United States Patent

Montgomery, Jr.

[15] **3,703,231**

[45] **Nov. 21, 1972**

[54] MATERIAL FEEDING APPARATUS

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[22] Filed: **Nov. 23, 1970**

[21] Appl. No.: **91,714**

[52] **U.S. Cl.**.....**198/165,** 198/190

[51] **Int. Cl.**.....**B65g 15/14**

[58] **Field of Search**.....198/165, 162, 190

[56] **References Cited**

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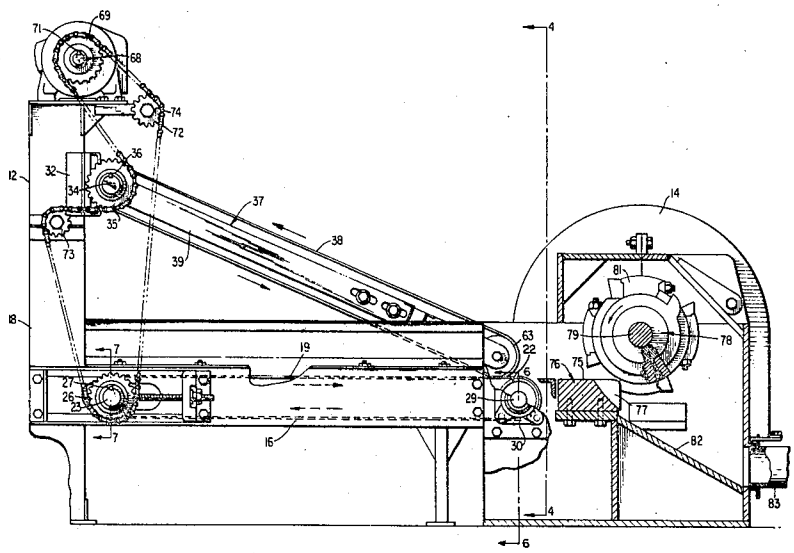
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[57] **ABSTRACT**

Apparatus for conveying and feeding pieces of wood or bulky items such as paper and cardboard boxes or the like to a cutting and punching type reduction device comprises a generally horizontal lower wide belt unit and a plurality of narrow upper belt units converging inwardly from a feed opening into that device. The belts define respective upper and lower sides of a feed passage moving in the same direction at the same speed. The narrow upper belt units are freely rockable about a common axis and all rest at their inner ends on the end of the wide belt adjacent the cutting and punching device.

