Aug. 21, 1951 E. H. JACOBSON 2,564,904

WORK HOLD-DOWN ROLL MECHANISM FOR WORK FEED APPARATUS

Filed April 16, 1948 2 Sheets-Sheet 1

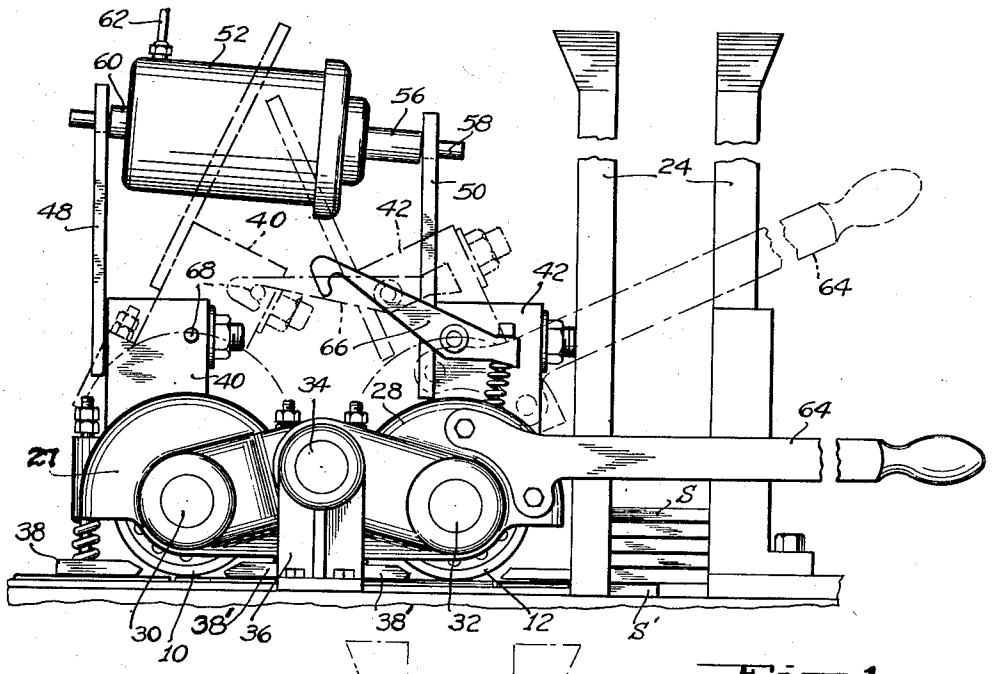


Fig. 1

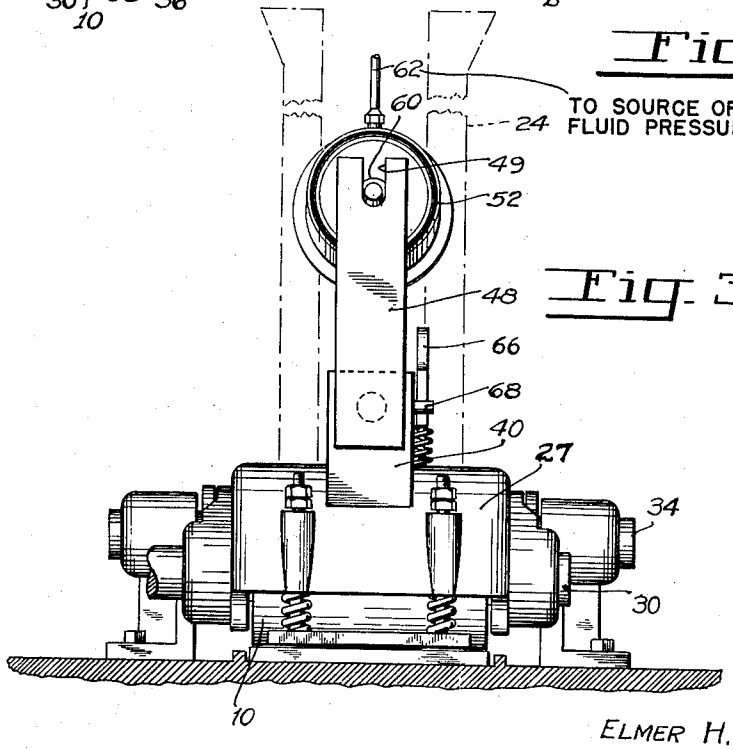


Fig. 3

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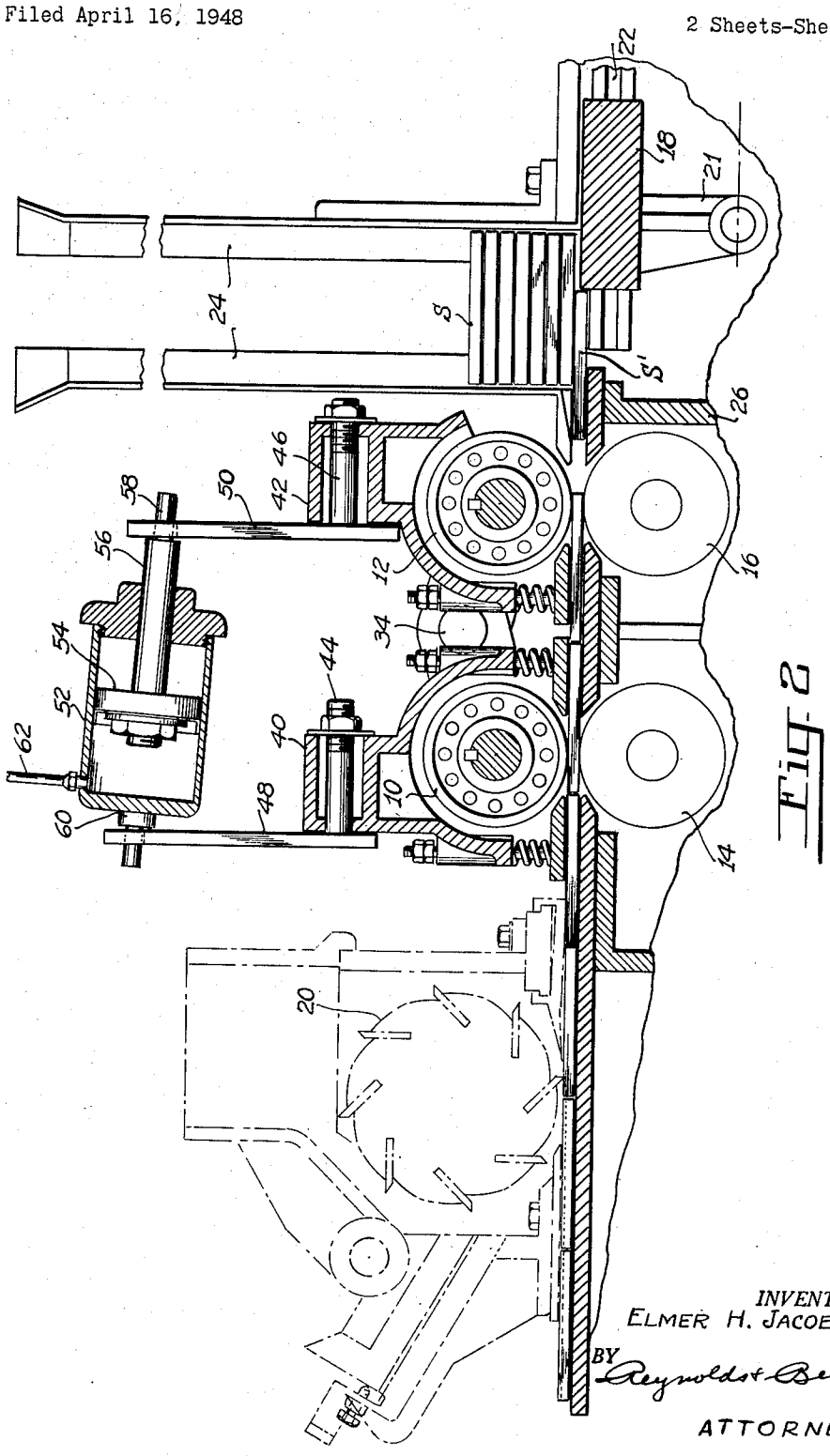


Fig. 2

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WORK HOLD-DOWN ROLL MECHANISM FOR WORK FEED APPARATUS

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3 Claims. (Cl. 144—242)

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This invention relates to combined hold-down and feed roll mechanisms operable to advance board strips in succession progressively from a feed-in point to and beyond an operating point, and it is illustratively described by reference to its application in a machine for grooving the thin wood blanks used as plate separators in storage batteries.

