Dec. 15, 1936. E. RUSSWURM ET AL. 2,064,689

COMBINED FAN AND CUTTER

Filed June 17, 1935

Fig 5.

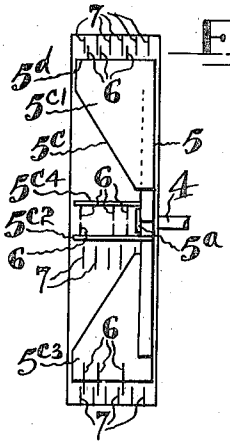


Fig 6.

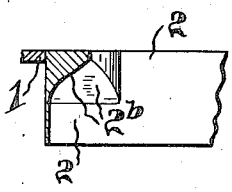


Fig 7.

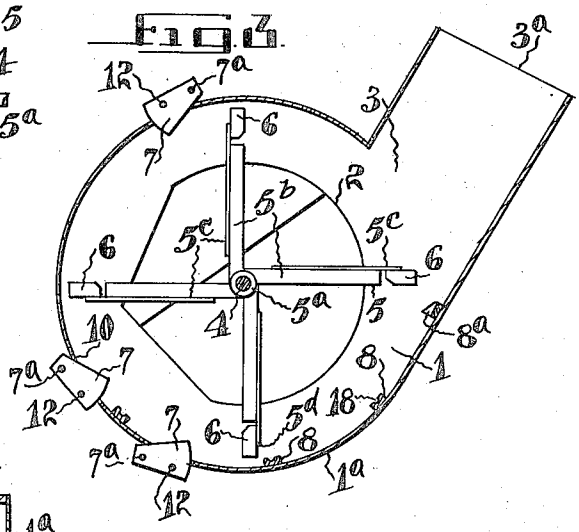
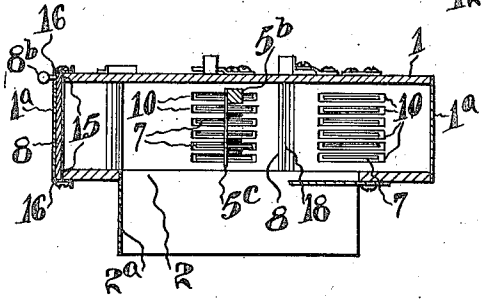


Fig 4.



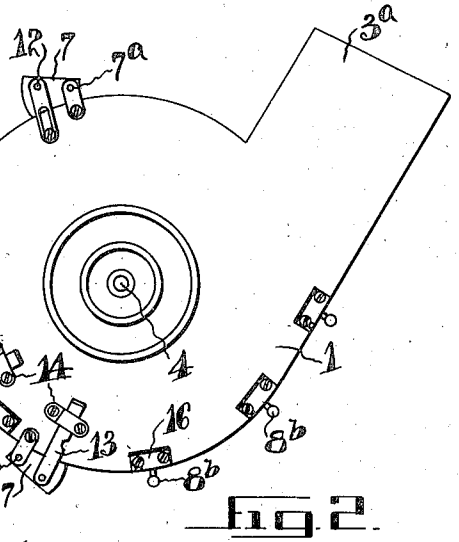
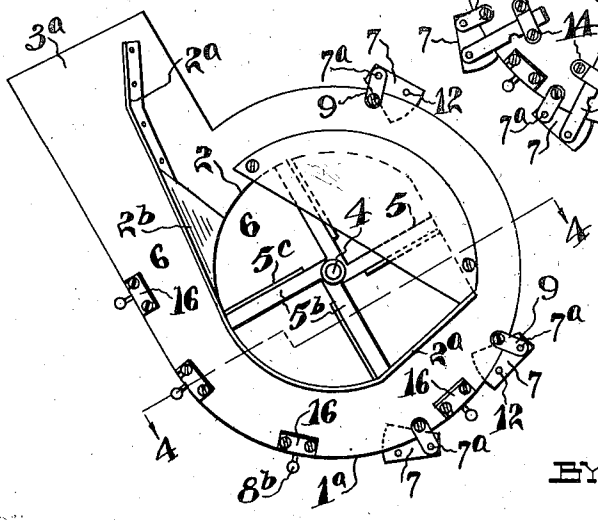


Fig 2.