8 Claims, 9 Drawing Figures

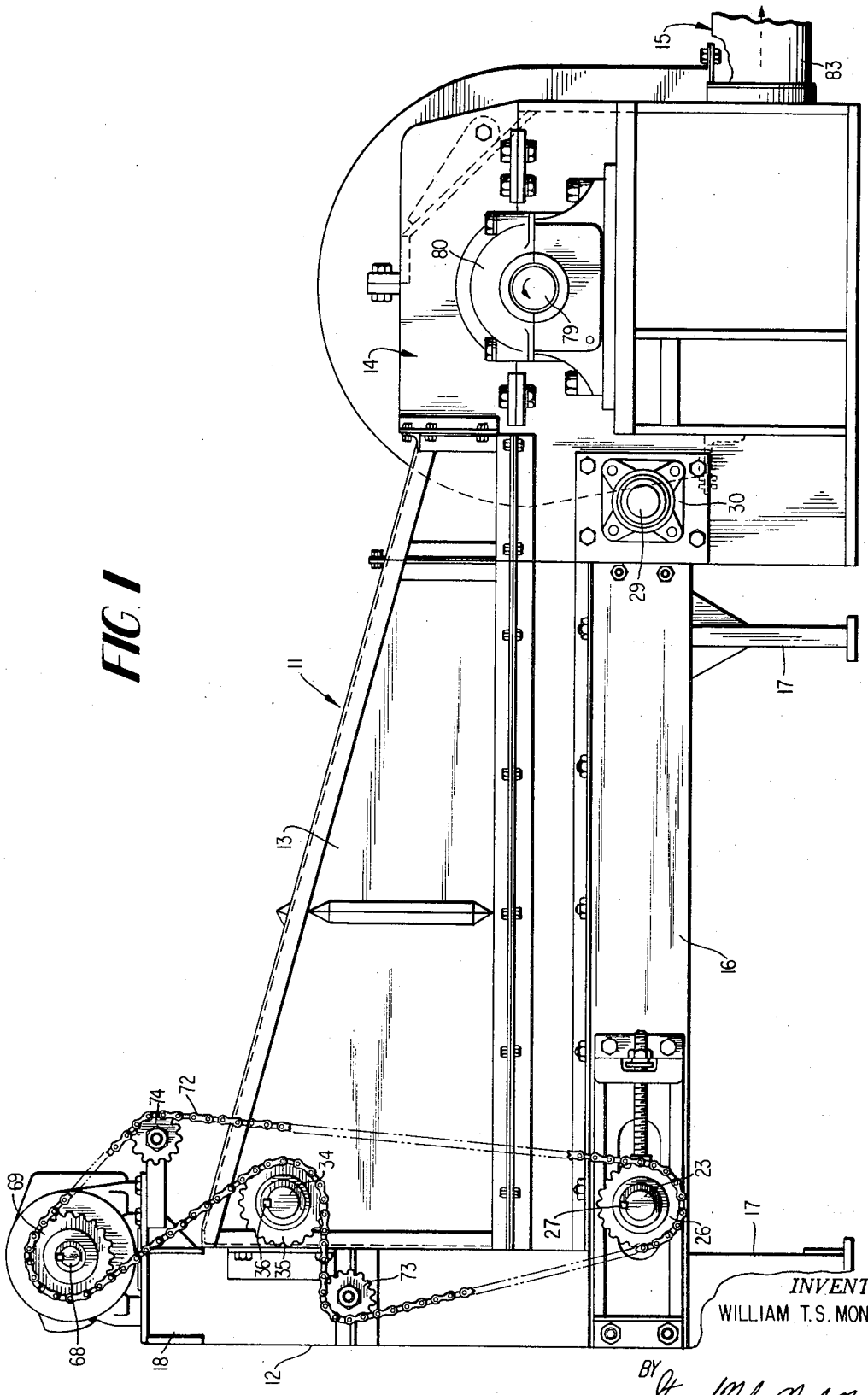


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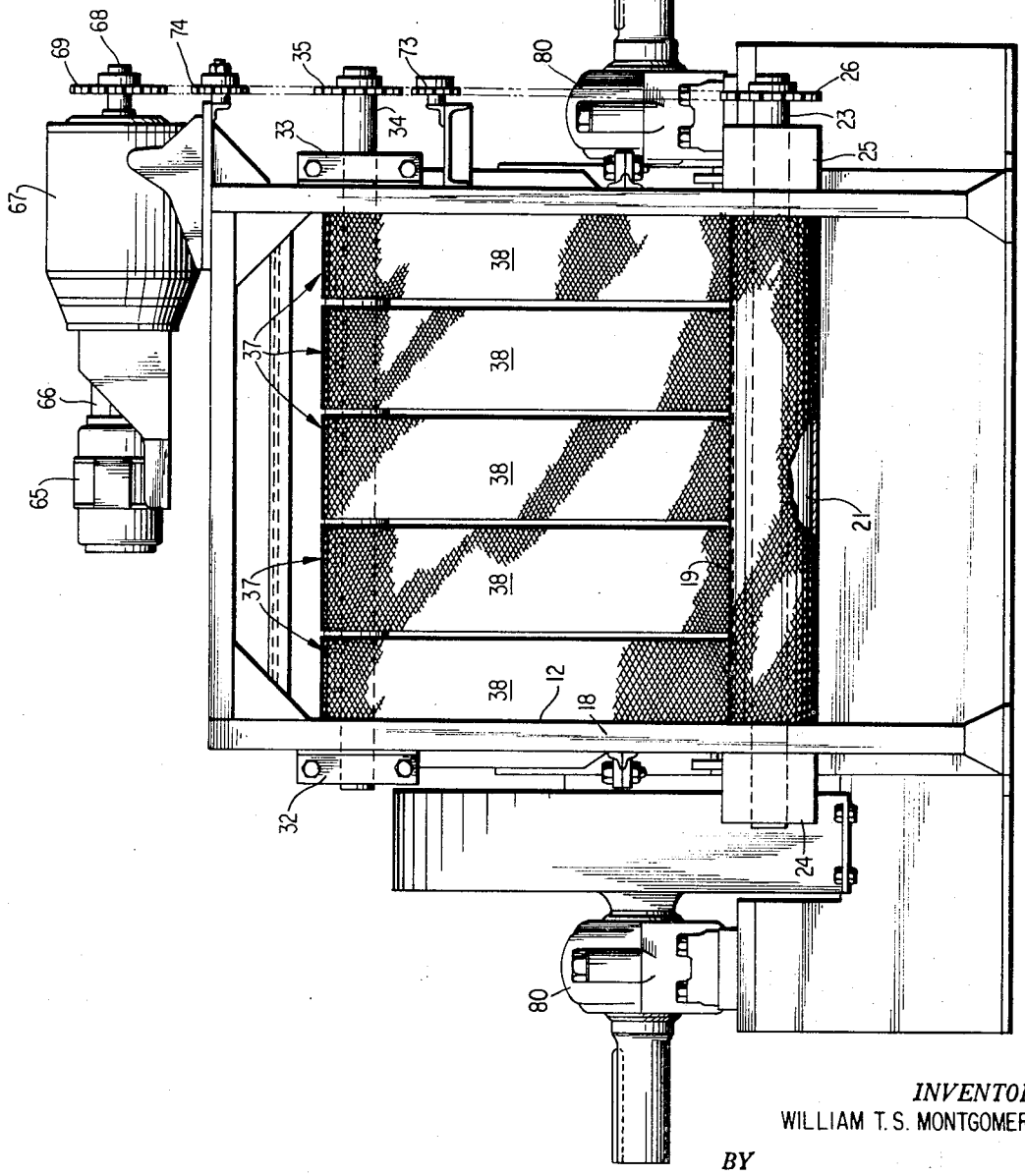
FIG. 1



