Jan. 8, 1957 M. J. F. BAS 2,776,711

MACHINE FOR CUTTING MOVING WEB INTO PARTICLES

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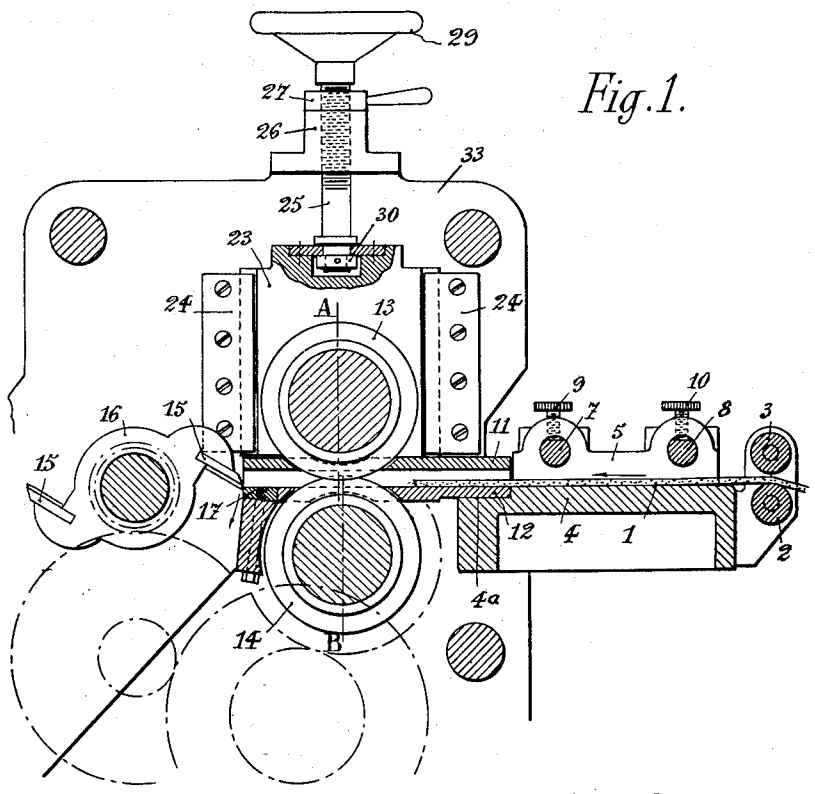


Fig. 1.

Fig. 2.

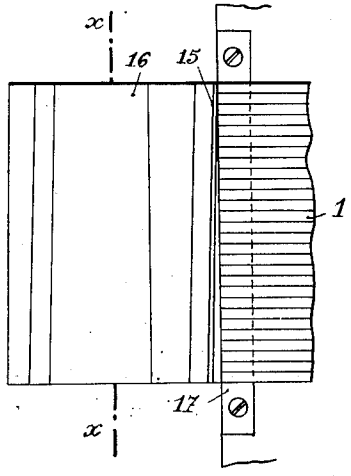
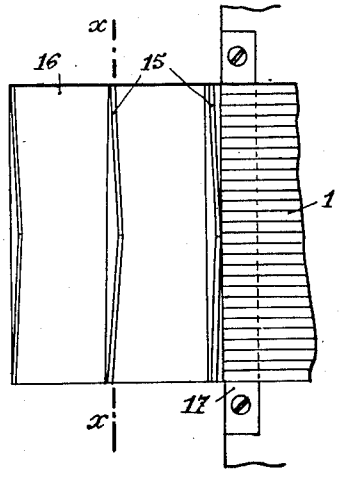


Fig. 3.



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Fig.4.