It is a broad object of my invention to devise improved actuating means for a combined hold-down and feed roll mechanism, such means being operable to exert the desired hold-down pressure against the work through the hold-down rolls while the work is being fed, and at the same time to permit the hold-down rolls to yield readily upward for cushioning against shock or vibration caused by sudden changes in thickness of the work being fed.

As a further matter of concern, it is desired to exert constant and controlled hold-down pressure against the moving strips irrespective of variations in their thickness. It is also desired to provide such a mechanism through which it it readily possible to adjust such pressure at any selected value, as may be best suited to the stock being run, without removing the hold-down rolls from the work or otherwise disturbing the operation of the machine. Another object is to coordinate hold-down pressures applied to the work through cooperating separate hold-down rolls, so that, with paired hold-down rolls for example, both rolls may be pressed against the work conjointly by a single force-producing means, while instantaneous rise or fall of one such roll attending a change in thickness of the work passing beneath it will not appreciably affect its own hold-down pressure nor that of the other roll.

A further object is to provide improved mechanism by which the hold-down rolls, which are ordinarily awkward to handle, may be lifted readily from the work and swung into convenient positions for cleaning them, for cleaning beneath them, or for cleaning the coacting work supports, such as cooperating feed rolls located beneath the upper or hold down rolls. It is also desired that the hold-down pressure may be relieved readily and the rolls freed when they are to be lifted, and that such pressure may then be reapplied at any time without inconvenience or delay.

My invention, is illustratively based in certain of its aspects upon roll-feed machines employing a work support against which the compacting pressure of a pair of coacting hold-down rolls,

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spaced apart in the direction of work feed, is exerted. Pneumatic, or more generally, fluid, pressure means, such as an air cylinder and coacting piston, interacting between the rolls produces the same or related hold-down pressures against the work by both rolls. The air pressure in the cylinder may be closely regulated by any suitable or well known type of regulator and, it will be observed, may be relieved at any time to free the rolls for lifting from the work. Because opposite and directly related fluid forces are exerted upon the rolls, changes in work thickness beneath one hold-down roll without a change, or with an opposite or similar change, beneath the other roll, will have no appreciable effect upon the hold-down pressures of either. The piston, while cushioning against abrupt variations, very quickly assumes an accommodating position lengthwise of the cylinder.

The hold-down rolls are supported and guided for swinging normally separatedly to and from the work about a common transverse axis located between the rolls. By swinging one roll toward the other with the air cylinder removed the rolls become automatically interconnected by latch means which connects them for conjoint swinging. Thereafter the rolls may be rocked together back and forth manually into various positions convenient for cleaning purposes. If desired, therefore, one of the rolls may be held in operative engagement with the work while the other is raised for cleaning, and vice versa.

Hence, my fluid actuating arrangement offers excellent control and regulation of hold-down pressures, instantaneous accommodation to changes in work thickness, and provides a simple device for coordinating the hold-down pressures of the rolls while affording convenient means for lifting and holding them in various positions over the work when not in actual use.

These and other features, and various details of construction of the illustrated form of my invention will become apparent from the following description which is based on the accompanying drawings.

Figure 1 is a side elevation view of my improved hold-down and feed roll mechanism, illustrating the hold-down roll assembly in operating position in solid lines and in inoperative position in broken lines.

Figure 2 is a longitudinal sectional view of such mechanism, showing particularly its relation to the cutters and to an arrangement to store and

feed into the machine in successive order the separator blanks to be grooved.

Figure 3 is an end elevation view of my hold-down mechanism in such a grooving machine, as viewed from its discharge end.

Illustration of my invention as embodied in a grooving machine for storage battery separators emphasizes certain advantages of my improved mechanism. For example, the blanks handled by such a grooving machine are relatively thin and short. They must not be crushed when advanced between the feed rolls, and yet they must be driven forwardly in positive manner to resist and overcome the impeding rearwardly-acting thrust imposed on them by the opposite movement of the cutter blades gouging the strips ahead.