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FIG 2

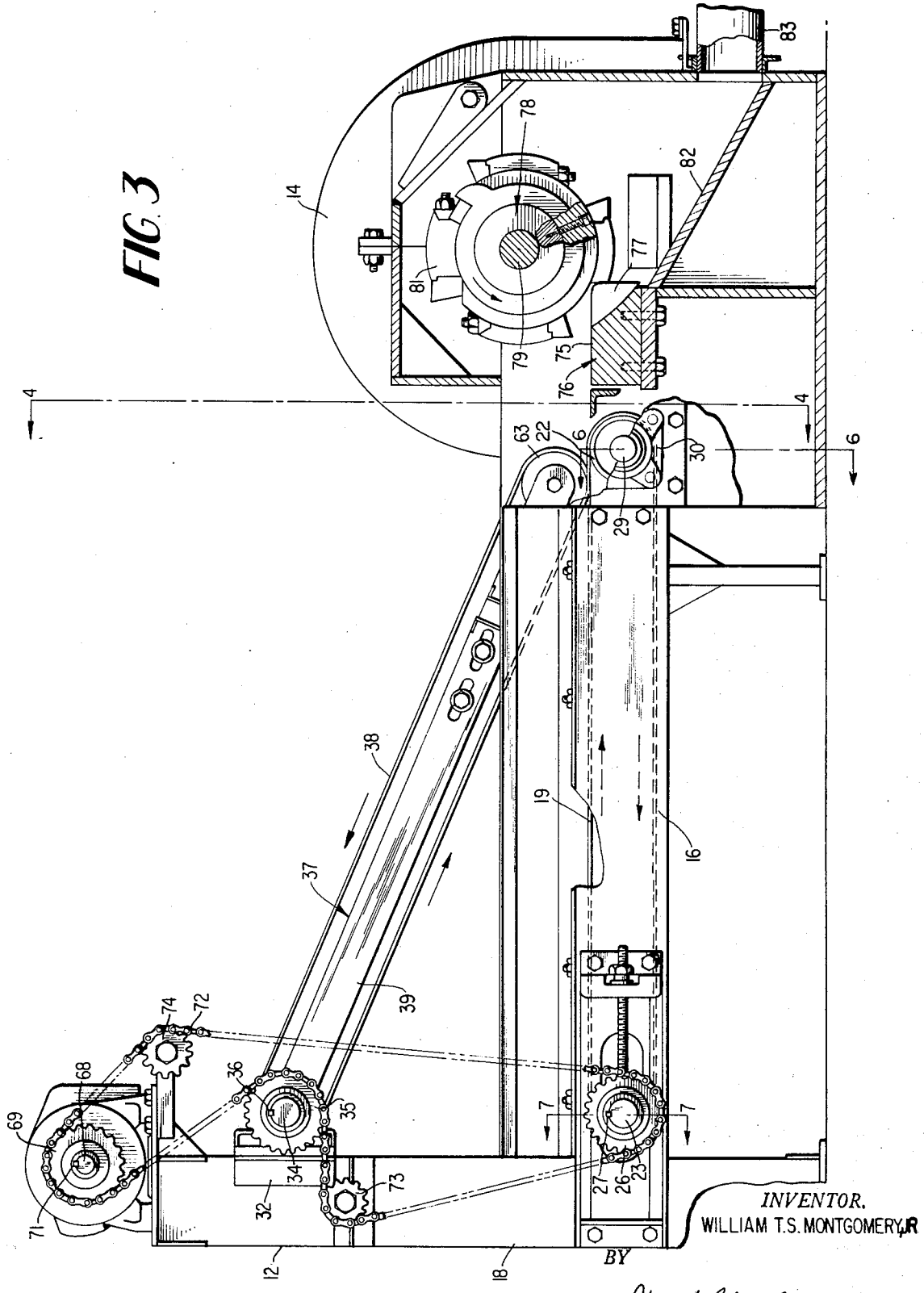


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FIG. 3