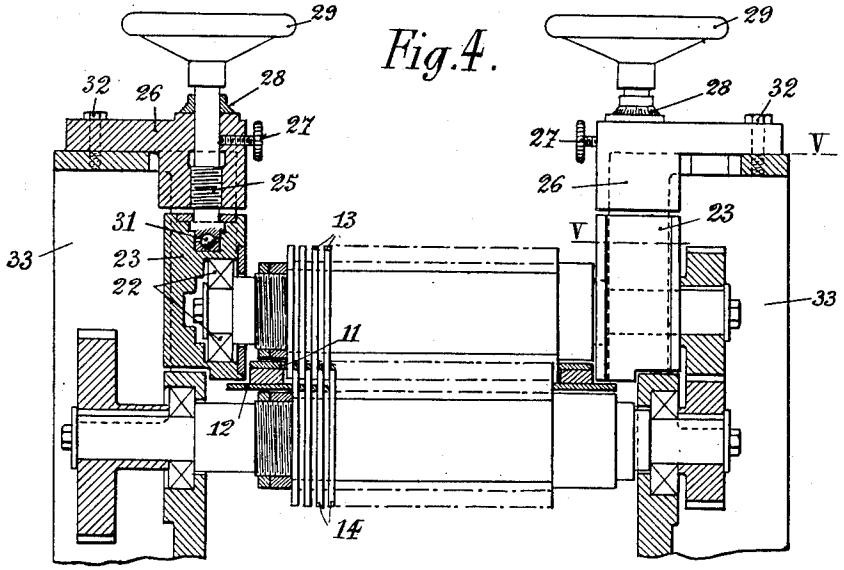


Fig.5.

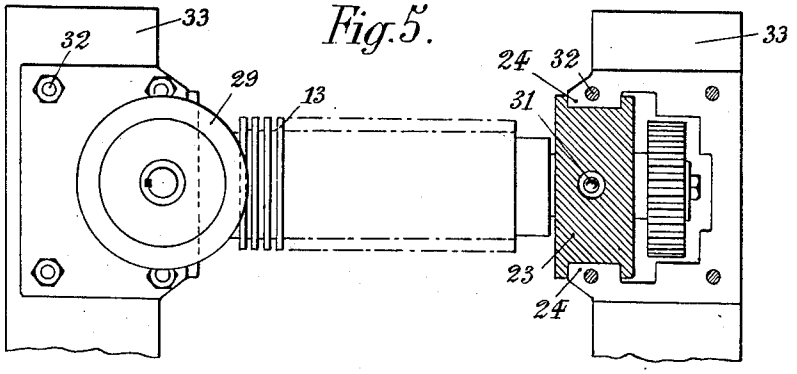


Fig.6.

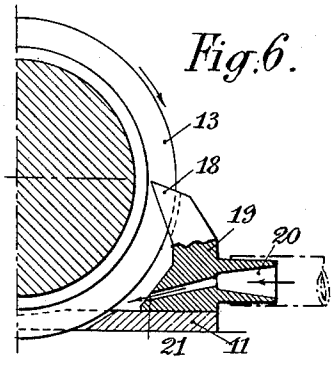
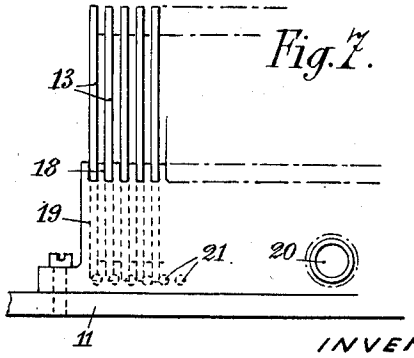


Fig.7.



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MACHINE FOR CUTTING MOVING WEB INTO PARTICLES

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Application February 1, 1954, Serial No. 407,416

Claims priority, application France November 6, 1953

7 Claims. (Cl. 164—61)

This invention relates to granulating or comminuting machines, more especially for use in comminuting sheets or strips of synthetic plastic materials.

Sheet or strip plastic materials are often granulated or comminuted to facilitate softening by heating in order to obtain a sufficiently fluid mass for the purpose of pressure moulding articles therefrom.

It is desirable that the particles obtained shall be of uniform size and shape as otherwise smaller grains in the mass being heated could be burned before larger grains became sufficiently heated and softened.

Many different machines are already known for the continuous comminution of materials at high speed to obtain particles of regular, e. g. cubical, form. However such machines have the disadvantage of being exposed to repeated shocks due to the action of the rotating knives as they repeatedly strike the material to be cut. The result is a loss of motive power, appreciable noise and vibration, and premature wear of the cutting edges. Moreover, the cutting action is accompanied by the production of more or less appreciable quantities of waste and dust, which become lodged between the preliminary co-acting cutter discs of the machine and the guides for the work material, in such manner as to foul the interior of these elements. Consequently, frequent stoppages for cleaning the machines are necessary.

