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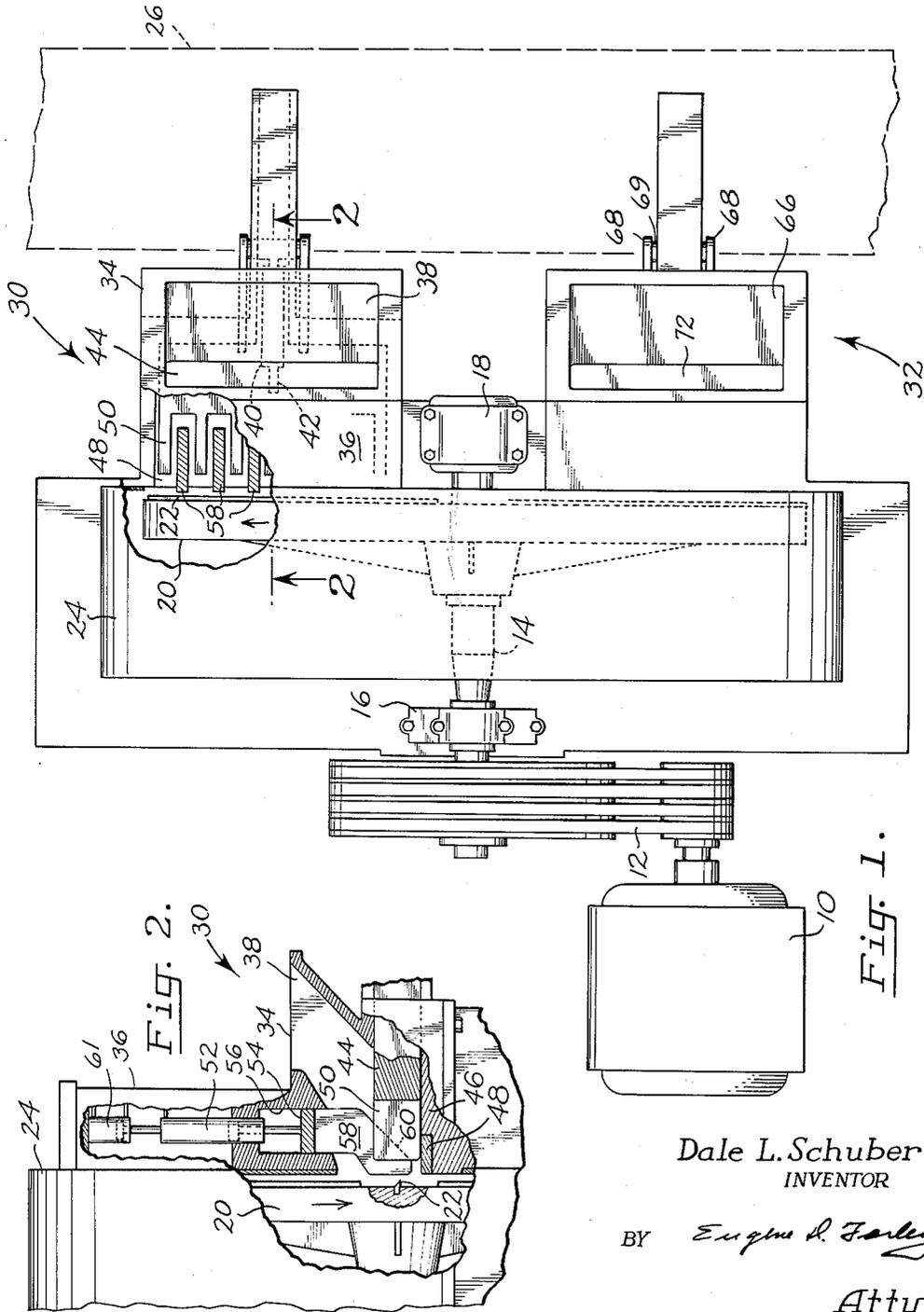
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DISC-TYPE WOOD REDUCER WITH MULTIPLE FEED

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2 Sheets-Sheet 1



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DISC-TYPE WOOD REDUCER WITH MULTIPLE FEED

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This invention relates to a disc type wood reducer of the class employed particularly for reducing wood to flakes used in the manufacture of wood composition board, although also it may be applied to the reduction of wood to pulp mill chips and similar uses.