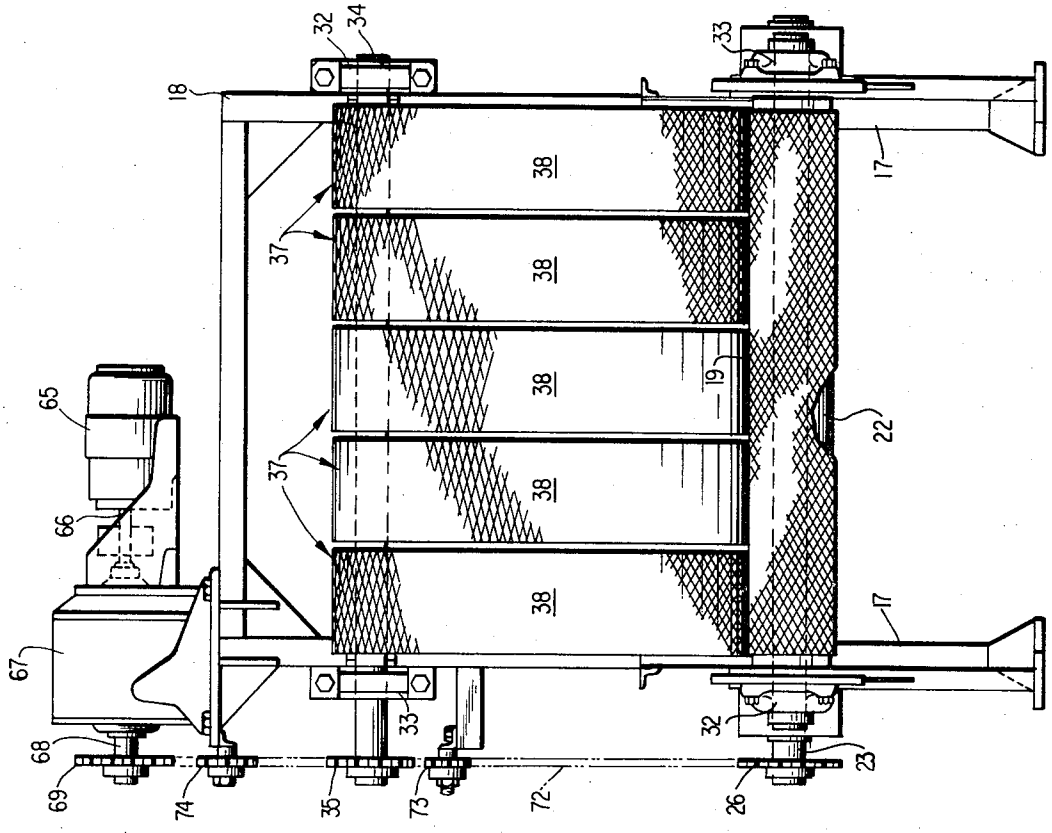


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FIG 4

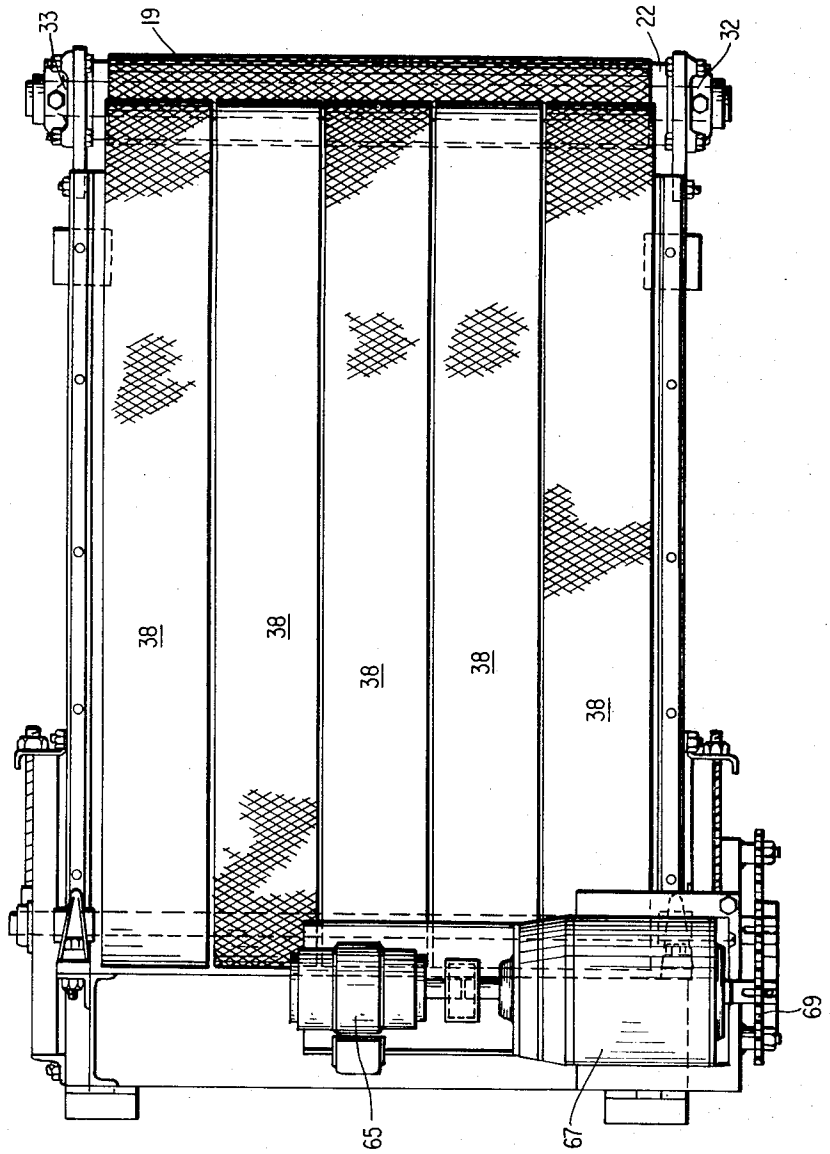


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FIG. 