The present invention provides improvements which enable these inconveniences to be avoided, ensure an appreciable saving in motive power, result in the machine running more smoothly and quietly, and facilitate the operation and maintenance.

The invention will be fully understood from the following description aided by the accompanying drawings which show some embodiments thereof by way of example.

Fig. 1 is a sectional elevation of one form of machine in accordance with the invention;

Fig. 2 is a detail plan view of the arrangement of the final cutting knives;

Fig. 3 is a plan view of a modified arrangement of these knives;

Fig. 4 is a sectional elevation of a slightly modified form of the machine in a plane at right angles to Fig. 1;

Fig. 5 is a plan corresponding to Fig. 4 partly in section along the line V—V of that figure; and

Figs. 6 and 7 show on a larger scale details of the clearing and cleaning element for removing waste and dust.

Reference **1** denotes a flexible strip of plastic material to be comminuted, **2** and **3** horizontal feed rollers at the entry of the machine, **4** a feed table for the said strip, and **5** two side guides adjustable on fixed spindles **7** and **8**. Set screws **9** and **10** are provided for fixing these guides. **11** and **12** denote two horizontal guides spaced from each other and between which the strip **1** is passed from the feed table to co-acting upper and lower cutter discs **13** and **14** having serrated sharp edges for slitting the strip

1 longitudinally into a plurality of ribbons. The guides **11** and **12** extend both forwardly and rearwardly of the cutter discs **13** and **14** and are spaced from each other for a distance substantially equal to the depth of cut of the cutter discs **13** and **14**. The guides **11** and **12** are laterally apertured and the cutter discs **13** and **14** project through the laterally apertured portion and overlap with each other providing the comminuting action on the plastic strip fed between the cutter discs. **15** are knives fixed in any required number on a rotatable shaft **16** which also carries the machine driving pulley which is coupled to suitable operating means. **17** is a fixed counter-blade working in conjunction with the knives **15**, the counter-blade **17** being mounted on guide **12**. A vertical clearing blade **18** (Figs. 6 and 7) is carried on a bracket **19** associated with a tubular element **20** and perforated with holes **21**, the bracket **19** being mounted on guide **11**. Ball bearings **22** (Fig. 4) for the journals of the cutter discs **13** are carried in adjustable upper bearing blocks **23** (Figs. 1, 4, 5) sliding between vertical guides **24** and controlled by set screws **25** held in threaded collars **26** and secured by locking screws **27**. Graduated scales **28** allow the screws **25** to be accurately adjusted by means of hand-wheels **29**. The ends of the screws **25** abut against the corresponding bearing blocks, either by means of a locking ring end nut **30** (Fig. 1), or by means of a bearing ball **31** (Fig. 4). **32** are fixing screws for the collars **26**. Collars **26** are integral parts of inwardly extending brackets that are supported by the frame **33** and directed inwardly toward each other and form the suspension means for the pendently disposed blocks **23** in which the opposite ends of the shaft which carries the upper set of discs **13** are journaled. These brackets also provide the mounting means for the shafts connected with the handwheels **29** and the associated graduated scales **28**.

In operation the strip of plastic material **1** passes between the feed rollers **2** and **3** and thence on to the feed table **4** between the two guides **5**, slidably adjustable on the rods **7** and **8** fixed on the said table. These guides **5** are locked in the required position apart by the screws **9** and **10**.

The strip **1** is thus fed between the fixed horizontal upper and lower guides **11** and **12** and passes to the multiple circular cutters or discs **13** and **14**. The lower guide **12** is supported at one end by a step **4a** formed in table **4** and extends substantially coplanar with the surface of table **4**. The set of discs **13**, working between the set of discs **14**, causes the strip **1** to be slit into a bundle of longitudinal ribbons.

