2

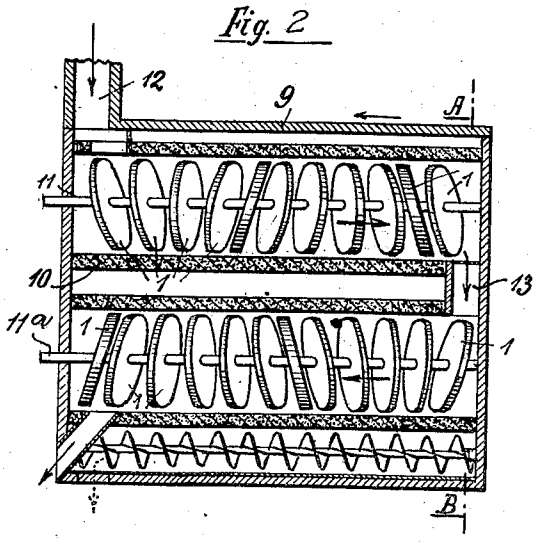
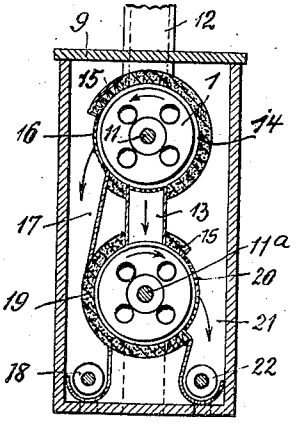


Fig. 3



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by [illegible]

his attorney

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MACHINE FOR WORKING OR DISINTEGRATING MATERIALS OF ALL KINDS, ESPECIALLY FOR HUSKING GRAINS

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Application November 28, 1936, Serial No. 113,213
In Germany November 29, 1935

1 Claim. (Cl. 83—30)

This invention relates to a machine which is particularly destined for husking grain but may also be used for other purposes such as cleaning, polishing, or disintegrating materials making up together a granular substance.

Machines for scouring and cleaning grain are known with oblique disks fixed parallel on a shaft, which disks either throw the grain to and fro with their side surfaces or roll it on the wall of a casing with their peripheral surfaces and thus husk the grain. It is likewise known to arrange half the disks at an inclination in one direction and the other half at the same angle of inclination but in the opposite direction. This is intended to eliminate vibrations in axial direction. However, this object is not entirely attained. The inclined disks are not parallel but of oval shape so that masses with unequal moment of inertia are produced. When the inclined disks cooperate with a casing and half the disks are inclined at the same angle, but in the opposite direction to the other half, other difficulties also arise. The two middle disks form a kind of scoop with which they grip the grain on the bottom of the casing at each rotation, thereby causing vibrations. Furthermore, in such an arrangement of disks, the whole of the surface of the casing is not brushed by the peripheries of the disks. Thus, the grain on the surface which is not brushed by the disks is insufficiently worked and irregular wearing of the casing occurs.

All these objections are overcome by the invention in which the disks are arranged on a shaft mounted to rotate in a casing so as to be at an angle to the axis of the shaft and at an angle to each other. By the rapid rotation of the shaft, the grains of granular substance are hurled against the inner surfaces of the casing and roll on the surface. At the same time, on account of the angular position of the disks with respect to the axis of the shaft, a given grain positioned between two disks is, for each revolution of the shaft, moved forward through a certain distance, and back again through the same distance. With this reciprocation of the grain through the same distance once per revolution is combined a movement which is due to the angularity of the disks with respect to each other, since the grain, when engaged by the surface of a disk, is moved in a given direction, say, to the right, independently of the aforesaid reciprocation. This extra movement is added to the first mentioned movement to the right, and subtracted from the movement to the left so that the resultant is a gradual progression to the right.

By this gradually progressive resultant movement imparted by the inclined disks, the grains are conveyed in one direction in the casing surrounding the disks. The grains are therefore not only moved to and fro by the rocking movements, but at the same time feed in the said given direction and in the present instance to the right, as shown at the upper side of Figure 2 and indicated by the arrow line placed on said disks. This presents the great advantage that the charging and discharging can take place without interruption so that the shutting off devices, which are otherwise necessary, and the very complicated clockwork mechanism and compensating vessels become superfluous.

The angle included by the individual disks may be uniform from one end of the shaft to the other, or it may be varied, i. e., increased or decreased according to whether it is desired to convey the grains at regular or irregular, constant, increasing or decreasing speed.

The vibrating of the machine is best eliminated when the disks are arranged at the same angle with respect to each other and when the total of the angles from one end to the other of the shaft amounts to 360° or a multiple thereof.