5



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FIG. 7

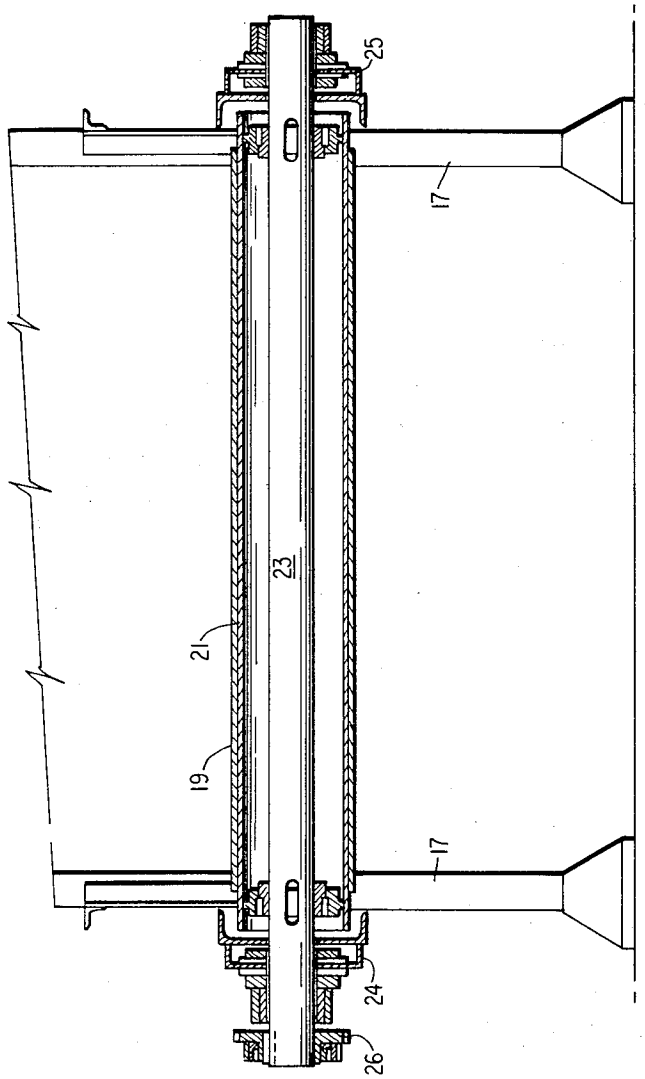
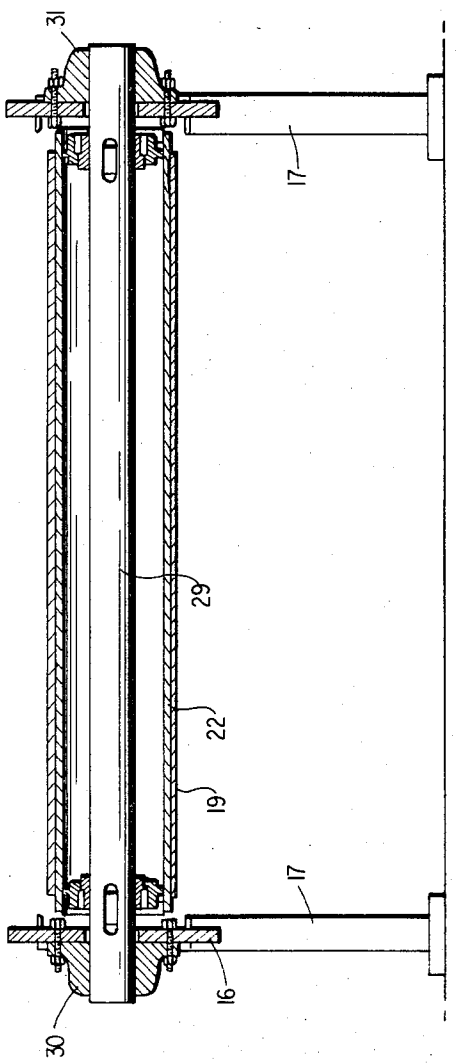