Upon leaving the guides **11** and **12**, these ribbons are cut in to nearly cubical grains by means of the knives **15** carried on the rotating shaft **16**, and acting against the counter-blade **17**, the speed of rotation of shaft **16** being adjusted to correspond to that of the serrated cutter discs **13** and **14**. Thus it will be seen that the lower guide **12** serves as a support for counter-blade **17** while upper guide **11** serves as a support for the vertical clearing blade **18**.

It will be seen from Fig. 1 that the vertical plane A passing through the axis of the cutters **13**, is slightly displaced to the left with reference to the plane B passing through the axis of the cutters **14**. This arrangement is for the purpose of directing downwards the bundle of longitudinal ribbons, in order to ensure that they will be effectively pressed against the counter-blade **17** when coming into contact with the knives **15**.

In accordance with Fig. 2 the knives **15** are set slightly askew in order to cut the longitudinal ribbons successively instead of simultaneously, and thus afford smoother working, absence of shocks or jerks, and cleaner cuts.

In the alternative arrangement shown in Fig. 3 the knives **15** are doubly skewed. It is possible to attain the same result by setting the knives normally on the shaft **16** and inclining the axis *x*—*x* of the latter slightly from the horizontal. Further it is possible to set the counter-blade **17** askew, instead of the knives **15**, and again attain the same result.

The vertical clearing blade **18** automatically removes waste and dust accumulating between the cutter discs. The hollow bracket **19** on which this blade is fitted has its tubular element **20** connected by rubber tubing to a source of compressed air, hot or cold. This air is ejected through the orifices **21**, which may be either round holes or horizontal slits, and is principally intended to heat or to cool, according to the material being processed, the circumferences of the cutter discs **13** and **14** as well as the material itself during the cutting operation.

Finally, the invention provides the possibility of removing from the machine integrally, the assembly of the upper discs **13**, their carrying shaft, the corresponding ball bearings **22** and bearing blocks **23**, the two set screws **25**, and the two operating hand-wheels **29**. The bearing-roller-auxiliary supports assembly can be removed from the machine frame without dismantling any of the elements and without disturbing the setting of the graduated scale **28**. This permits both the cleaning of the complete assembly of cutter discs and guides, and inspection and adjustment or replacement of these elements. It will be seen that in order to remove the assembly it is sufficient to remove the screws **32** whereupon the assembly can be lifted out as a unit.

I claim:

1. In a machine for comminuting plastic strip material, the combination of a frame, upper and lower co-acting cutter discs rotatably mounted in said frame, a pair of horizontally extending guides projecting both forwardly and rearwardly of the co-acting portions of said cutter discs and spaced apart a distance substantially equal to the depth of cut of said co-acting cutter discs and effective to cut strip material passed therebetween into ribbons, a shaft rotatably mounted in said frame adjacent the rear of said cutter discs, knives carried by said shaft, a stationary counter-blade supported by the rearward edge of one of said guides, said knives and counter-blade being effective to sub-divide said ribbons into particles of regular form, said knives being horizontally inclined to said cutter discs to cause said knives to co-act with said counter-blade and act on said ribbons successively graduated scale means associated with said frame and means for adjusting said upper cutter discs with respect to said lower cutter discs and with reference to said graduated scale means, said upper discs and shaft constituting an assembly which is removable from said frame while maintaining said graduated scale means and said adjusting means in the adjusted position thereof.

2. In a machine for comminuting plastic strip material, the combination of a frame, a pair of spaced horizontally extending guides having a lateral aperture therein, upper and lower co-acting cutter discs rotatably mounted in said frame and projecting through the lateral aperture in said guides and effective to cut plastic strip material passed between said guides and through said cutter discs into ribbons, a shaft rotatably mounted in said frame in the rear of said cutter discs, knives carried by said shaft, a stationary counter-blade, said knives and counter-blade being effective to sub-divide said ribbons into particles of regular form, and said knives being set askew to cause said knives to co-act with said counter-blade and act on said ribbons successively graduated scale means associated with said frame and means for adjusting said upper cutter discs with respect to said lower cutter discs and with reference to said graduated scale means, said upper discs and shaft constituting an assembly which is removable from said frame while maintaining said graduated scale means and said adjusting means in the adjusted position thereof.