To provide the desired pressure for feeding the blanks past the grooving head and partly to minimize interruptions in feeding the work continuously to the cutters in case a gap between blanks should occur beneath one feed roll, it is customary in such machines to employ two or more feed rolls engaging successive blanks to advance a column of blanks uniformly past the cutting station and to a point of delivery. However, the cutters are customarily quite close to the feed rolls in order to prevent the column of blanks, which are individually short, from buckling during passage from the rolls to the cutters, even though not pressed flat in that interval. As a result, chips of wood from the cutters are showered over the feed-roll assembly. Some of these fall on the blanks and pass under the presser rolls, tending to increase their pressure and cause the strips to jam in the machine, and in any event the hold-down rolls are forced to rise and fall intermittently as the chips pass under such rolls with the separators. Oftentimes irregularities or fractures in the separators themselves, or foreign objects carried with them, tend to have the same effect, namely of causing blockages or impositive feeding action. Wood pitch and dirt, accumulated on the feed rolls from the separators, results in the need to clean the rolls quite frequently. For these and other reasons the above-stated objects and features of my invention therefore become particularly important in connection with separator grooving machines.

In Figure 2, preferably the paired hold-down rolls 10 or 12 are both driven, as are the coacting work support rolls 14 and 16, beneath the work. The roll drive power means are not shown in the drawings and may be of a conventional nature. Together, the hold-down and support rolls comprise continuously acting feed-rolls, by which the separator blanks S supplied intermittently by the reciprocative feed bar 18, are moved steadily toward and past the grooving mechanism comprising the cutter wheel 20. Separator blanks S are stored in the hopper comprising the parallel vertical angle iron sections 24 supported on the machine frame 26 at the corners of the stock of blanks. Bar 18 is carried by a driving bracket 21 guided for translatory movement to and fro in a guide 22 which is parallel to the general path of movement of the separators. Therefore, on each forward stroke of the feed-in bar 18 the bottom separator blank S' is stripped from the stack of blanks S and projected into roll-engaged position.

Preferably the reciprocating movement of the feed-in bar 18 is synchronized with the rotation

of the feed rolls 10 and 12 in order to produce an endless column of separator blanks at all times between the hopper and the cutters 20. For effecting such an arrangement synchronizing means is not shown because it is not a component part of the present invention and such arrangements are conventional in separator blank grooving machines. The invention here concerned lies in the supporting and actuating mechanism for the hold-down rolls 10 and 12, by which they are normally pressed against the work, and enabling them to be raised conveniently from the work at any time to clean them or the passage between them and the support rolls 14 and 16.

The supporting structure for hold-down rolls 10 and 12 comprises the roll housings 27 and 28 in which roll supporting shafts 30 and 32 for such rolls are respectively journalled. The roll housings are supported for swinging about a horizontal axis between them by a common pivot shaft 34 extending parallel to the rolls. Such shaft is journaled in brackets 36 (Figures 1 and 3) located on opposite sides of the machine frame 26, in positions slightly above the rotational axes of the hold-down rolls. A spring-urged hold-down foot 38 carried by housing 27 engages the blanks as they leave the rolls to prevent them from buckling and insures end-to-end abutment of successive strips. Additional, spring-urged hold-down feet 38' supported from each of housings 27 and 28 are conventionally provided between the rolls.

Roll housings 27 and 28 have brackets 40 and 42 projecting above them, respectively, to which the respective lever arms 48 and 50 are secured in upright position by bolts 44 and 46. The upper ends of these lever arms have open ended slots 49 to receive the operating connections of fluid pressure means reacting resiliently between and exerting pressure on such arms to produce substantially equal torques in opposite directions about shaft 34 if the lever arms are of equal length, or definitely related torques if the lever arms are of somewhat different lengths, forcing the hold-down rolls against the work. Such fluid pressure means may include a pneumatic cylinder 52 and coacting piston 54 having a piston shaft 56 projecting through one end of the cylinder. Such shaft has a reduced outer end post portion 58 adapted to fit in slot 49 of arm 50, and an intervening shoulder which bears against the adjacent side of the arm 48, whereas the opposite end of cylinder 52 has a projecting post 60, the outer end of which is likewise reduced in diameter to seat in the slot 49 of arm 48 and has a shoulder bearing against the adjacent side of arm 48.