FIG 6



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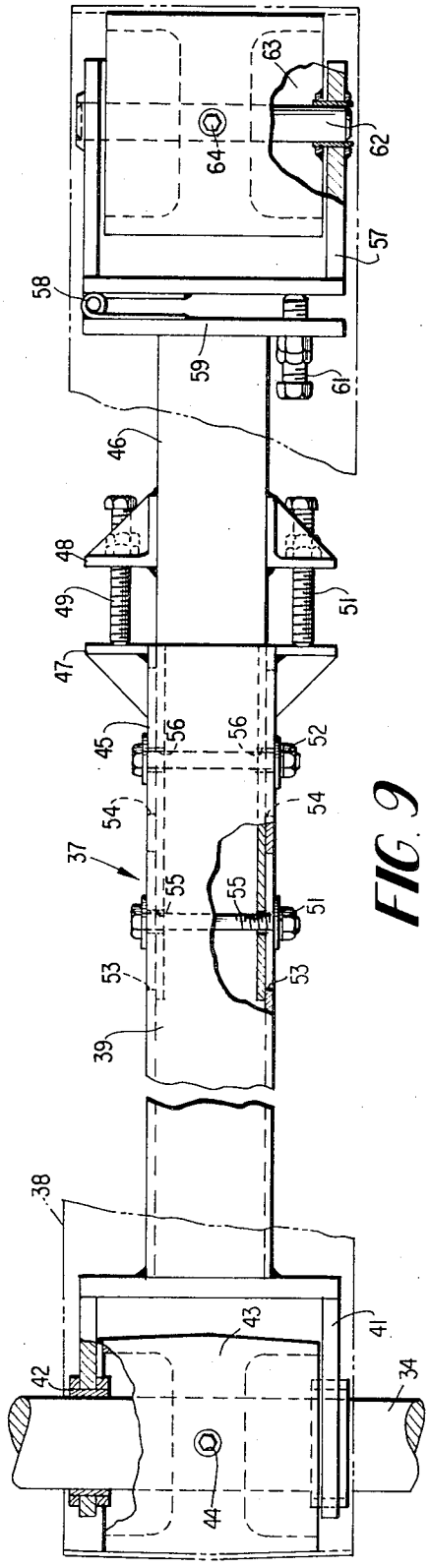


FIG. 9

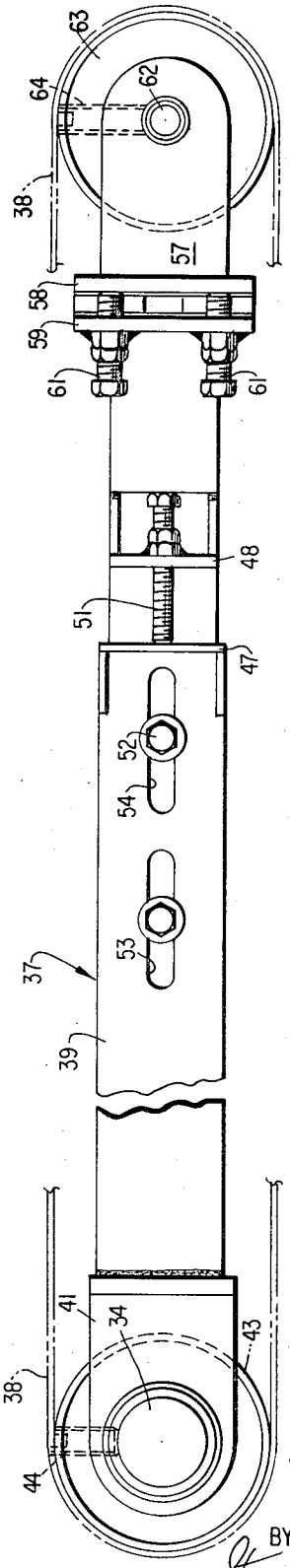


FIG. 8

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MATERIAL FEEDING APPARATUS

History and Background

The machine of the invention comprises essentially a special conveyor section for introducing random size pieces of wood or paper etc. and a wood reduction section wherein the pieces of wood are reduced in size for further processing or disposal.

The invention relates mainly to a machine of the type disclosed in U.S. Pat. No. 2,869,793 wherein chunks of wood are fed into a heavy duty cutting and punching wood reduction section wherein they are reduced to substantially uniform smaller sizes and from which they are conveyed for further handling.