Several embodiments of the invention are illustrated by way of example in the accompanying drawing, in which

Figure 1 shows six disks, each progressively rotated in the same direction through angles of substantially 60° with respect to the immediately adjacent disk,

Figure 2 is a vertical longitudinal sectional view of a grain husking machine equipped with disk arrangement shown in Figure 1,

Figure 3 is a vertical cross-sectional view taken on line A—B of Figure 2,

Figure 4 is a vertical cross-sectional view of another type of casing of ovoidal form, and

Figure 5 is a longitudinal sectional view of another type of casing of conical form with disks arranged therein as illustrated in Figure 1.

As illustrated in Figure 1, six disks designated in general by the reference character 1 and sequentially bearing the legends I, II, III, IV, V, and VI, are secured to a shaft diagrammatically illustrated by the reference character 4 and in accordance with the invention each succeeding disk is rotated at an angle of 60° in advance of the preceding one. If the position of the disk bearing legend I is termed the initial position, the total angles rotated by the several disks are

as follows: II: 60°; III: 120°; IV: 180°; V: 240°; VI: 300°, and I: 360°.

The angles of inclination of the individually inclined disks relative to the axis of shaft 4 may be different.

It is advisable to make all the inclined disks of a machine of the same shape so as to avoid vibration and reduce the cost of production. The peripheral surfaces of the inclined disks may be of any shape, that is, smooth, roughened or serrated. The side faces of the inclined disks may be of any shape and smooth or rough, or provided with projections or depressions. The inclined disks may be made of any material, such as emery, steel, iron, aluminum, wood, felt, bristles and so forth, or combinations thereof.

The casing with which the inclined disks are associated may be cylindrical, conical, polygonal or the like, but it is preferable to construct the casing of conical or cylindrical shape.

In the form of invention shown in Figure 4, the disks 1 as shown in Figure 1 are mounted on the shaft 4 and are surrounded by a casing 5 of ovoidal shape to enable that a sufficient quantity of air may flow through the casing parallel to the axis to be exhausted through aperture 6 provided in one of the end walls. The disks 1 have aspiration holes 3 therein for the purpose of cooling the machine and facilitating the drawing off of the products resulting from disintegration.

In Figure 5, inclined disks 1 upon the shaft 4 set at progressive angles as described in connection with Figure 1 have the disks of gradually decreasing diameters toward one end disk with the tapered disk arrangement set into a casing 5a of conical formation.

A grain husking machine is illustrated in longitudinal and cross-sectional views in Figures 2 and 3, the machine comprising a housing 9, superposed stationary casings 10 and 18, a pair of shafts 11 and 11a respectively mounted to rotate in the casings 10 and 19 and disks 1 arranged on each shaft in a manner described with reference to Figure 1. The grain is fed through a pipe 12 at one end of the casing 10 and the discharge takes place through a pipe 13 at the other end of the casing 10 at a point below the axis of the shaft 11 at the other end of the casing 10. The casing 10 comprises a husking surface 14, a brushing surface 15 and a sifting surface 16. The husks drop through the sieve 16 and through a passage 17 into the collecting worm 18. The grain then passes into a second stationary casing 19 by way of the pipe 13 and in which the husking process is repeated by the disks 1 on the shaft 11a. The better grain fodder flour produced in this casing 19 drops out through the sieve 20 and the passage 21 and the collecting worm 22.

By arranging the disks 1 on the shaft 4 in spaced relation with all of the disks at an equal acute angle with respect to the shaft with the radial vector which measures one side of the included angle between the disk and shaft successively rotated through an acute angle with respect to the preceding disks, it is possible to accomplish the forward feeding of the grain through the machine.

From the above detailed description it is believed that the construction and operation thereof will at once be apparent, and while there are herein shown and described the preferred embodiments, it is to be understood that minor changes may be made therein such as will fall within the scope of the invention as claimed.

I claim:

In a machine for working and disintegrating materials of all kinds, especially for husking grain, a housing, a substantially cylindrical casing, in the housing, a rotary shaft journaled centrally and longitudinally of the casing, material feeding means at one end of the casing, material discharge means at the opposite end of the casing and located at a point below the axis of said rotary shaft, and spaced husking disks on said shaft cooperating with the walls of the casing and slightly spaced therefrom, all disks being at an equal acute angle with respect to the shaft and each disk secured to the shaft in such manner that the radial vector which measures one side of the included angle between the disk and shaft is successively rotated through an angle with respect to the preceding disk, all of said latter angles being substantially equal.

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