Air under controlled pressure from a suitable pressure source (not shown) and introduced into the cylinder 52 through tube 62 forces piston 54 outwardly of the cylinder and toward lever arm 50, and thereby causes equal and opposite forces to be exerted against the sides of the arms 48 and 50. Liquid, instead of a gaseous fluid could be used, but less satisfactorily since the position of the piston in the cylinder may change more rapidly with gas to accommodate variations in the positions of the arms without appreciable alteration in gas pressure. With constant pressure in the fluid cylinder, as may be readily maintained by any of various constant air-pressure control systems (not shown) for the supply, it will be seen that the tilting of one of arms 48 and 50 occasioned by the rise and fall of its roll,

when chips or other foreign objects pass beneath it in company with a separator blank, will have no appreciable effect upon the hold-down pressure exerted by the other roll. The yield of the air in the cylinder **52** exhausted through duct **62** sufficiently to compensate for the contraction in available cylinder space, accommodates such movement, and the resilience of the air also cushions such arm tilt, since an instant is required for pressure readjustment in the cylinder following a sudden shift in position of the piston.

When the rolls are to be cleaned the pressure may be released from the pneumatic press, comprising the cylinder **52** and piston **54**, and it may be lifted bodily from the slots in lever arms **48** and **50**, leaving the arms free to tilt without restraint. Thereupon one of the roll housings, such as **26**, may be raised and swung toward the housing **27** by manipulation of a handle at the end of a lever **64** secured on the housing **28**. Either of the housings, such as housing **28**, carries a spring-actuated latch **66** which is supported pivotally from the side of bracket **42** (see Figure 1) in a position to enable its engagement of a latch pin **68** correspondingly located on the bracket **40** of housing **27**. The latch and pin engage and lock automatically when the roll **12** has been swung away from the work and sufficiently close to the roll **10**, and thereafter the rolls may be swung conjointly by the lever **64**, one up and the other down, about shaft **34** as a common pivot. The angular separation of the rolls **10** and **12** about their pivot shaft **34**, when interconnected by the latch, is sufficient to provide the necessary clearance beneath an elevated roll while the other roll contacts the work, which position of the rolls may be effected when, for example, the work is to be fed without interruption while cleaning the rolls individually.

When the rolls **10** and **12** are freed of the pneumatic pressure means and are latched together it is possible to rock them back and forth into convenient positions for cleaning them or the lower rolls **14** and **16**, or for eliminating blockages of the strips beneath them.

I claim as my invention:

1. In apparatus for advancing work strips over a work guiding support, yieldable work hold-down means comprising a pair of hold-down rolls adapted to hold an advancing work strip down against said support, a pair of bell cranks having a common pivot axis extending generally parallel to said support and perpendicularly to the line of advance of work strips thereon, said bell cranks

having roll-carrying arm portions rotatively supporting said hold-down rolls in spaced relationship substantially parallel to said axis and on opposite sides thereof respectively while said rolls are normally in contact with the work, said bell cranks further having control arm portions swingable about said axis, and fluid pressure operated jack means interengaged between said control arm portions and operable by reaction therebetween to apply oppositely directed torque forces to such bell cranks, respectively, thereby to exert hold-down pressure simultaneously on both of said rolls through said bell cranks.

2. Apparatus as defined in claim 1, wherein the jack means comprises a fluid cylinder and a coacting piston respectively provided with mounting shafts extending from opposite ends of said cylinder, and wherein the control arm portions have slots receiving said mounting shafts, respectively, for quick detachment of said jack means from said control arm portions.

3. Apparatus as defined in claim 1, wherein the jack means is removably connected to the control arm portions, and means to interconnect said bell cranks for conjoint rocking motion thereof about their common pivot axis at will when one of said bell cranks is swung generally away from the work support and into predetermined angular relationship closer than normal to the other of said bell cranks, permitted by removal of the jack means.

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