Fig 1.



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COMBINED FAN AND CUTTER

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Application June 17, 1935, Serial No. 26,941
In Canada July 6, 1934

6 Claims. (Cl. 146—107)

This invention relates to combined fans and cutters and more particularly to those adapted for use in connection with a threshing-machine for stacking the straw discharged therefrom, and our object is to provide apparatus of this character which may be readily and quickly converted to act as an ordinary fan or as a combined fan and cutter to produce short straw, which will require a minimum of additional power for operation as a combined machine, and which can be manufactured at a very slight additional expense over that of an ordinary fan.

We attain our objects by providing the usual fan vanes with cutting blades which extend radially beyond the peripheries of the vanes. The fan casing is provided with slots through which cutting blades are adapted to be moved into and out of position for co-operation with the blades on the vanes. The casing cutting blades are arranged in sets around the periphery of the casing remote from the outlet thereof. The sets of blades on the vanes are staggered relative to one another axially of the casing so that they pass between different blades in each set of the casing blades. The inlet in the side of the casing is so located as to bring it more or less into alinement with the outlet. The latter communicates with the usual discharge or stacker pipe and shredder bars are arranged across the peripheral wall of the fan casing to position the material so that the rotary blades will cut it into shreds. The casing blades are so mounted that they may be readily moved through the slots into and out of position for co-operation with the rotary cutting blades. The shredder bars are so carried that they may be readily removed from the casing or repositioned therein for co-operation with the rotary blades.

The constructions are hereinafter more fully described and are illustrated in the accompanying drawing in which

Fig. 1 is a side elevation of the inlet side of our apparatus showing the casing cutting blades in their operative position;

Fig. 2 a side elevation of the opposite side of the apparatus showing the casing blades in their inoperative position;

Fig. 3 a longitudinal section of our apparatus when used as a fan and cutter;

Fig. 4 a sectional detail on the line 4—4 in Fig. 1;

Fig. 5 a plan view of the fan and showing the casing blades diagrammatically; and

Fig. 6 a sectional detail on the line 6—6 in Fig. 1.

In the drawing like numerals of reference indicate corresponding parts in the different figures.

1 is a fan casing having an inlet 2 and an outlet 3, the latter communicating with a discharge pipe 3^a. A shaft 4 journalled in the casing carries a fan 5 which includes a hub 5^a having a plurality of radially directed arms 5^b on which the vanes 5^c are carried. Cutting blades 6 are carried by the vanes 5^c and project radially beyond the outer ends 5^d thereof for co-operation with relatively stationary cutting blades 7 and shredder bars 8, 8^a carried by the casing 1.

The blades 7 are arranged in sets, each set being carried on a spindle 7^a which is journalled in brackets 9 secured to opposite sides of the casing. The brackets 9 project beyond the outer periphery of the casing and the spindles 7^a extend across the peripheral wall 1^a thereof. The said wall is provided with slots 10 adapted to permit the passage of the blades 7 therethrough so that these blades may be moved into and out of position for co-operation with the rotary blades 6. The latter are also arranged in sets on the vanes 5^c, the number of blades 6 in each set being fewer than the number of blades 7 in each set thereof. The sets of rotary blades 6 are staggered relative to adjacent sets so that they will pass on different sides of the casing blades 7 and thus between differently positioned blades in the sets of blades 7. That is to say, while two or more rotary blades 6 of each set pass between the relative stationary blades 7 of each set in the casing, the first set of blades 6 pass say, to the left of a corresponding number of blades 7 in each set thereof, the next set of rotary blades 6 will pass to the left of a corresponding number of different blades 7 in each set thereof and the next two sets of rotary blades 6 may be arranged to pass between the same blades 7 as those in the first and second sets of blades 6. Referring to Fig. 5, the blades 6 on vane 5^{c1} pass to the left of the second, third and fifth blades 7 in each set of casing blades, the blades 6 on vane 5^{c2} pass to the left of the first, fourth and sixth blades 7, the blades 6 on vane 5^{c3} pass to the left of the second, third and fifth blades 7, and the blades 6 on vane 5^{c4} pass to the left of the first, fourth and sixth blades 7. With this arrangement the straw or other material passing through the casing is cut or broken into short lengths with a minimum of power in addition to that required to run the fan.