When making composition board from wood flakes, it is essential to the production of a board product having uniform properties that the flakes of which it is composed have uniform dimensions and be free from an undue large proportion of fines and slivers. This objective is difficult of achievement, particularly when producing flakes in large quantities from wood pieces of random sizes.

Accordingly it is the general object of the present invention to provide a high-capacity, disc-type wood reducer capable of reducing wood pieces to flakes or other shapes, particularly to flakes suited for use in the large scale manufacture of wood composition board.

Another object of this invention is to provide wood reducing apparatus to which random size wood pieces may be fed at a high rate of speed, and which can be cleared of wood pieces quickly and efficiently in the event that the pieces become jammed in the feeding mechanism.

In the drawings:

FIG. 1 is a plan view of the herein described multiple feed disc-type wood reducer, partly broken away to illustrate its interior construction;

FIG. 2 is a fragmentary sectional view taken along line 2-2 of FIG. 1 and illustrating the wood feed and reduction means on the downstroke side of the reducer;

FIG. 3 is a view in side elevation, partly in section, of the presently described wood reducer illustrating the wood feed and reduction apparatus on its upstroke side;

FIG. 4 is a fragmentary sectional view looking in the direction of the arrows 4-4 of FIG. 3 and illustrating the hold down means employed in stabilizing the wood pieces as they are reduced; and

FIG. 5 is a detail sectional view illustrating an alternate construction for the wood stabilizing and feed mechanism employed on the upstroke side of the reducer.

In general, the wood reducer of my invention comprises a disc-shaped rotor having a plurality of knives mounted on its face and extending a predetermined distance outwardly therefrom. While the rotor is driven at a selected rotary speed, wood is fed against it by multiple feed means arranged at a predetermined angular spacing from each other. Suitable hold down means are employed for stabilizing the wood as the knives cut against it in one direction on one side of the apparatus and in the opposite direction on the other side of the apparatus, thereby insuring the reduction of the wood to flakes of uniform size.

In FIGS. 1 and 3 there is depicted a rotary disc wood reducer driven by a motor 10 which drives through belt 12 a shaft or arbor 14 journaled in bearings 16, 18 and mounting a vertical disc 20. The latter is of substantial dimensions, being several feet in diameter, and mounts a plurality of knives 22. These extend outwardly from the face of the disc a distance which determines the approximate thickness of the pieces to be cut. They may be mounted adjustably as required to extend or retract them to any desired degree of projection.

The entire disc assembly is contained in a housing 24. Flakes or chips produced by the knives pass through the

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face of the disc and are discharged from the bottom of the housing as indicated in FIG. 3. Wood billets to be fed to the reducer are brought in on belt 26.

When disc 20 is mounted vertically, as is preferred, two horizontally disposed wood feeding assemblies 30, 32 may be arranged at substantially 180° to each other on opposite sides of the disc. As a consequence, the knives will cut downwardly on the wood on one side of the apparatus and upwardly against it on the other side. More than two feeding assemblies may be employed if desired, however, arranged at a predetermined angular spacing from each other about the disc.

Each feed unit contains essentially the same components, i.e. a hopper for receiving wood billets, means for driving the wood against the disc, means for holding the wood down and stabilizing it as it is reduced, and anvil means against which the knives in the disc work. However, the arrangement of these components differs on the downstroke and upstroke sides of the apparatus.

The construction of the wood feed assembly on the downstroke side of the apparatus is shown in FIGS. 1 and 2. Its elements are housed in a horizontal frame 34 and a vertical frame 36. A hopper 38 is positioned for guiding the wood pieces in the direction of disc 20 in approximately the 3 o'clock position when the disc rotates in a clockwise direction as viewed from in front. The pieces are pushed against the disc by a fluid operated ram, preferably an hydraulic ram, the cylinder of which is indicated at 40 and the piston rod at 42. A crosshead 44 having a width approximating the length of the wood pieces to be reduced slides on a base 46 in the forward margin of which is seated a renewable anvil 48.