In the present invention, as will appear, the cutting and punching section may be in all material aspects the same as that of said patent, but the mode of feeding wood chunks or bulky pieces such as paper involves a special arrangement of conveyor belts defining a novel conveying infeed throat consisting in the preferred embodiment essentially of a relatively wide lower substantially horizontal belt and a plurality of side by side relatively narrow upper belts that incline downwardly and inwardly toward the inner end of the lower belt, and such is the major object of the invention.

A further object of the invention is to provide a novel conveyor feed arrangement for introducing pieces of wood to a cutting and punching station comprising a lower relatively wide generally horizontal conveyor belt and a plurality of downwardly and inwardly inclined narrow side by side upper belts driven at the same speed as the lower belt and having their inner ends disposed above the inner end of the lower belt adjacent said station.

Another object of the invention is to provide a novel conveyor feed arrangement for introducing pieces of wood or paper etc. into a reduction station, wherein a plurality of upper inwardly and downwardly inclined conveyor belt units are pivoted at their upper ends about a transverse axis and rest at their lower end on the inner end of a relatively wide generally horizontal belt, the units being individually swingable about said transverse axis in response to the presence of material between them and the lower belt.

Further objects of the invention relate to structural detail such as the construction of said upper conveyor belt units including adjustments for belt length and tracking, drive arrangements for the belts, and related support structure, reference being made to the drawings, specification and claims herein.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a side elevation showing a machine according to a preferred embodiment of the invention;

FIG. 2 is a rear elevation of the machine showing the belt arrangement at the intake, as viewed from the left end of FIG. 1;

FIG. 3 is a side elevation similar to FIG. 1 but with side cover structure removed and partly broken away in section, to show details;

FIG. 4 is a rear elevation as viewed substantially at line 4—4 in FIG. 3 showing the upper and lower conveyor belt coaction;

FIG. 5 is a top plan view showing particularly the upper belt arrangements;

FIG. 6 is a section substantially on line 6—6 of FIG. 3 showing the idler pulley at the lower end of each upper narrow conveyor unit;

FIG. 7 is a section substantially on line 7—7 of FIG. 3 showing the drive pulley for the lower wide conveyor;

FIG. 8 is a side elevation showing one of the upper conveyor units; and

FIG. 9 is a top plan view of the conveyor unit of FIG. 8, partly broken away and in section.

PREFERRED EMBODIMENTS

The machine 11 shown in side elevation in FIG. 1 comprises an open intake section 12, a feed section 13 wherein random size pieces of wood entering the open intake are conveyed to a reducing section 14, and a take-away section indicated at 15. The intake and feed sections are supported on a platform 16 having depending legs 17. At its outer end platform 16 is rigidly connected to an upright open frame 18 partly defining the intake opening at 12.

The feed section contains a relatively wide endless belt 19 having approximately the width of opening 12 and with its upper flight substantially horizontal. Belt 19 is supported on and extends between a front pulley 21 (FIGS. 2 and 7) and a rear pulley 22 (FIGS. 3 and 4).

Front pulley 21 is mounted on a shaft 23 having its opposite ends journalled in bearings at 24 and 25. A sprocket 26 is secured on one end of shaft 23 as by key 27. Rear pulley 22 is mounted on a shaft 29 journalled at opposite ends in frame mounted bearing units 30 and 31.

Adjacent its upper end frame 18 has secured on opposite sides two bearing assemblies 32 and 33 wherein are freely rotatably mounted the opposite ends of a horizontal shaft 34 on which is fixed a sprocket 35 as by key 36. Preferably shafts 23 and 34 have their axes in a vertical plane.

A plurality of upper relatively narrow belt units 37 (FIG. 2), the combined width of which is substantially equal to the width of belt 19, extend from shaft 34 downwardly and inwardly to rest upon belt 19 substantially at rear pulley 22. Each of the units 37 is rockably mounted on shaft 34 which drives endless belts 38 mounted on the units.

Referring to FIGS. 3 and 9, each narrow belt unit 37 comprises a rigid longitudinal bar structure 39 having fixed on its upper end a yoke 41 in the arms of which are bearings 42 rockably mounting the unit on shaft 34. Within the space between the yoke arms of each unit a pulley 43 is mounted on shaft 34, being fixed axially and non-rotatably to shaft 34 as by a screw 44. Each pulley is freely rotatable with respect to the associated yoke.

In each unit 37 the bar structure 39 comprises telescoped tubular sections 45 and 46 having rigid radial flanges 47 and 48 respectively. Spacer screw units 49 and 51 threaded in flange 48 abut flange 47 and are adjustable to determine the relative longitudinal positions of tubes 45 and 46. A plurality of through bolt assemblies 51 and 52 extend through opposed slots 53 and 54 in outer tube 45 and aligned openings 55 and 56 in inner tube 46, and when these bolt assemblies are tightened they lock the tubes in the longitudinally adjusted position.