To shred the material cut by the blades 6 and 7, we provide a plurality of bars 8 and a bar 8^a

which extend across the peripheral wall 1a of the casing 1 for co-operation with the rotary blades 6. These bars are spaced slightly out of the path of the blades 6 but are adapted to position the cut material passing over the bars into the path of the said blades so that the material will be shredded by the passage of the blades therethrough. That is to say, the short lengths of material are cut or broken longitudinally into shreds. The bars 8 are provided with longitudinal grooves 18 and the bar 8a, which is located adjacent the outlet 3, is serrated and the serrations project close to the path of the rotary blades 6.

Two sets of blades 7 are located substantially diametrically opposite the outlet 3 and the third set of blades 7 is located intermediate the first mentioned sets thereof and the outlet 3. The inlet 2 is offset relative to the axis of the fan 5 to bring it more into alinement with the outlet and is provided with a hopper 2a formed as a flange extending laterally from the inlet side of the casing 1. Preferably the inlet is substantially semi-circular and is concentric with the casing, the chord extending from a point adjacent the inner side of the discharge pipe. The hopper is substantially L-shaped to follow part of the curved contour of the inlet 2 and to extend along the side of the discharge pipe 3a. The hopper is provided with a straw guide 2b located adjacent to but above the point where the straight part of the hopper wall joins the curved part. This guide inclines outwardly from the casing to the hopper wall both longitudinally and transversely. The result is that, as straw is fed down the hopper with individual straws parallel to the casing, the forward ends of the straws are deflected outwardly before being drawn inwardly through the inlet. The right angled turn of the straw is thus greatly facilitated and the straw enters the fan casing in the best position to be carried round and cut and shredded. With this construction the maximum suction is obtained and the material to be cut is drawn into the fan at a point where its passage to the knives and over the shredder bars is facilitated.

It will be noted that the guide 2b is located adjacent the discharge 3 but as only lengths of straw enter the inlet, there will be no danger of their being discharged before they are cut into shorter lengths.

To enable the apparatus to be readily and quickly converted for use as a fan, we provide means for swinging the blades 7 to their inoperative position and we carry the bars 8, 8a so that they may be readily removed from the casing 1. A rod 12 is secured in any suitable manner to the free ends of the blades 7, one rod 12 being secured to the blades of each set of blades 7. Each rod 12 has an arm 13 pivotally connected with one end thereof and each arm passes freely through a keeper 14 secured to the side of the casing 1. The arms are notched to engage the keepers to retain the blades 7 in their operative position and are provided with hand grips whereby the notches may be disengaged from the keepers by shifting the arms laterally. The arms may then be shifted longitudinally through the keepers to cause the blades to be swung to their inoperative position. The opposite sides of the casing 1 are provided with openings 15, the openings at one side of the casing being adapted to permit the passage of the bars 8, 8a therethrough and the openings at the other side of the casing being adapted to receive the ends of the bars. The openings are normally closed by retainers 16 which are pivoted on the sides of the casing 1 to engage the ends of the bar to prevent them from shifting longitudinally. Each bar may be provided with a handle 8b which extends through a small slot in the wall 1a of the casing.

It will be distinctly understood that the blades 6, 7 and bars 8, 8a may not be sharpened sufficiently to actually cut the material but may only break it, and that the terms "cutting", "cut" and "uncut" used throughout the specification and claims are intended to include "breaking", "break" and "unbroken" respectively.

