Aug. 27, 1963 D. L. SCHUBERT 3,101,756

DISC-TYPE WOOD REDUCER WITH MULTIPLE FEED

Filed April 4, 1960 2 Sheets-Sheet 1

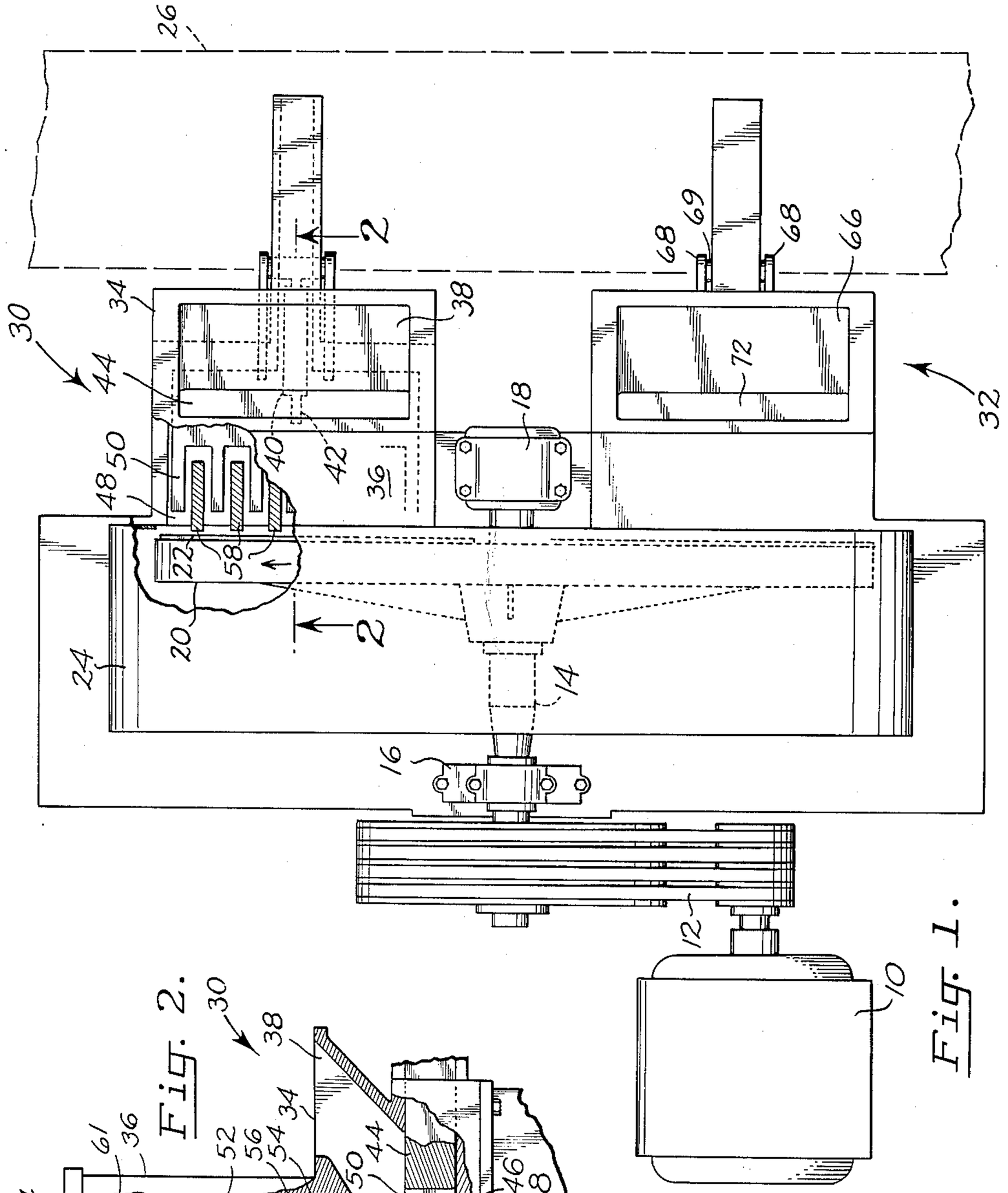

Fig. 1.