Cross head 44 is provided with spaced, forwardly projecting fingers 50, the ends of which contact the work and drive it across anvil 48 against disc 20. The rate at which this is accomplished may be determined by the rate at which the wood is severed from the feed, the substantial force of the ram advancing the piece by increments as each flake is cut away by the knives. Thus the feed is metered automatically, although if desired the rate of advancement of the ram may be synchronized with the theoretical rate of reduction of the wood piece as determined by knife projection and rotor speed.

Hold down means are provided for stabilizing the wood as it is reduced. In the illustrated form of the invention, the stabilizing hold down component is housed in vertical frame 36. It comprises a constant pressure air cylinder 52, to the piston rod of which is connected a crosshead 54 working in guideway 56.

A plurality of spaced, vertical fingers 58 extend downwardly from the crosshead. These are interleaved with fingers 50 of ram crosshead 44 whereby the hold down head is movable toward the base to an inward position wherein the distance between the ends of fingers 58 and the base is less than the corresponding thickness of the ram head fingers. The lower rearward working surfaces of the fingers 58 are angled to provide a guiding surface 60 which cooperates with the ram in driving the pieces across anvil 48 and into the knife assembly. During this operation, the pressure exerted by air cylinder 52 provides a resiliency which enables the holddown to work effectively against pieces of irregular dimensions and random size, stabilizing them as they are fed into the knives.

Irrespective of the stroke of cylinder 52 and of the diameter and shape of the random sized billets constituting the feed, it is inevitable that the billets should become jammed from time to time as they are subjected to the cooperating, but opposed, actions of ram fingers 50 and stabilizing holddown fingers 58. Accordingly, means are provided for quickly releasing billets which become jammed in this manner.

In the illustrated form of the invention, this objective is achieved by mounting cylinder 52 slidably in elements of vertical frame 36. Its base then is connected to such means as a cam, crank, or, preferably, the piston rod of a second cylinder 61. The latter cylinder may have a short stroke, for example, a stroke of about 1 inch. During operation of the apparatus, the piston rod of cylinder 61 normally is extended. Then when the billets become jammed, it may be retracted. This withdraws stabilizing fingers 58 and enables the operator quickly to clear the machine.

The wood feeding assembly 32 on the upstroke side of the apparatus is shown in detail in FIGS. 3 and 4. It corresponds essentially to that on the downstroke side, with the exception that the feed stabilizing means and anvil are arranged differently.

Thus feed assembly 32 is housed in a horizontal casing 62 and a vertical casing 64. It includes a hopper 66 dimensioned and positioned for feeding wood pieces crosswise to the rotor on the upstroke side, i.e. at approximately the 9 o'clock position. The pieces are advanced by a fluid operated cylinder 67 which may be coupled to the driving elements by the coupling arrangement illustrated in FIG. 3.

In this arrangement, the cylinder is mounted substantially horizontally on a plane below that of the feed. Its piston rod is pivotally connected to pivotally mounted, spaced, parallel, lever arms 68. The upper ends of the lever arms are slotted and slidably engage pins 69 extending laterally from the sides of a slide 70 extending rearwardly from a crosshead 72. Spaced fingers 74 extend forwardly of the crosshead and drive the work beneath a segmental anvil 76 seated in a frame member.

In this instance, the stabilizing holddown assembly, housed in vertical casing 64, is actuated by resilient air cylinder 78, the piston rod of which is connected to a crosshead 80 working in a guide 82. The base of cylinder 78 may be connected to the piston rod of a short stroke cylinder, not illustrated, which corresponds in operation and function to cylinder 61 of FIG. 2, i.e. in releasing billets which inadvertently become jammed as they are fed to the rotor.

A plurality of spaced, vertically arranged fingers 84 extend upwardly from the crosshead. The leading upper surfaces 86 of these fingers are angled, like surfaces 60 of fingers 58, to guide the pieces against the anvil.

An alternate form of feedworks for use on the upstroke side of the disc is illustrated in FIG. 5. Its construction is such as to permit use of a resilient stabilizing component located above the work, rather than below it as in the case of the embodiment of FIGS. 3 and 4.