3. In a granulating or comminuting machine for plastic material, a frame, an upper and lower guide plate supported by said frame and having a laterally disposed aperture therein, an upper and lower set of co-acting cutter discs projecting through the laterally disposed aperture in said guides, each set of said discs being carried by a shaft journalled for rotation with respect to said frame, a blade set carried by said upper guide plate adjacent the upper set of cutter discs effective to clear and remove waste and dust and means extending through said blade set for blowing air against said cutter discs adjacent the coacting portions thereof graduated scale means associated with said frame and means for adjusting said upper cutter discs with respect to said lower cutter discs and with reference to said graduated scale means, said upper discs and shaft constituting an assembly which is removable from said frame while maintaining said graduated scale means and said adjusting means in the adjusted position thereof.

4. In a granulating or comminuting machine for plastic material, a frame, an upper and lower set of co-acting cutter discs, each set of said discs being carried by a shaft journalled for rotation with respect to said frame, a stationary feed table in advance of said cutter discs, a pair of rollers at the front of said table for feeding plastic strip material to said discs and reducing retardation of the feed of the plastic strip material by friction against the surface of said table, upper and lower guide plates spaced from each other and extending forwardly and rearwardly of said cutter discs, said lower guide plate being substantially coplanar with the surface of said table graduated scale means associated with said frame and means for adjusting said upper cutter discs with respect to said lower cutter discs and with reference to said graduated scale means, said upper discs and shaft constituting an assembly which is removable from said frame while maintaining said graduated scale means and said adjusting means in the adjusted position thereof.

5. In a machine for comminuting plastic strip material, a frame, upper and lower shaft members, cutter discs mounted on said shaft members, means for journalling said lower shaft member in said frame with said frame extending above said means, a pair of brackets mounted on said frame and directed toward each other and extending over said shaft members, bearing blocks for mounting opposite ends of said upper shaft member, adjustable screws extending through said brackets and engaging said bearing blocks, means secured to said frame for guiding said bearing blocks for movement in a vertical direction, guide plates supported with respect to said frame and extending intermediate said shaft members with said cutter discs projecting therethrough, whereby plastic strip material fed between said guide plates may be cut into ribbons by said cutter discs graduated scale means associated with said frame and means for adjusted said upper cutter discs with respect to said lower cutter discs and with reference to said graduated scale means, said upper discs and shaft constituting an assembly which is removable from said frame while maintaining said graduated scale means and said adjusting means in the adjusted position thereof.

6. A machine for comminuting plastic strip material as set forth in claim 5 in which one of said guide plates forms a mounting means for an elongated hollow member which includes a vertical shearing blade directed inwardly between the cutter discs associated with said upper shaft member and wherein said hollow member also includes a multiplicity of downwardly directed apertures for conveying air under pressure from said hollow member to the juncture position of the cutter discs carried by said upper and lower shaft members.

7. In a machine for comminuting plastic strip material as set forth in claim 5, a hollow blade carried by one of

said guide plates, said hollow blade including an intake compression for compressed air and a multiplicity of discharge pockets directed downwardly toward the juncture of said cutter discs, said hollow blade also including a set of upwardly and inwardly directed comb-like projections extending between the cutter discs on said upper shaft for removing accumulated material between the said cutter discs for gravitation to a position in the vicinity of said discharge pockets whereby the said material is forced under pressure intermediate the cutter discs on said upper and lower shaft members.

References Cited in the file of this patent

UNITED STATES PATENTS

35,592	Dougherty	June 17, 1862
81,021	Skidmore	Aug. 11, 1868
280,023	Estabrook	June 26, 1883
303,893	Stewart	Aug. 19, 1884
461,600	West	Oct. 20, 1891
630,631	Rousay et al.	Aug. 8, 1899
712,187	Frazer	Oct. 28, 1902
1,515,377	White	Nov. 11, 1924
1,725,176	Bevis	Aug. 20, 1929
1,878,453	Lade	Sept. 20, 1932
2,603,262	Urschet et al.	July 15, 1952
2,613,741	Battersby	Oct. 14, 1952

FOREIGN PATENTS

644,032	Great Britain	Oct. 4, 1950