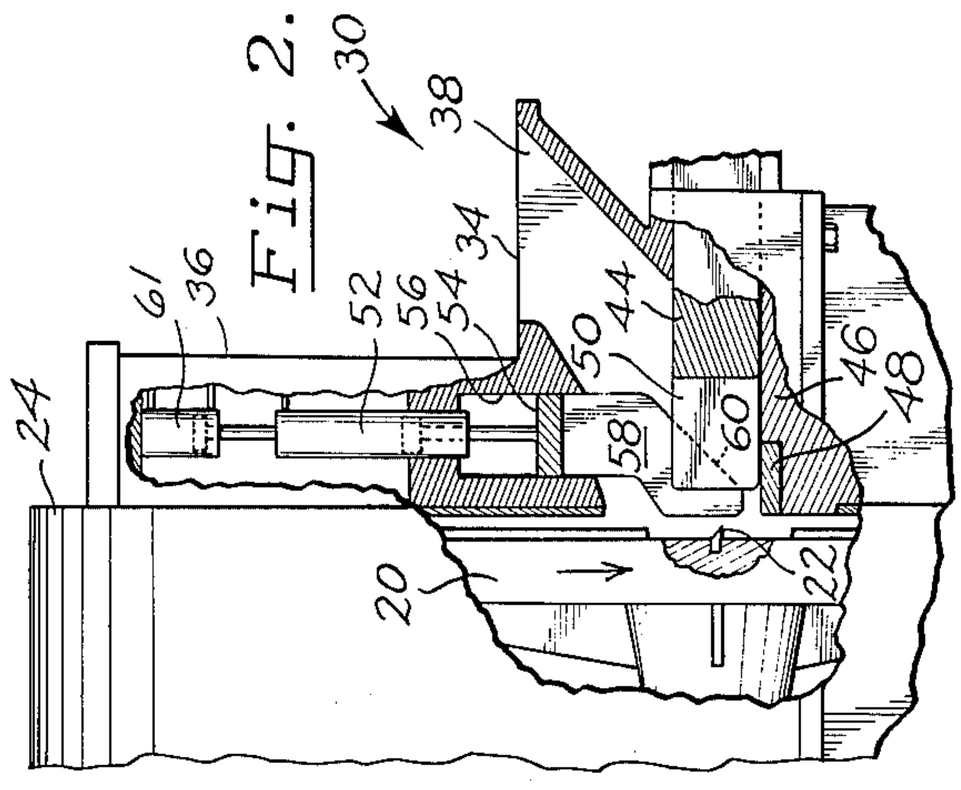

Fig. 2.

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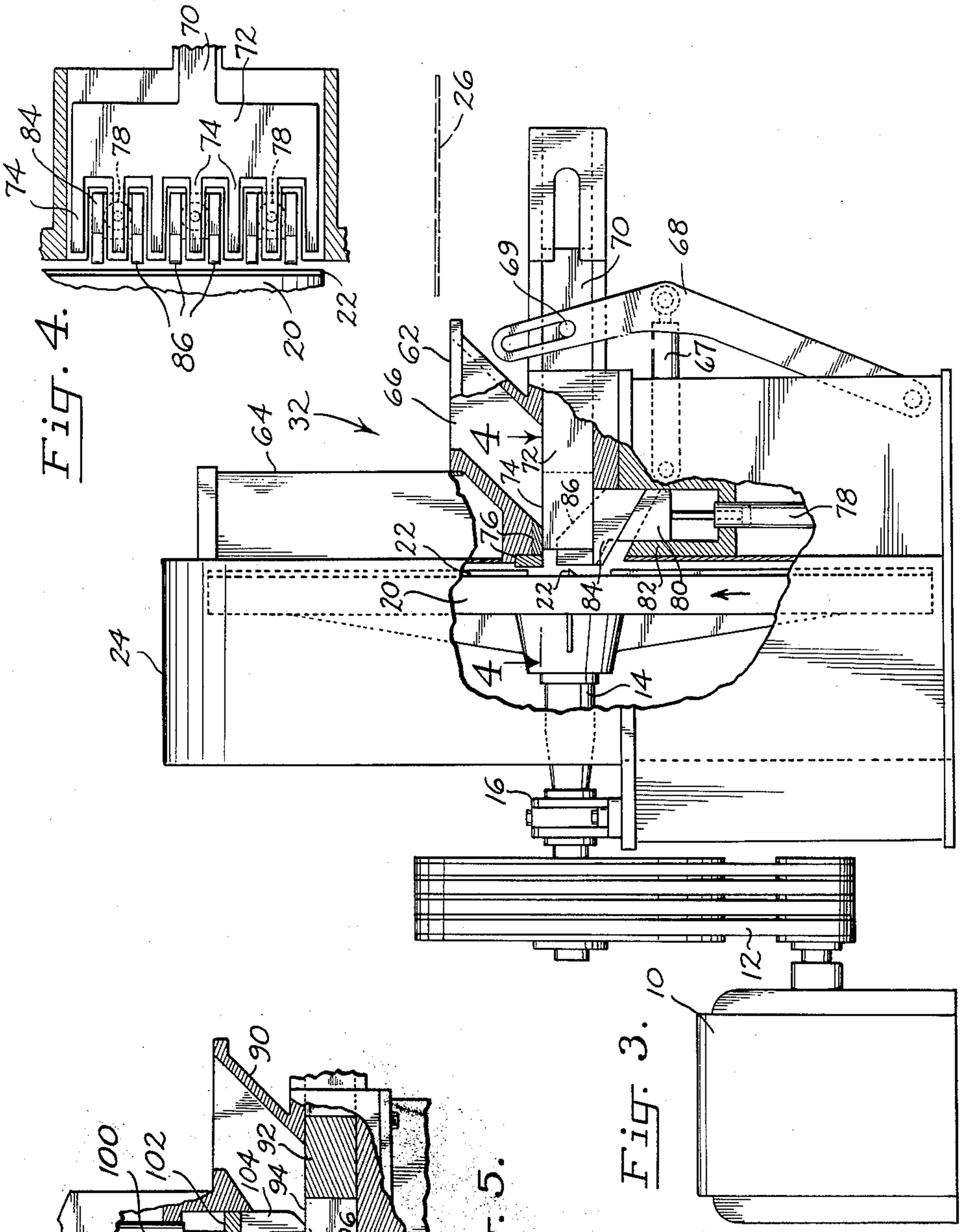

Fig. 4.

Fig. 5.

Fig. 3.

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3,101,756

Patented Aug. 27, 1963

3,101,756
DISC-TYPE WOOD REDUCER WITH MULTIPLE FEED

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Filed Apr. 4, 1960, Ser. No. 19,920
7 Claims. (Cl. 144—176)

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 unduly 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 sde 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

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 piostn 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 thickness 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 reciprocative 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

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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