A hopper 90 feeds the work to a fluid-driven ram, the crosshead of which is indicated at 92 and the forwardly projecting fingers of which are shown at 94. The ram advances the work across a sealing strip 96 and beneath a bar 98 which serves the function of a secondary anvil.

The construction of the stabilizing holddown assembly is similar to that shown in FIG. 2. A resilient air cylinder 100 pushes downwardly a crosshead 102 to which are attached a plurality of spaced, vertical fingers 104. These are interleaved with fingers 94 on ram crosshead 92.

Their lower working surfaces are characterized by angled guiding segments 106 and anvil segments 108. Hence as the wood is cut by knives 22 moving upwardly, anvil segments 108 are employed primarily. However, any pieces in need of further reduction which pass behind and above the holddown fingers then are reduced by the action of the knives working against secondary anvil 98.

Thus the present invention provides a disc-type, rotary wood reducer of high capacity which can be fed by a single operator standing at a station defined by infeed conveyor 26, feed works 30, 32, and the rotary disc cutter. The apparatus, furthermore, is highly efficient in producing chips or uniform flakes of predetermined thick-

ness from a feed which may comprise wood pieces of random diameter and non-uniform surface.

It is to be understood that the forms of my invention herein shown and described are to be taken as preferred examples of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A disc-type wood reducer for small pieces of wood comprising a disc-shaped rotor having a face surface, a plurality of knives mounted on the face surface of the rotor, means for driving the rotor, base means adjacent the rotor, a power operated feed ram on the base movable forwardly and rearwardly relative to the face of the disc and having a head for engaging and driving wood pieces against the disc face, feed hopper means for directing wood pieces to the forward end of the ram head when the latter is retracted, a holddown head movable in a direction substantially at right angles to the direction of travel of the feed ram, the holddown head and ram head having forward portions arranged to interleave so that the holddown head is movable toward the base to an inward position wherein the distance between the holddown head and the base is less than the corresponding thickness of the ram head, and means for moving the holddown head toward the base.

2. The disc-type wood reducer of claim 1 wherein the ram feed head and the holddown head each includes a plurality of spaced fingers, the fingers of the holddown head being arranged to interleave with the fingers of the ram feed to permit the former to move to said inward position.

3. The disc-type wood reducer of claim 1 wherein the means for moving the holddown head comprises resilient power means.

4. The disc-type wood reducer of claim 3 including reciprocal advancing and retracting means connected to the resilient holddown head power means for retracting the latter to release jammed wood pieces.

5. The disc-type wood reducer of claim 1 wherein a rearward side of the holddown head is angled toward the base in the direction of forward movement of the feed ram.

6. A disc-type wood reducer comprising a disc-shaped rotor having a plurality of knives mounted on its face and extending a predetermined distance outwardly therefrom, means for driving the rotor at a predetermined rotary speed, a plurality of wood feed means arranged at a predetermined spacing from each other around the rotor for feeding wood pieces against the rotor face, the knives cutting in one direction on wood pieces fed to one side of the rotor and in the opposite direction on wood pieces fed to the opposite side of the rotor, means for stabilizing the wood pieces as they are advanced against the rotor and reduced thereby, the stabilizing means comprising a plurality of spaced fingers having rearward work-guiding segments and forward anvil segments, and means for urging the fingers resiliently against the wood pieces.

7. A disc-type wood reducer comprising a disc-shaped rotor having a plurality of knives mounted on its face and extending a predetermined distance outwardly therefrom, means for driving the rotor at a predetermined rotary speed, a plurality of wood feed means arranged at a predetermined spacing from each other around the rotor for feeding wood pieces against the rotor face, the knives cutting in one direction on wood pieces fed to one side of the rotor and in the opposite direction on wood pieces fed to the opposite side of the rotor, means for stabilizing the wood pieces as they are advanced against the rotor and reduced thereby, the stabilizing means comprising a plurality of spaced fingers having working surfaces including rearward work-guiding segments and forward anvil segments, the fingers being interleaved with

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a plurality of fingers provided on the wood feed means and being urged resiliently against the wood pieces for stabilizing the same.

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