What we claim as our invention is:—

1. A combined fan and cutter including a plurality of rotary vanes; cutting blades carried by the vanes; a fan casing provided with an outlet pipe and a suction inlet; and sets of cutting blades pivotally mounted on the casing, each set being adapted to be swung into and out of position for co-operation with the rotary cutting blades, the sets of casing cutting blades being arranged in spaced relationship around the casing opposite the outlet, and the inlet being elongated and offset relative to the axis of the rotary vanes in a direction to bring it towards a position of alinement with the outlet pipe.

2. A fan including a casing and vanes mounted to rotate therein; cutting blades carried by the vanes and extending radially beyond their outer ends, the casing having a plurality of slots through its periphery; a spindle journalled on the casing; cutting blades carried by the spindle for passage through the slots and co-operation with the cutting blades on the vanes; an arm pivotally connected with the cutting blades on the spindle; and means for releasably locking the arm to retain the cutting blades on the spindle in their operative position.

3. A combined straw blower and cutter comprising a fan casing having a tangential discharge pipe and an axial suction inlet, the said inlet being approximately semi-circular with its curved edge substantially concentric with the fan casing and its chord extending from a point adjacent the inner side of the discharge pipe at a small angle relative thereto; a fan rotatably mounted in the casing; co-operating radial straw cutters mounted on the casing and fan respectively; a straw shredder bar carried by the casing for co-operation with the straw cutter on the fan to shred the straw cut by the cutters; a hopper comprising a flange extending laterally from the side of the casing partly following the curve of the inlet and extending longitudinally of the discharge pipe; and a straw guide positioned at the junction of the curved part of the hopper with the part extending longitudinally of the discharge pipe and shaped to direct straw passing down the hopper somewhat outwardly from the inlet before it is drawn by suction thereinto.

4. In a combined fan and cutter the combination of a fan casing having a tangential discharge outlet; a rotor provided with vanes; sets of cutting blades secured to the vanes; sets of cutting blades secured to the casing for co-operation with the vane blades, the casing having an inlet opening adjacent the outlet of substantially semi-circular form positioned with the chord extending from a point adjacent the inner side of the outlet; and an open sided hopper formed as a curved flange extending from the

casing along the lower side of the opening and having a substantially straight portion extending tangentially from the curved side of the opening along the side of the outlet to guide straw down to the hopper.

5. In a combined fan and cutter the combination of a fan casing having a tangential discharge outlet; a rotor provided with vanes; sets of cutting blades secured to the vanes; sets of cutting blades secured to the casing for co-operation with the vane blades, the casing having an inlet opening adjacent the outlet of substantially semicircular form positioned with the chord extending from a point adjacent the inner side of the outlet; an open sided hopper formed as a curved flange extending from the casing along the lower side of the opening and having a substantially straight portion extending tangentially from the curved side of the opening along the side of the outlet to guide straw down to the hopper; and a straw guide located at and above the junction of the curved part of the hopper with the part extending longitudinally of the discharge pipe and inclined outwardly from the casing to the hopper to direct straw passing down the hopper somewhat outwardly from the inlet before it is drawn by suction thereinto.

6. In a combined fan and cutter the combination of a fan casing having a tangential discharge outlet; a rotor provided with vanes; sets of cutting blades secured to the vanes; sets of cutting blades secured to the casing for co-operation with the vane blades, the casing having an inlet opening formed with a curved lower side adjacent the outlet and substantially concentric with the fan casing; an open sided hopper formed as a curved flange extending from the casing along the curved side of the opening and having a substantially straight portion extending tangentially from the curved side of the opening along the side of the outlet to guide straw down to the hopper; and a straw guide located at and above the junction of the curved part of the hopper with the part extending longitudinally of the discharge pipe and inclined outwardly from the casing to the hopper to direct straw passing down the hopper somewhat outwardly from the inlet before it is drawn by suction thereinto.

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