At the lower end of each unit 37, a yoke 57 is pivoted as by a hinge 58 that is offcenter with respect to the longitudinal axis of the unit. Hinge 58 is mounted at one side of an end flange 59 on tube 46, and adjustable screws 61 threaded in flange 59 bear on the yoke at the other side of the axis of the unit. A shaft 62 is freely rotatably mounted in suitable bushings in the arms of yoke 57, and a pulley 63 of the same size as pulley 43 is fixed on shaft 62 as by a screw 64. The endless belt 38 in each unit passes over both pulleys 43 and 63 and the longitudinal adjustment of tubes 45 and 46 determines the belt tension. The adjustment at screws 61 determines the angularity of shaft 62 and the belt 38 relative to the longitudinal axis of the unit, for a purpose to appear.

In the machine the identical upper feed belt units 37 are arranged side by side and independently freely rockably mounted on shaft 34. The belts 38 are of the same width and their lower flights normally lie in the same inclined plane. At the lower ends of the units 37, all of the inclined belts 38 rest upon the upper surface of horizontal belt 19. Thus the feed section of the machine comprises an inwardly tapering chamber having a moving bottom wall defined by belt 19 and a moving upper wall defined by the side by side belts 38.

An electric motor 65 is mounted on the top of frame 18 and its shaft 66 enters a drive reduction gearing assembly 67 having an output shaft 68 on which is fixed a drive sprocket 69 as by key 71. A drive chain 72 is meshed with sprockets 69, 35 and 26 as well as idler sprocket 73 and 74 mounted for free rotation on the frame.

The drive by chain 72 rotates shafts 23 and 34 in opposite directions and at the same speed so that the linear speeds of belts 19 and 38 are equal, and the top flight of belt 19 and the bottom flights of all belts 38 move in the same direction.

Referring to FIG. 3, pieces of wood or paper, etc. emerging from the pass between the end of belt 19 and the lower ends of belts 38 will be directed across the relatively flat horizontal top 75 of a stationary anvil unit 76 having a toothed section indicated at 77. The wood or paper, etc. pieces are punched and cut to smaller size by the action of a heavy duty rotary cutter unit 78 carried by a shaft 79 journalled at opposite ends in bearings such as that indicated at 80. Suitable power means (not shown) rotates shaft 79 continuously.

The cutter unit consists of a series of side by side rotary knives 81 that coact with a corresponding series of teeth on the anvil 76 and the reduced size bits of wood or paper etc. pass downwardly below the cutter and along inclined passage 82 toward the mouth of a relatively large conduit 83 of the takeaway section that is coupled to a suitable source of reduced air pressure.

In the machine, the rotary cutter and the anvil structure and coaction are preferably the same as disclosed in said U.S. Pat. NO. 2,869,793 to which reference is made for any further necessary disclosure of the same.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. Apparatus for feeding pieces of wood, paper or like material into a reduction device comprising upper and lower belt means converging inwardly from an inlet opening, said upper belt means comprising a plurality of side by side separate relatively narrow belt units and said lower belt means comprising a wide belt unit at least as wide as a plurality of said upper belt units, and means individually pivotally mounting said upper belt units (being individually pivoted) to rock independently about transverse axes at their uppermost ends at said inlet opening, and said upper belt units being distributed transversely of said lower belt unit and being adapted to permit said upper belt means to substantially conform to a contour of material on said lower belt unit.

2. Apparatus as defined in claim 1, wherein means is provided for driving both said belt means so that the lower flights of the upper belts move in the same direction and at about the same speed as the upper flight of said wide lower belt.

3. Apparatus as defined in claim 1, each of said upper belt units being swingably mounted on a common axis.

4. Apparatus as defined in claim 3, said lower belt means comprising a single wide belt unit having a width substantially as great as the combined width of all of said upper narrow belt units.

5. Apparatus as defined in claim 4, wherein all of said narrow upper units may rest at their inner lower ends on said wide lower belt unit when there is no material therebetween

6. In the apparatus defined in claim 1, a common drive shaft upon which each of said upper belt units is pivoted, a plurality of spaced pulleys along said shaft one for each upper belt unit, each upper belt unit comprising a longitudinal member mounted for free rocking about the axis of said shaft and rotatably mounting a pulley on a transverse axis at the lowermost end of said member and an endless belt between each pulley on the shaft and the pulley on an associated upper belt unit.

7. In the apparatus defined in claim 6, means for adjusting the angularity of the transverse axis of the pulley on each of said members.

8. In the apparatus defined in claim 6, means for adjusting the effective length of each said member.

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