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(54) SUPPORT DEVICE FOR LOGS IN A FRAME SAW.

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Description

The present invention relates to a support device for supporting a log advancing through a frame saw, said device comprising one or more supporting elements positioned adjacent to the saw frame.

Frame saws represent the oldest known sawing technique for mechanically ripping round logs into various types of sawn timber. The frame saws in principle consist of a frame which is guided for reciprocating movement in a plane, preferably in a vertical direction. The frame may be guided by means such as rollers, slides etc., and the movement may be provided by means of various mechanical systems of which the most usual comprises a crank shaft with a connecting rod. One or more parallel saw blades are strapped in the frame, and the log to be ripped is advanced towards the frame and the saw blades. As the log is advanced through the frame, the reciprocating saw blades will cut the log and rip it into a plurality of planks, boards, blocks etc. according to the size and shape of the log and the positioning of the saw blade in the frame.

However, for a good result to be obtained it is essential that the log is advanced towards the saw blades in a stable and linear fashion. This can be obtained by fixing one or both ends of the log in a trolley accompanying the log during the advancement thereof and preventing the log from rolling laterally or twisting. Additionally, the log is usually fixed and supported by a plurality of rollers under, above and possibly also at the sides of the log immediately in front or upstream of the saw frame. These rollers will support the log adjacent the frame and are primarily intended to take up the reaction forces from the sawing operation. However, the rollers may also be rotationally driven and thereby provide the necessary force for advancing the log. Alternatively, the advancement or feeding of the log can be obtained by a winch or the like pulling the log through the saw. In order to prevent twisting of the log, strong driving blades are often provided behind the saw blades.

This way of supporting and fixing the logs is satisfactory provided the logs are approximately straight and without large irregularities due to twigs and the like or provided the logs are trimmed on one side, preferably the lower side so as to provide a uniform plane surface as a basis. However, this trimming should take place in another apparatus and requires a separate operation which will hamper the work. If the log has large irregularities due to twigs, or if it is somewhat bent in the longitudinal direction, the log will change its position when the irregularities pass over the rollers with a consequent risk of a corresponding deformation of the sawn timber. If the log is bent, there is a large risk that the sawn timber will be correspondingly bent. Logs having such defects are therefore not suited for ripping in existing frame saws.

An object of the present invention is to stabilize a nonuniform log having lopped-off twigs in a manner allowing for irregularities in the log, while providing a fixed, rigid support capable of taking up the forces from the saw blades.

This object is met according to the present invention by providing supporting elements adapted to be resiliently pressed into contact with the log with a predetermined force, and to be locked for fixedly supporting the log and taking up the forces from the saw blades during the entire working stroke thereof, said elements being releasable during at least a part of the return stroke to allow the elements to adapt themselves to the varying shape of the advancing log.

Thereby it becomes possible to handle even very irregular logs with a good result, which is of great importance with respect to utilizing as much as possible of the available raw material in the production of sawn timber. The required fixation of the log during the working stroke of the saw blades is obtained in a simple manner and with great precision. At the same time the advantages of a resilient support accommodating the varying shape of the advancing log are obtained.

Preferably, the force with which the elements are pressed into contact with the log in released condition, is adjustable in accordance with the weight and shape of the log.

Each supporting element may be associated with an hydraulic system pressing the element into contact with the log. Alternatively, each supporting element may be associated with a mechanical device providing the force pressing the element into contact with the log. In both cases the supporting element may be blocked during the working stroke by mechanical means such as wedges, stepped stops or brakes. When an hydraulic system is used, the locking of the supporting elements may be achieved by means of a valve which when closed blocks the flow of hydraulic medium, thereby locking the supporting elements. When the valve is open the supporting element is released. Further supporting elements may be arranged over the length of the log path. Such supporting elements are preferably lockable like the previously defined supporting elements. However, such locking may not be necessary in connection with supporting elements positioned at a substantial distance from the saw frame.

The supporting elements may consist of rollers or wheels, and in this case one or more of the rollers or wheels may be rotatably driven to provide the feeding movement of the log.

It will be understood that during the working stroke of the saw frame, that is when the saw frame and thereby the saw blades are moved so as to cut their way through the log, the supporting elements are fixed and will not yield, so that they may take up the reaction forces from the sawing operation. When the saw frame and thereby the saw blades perform the return stroke, the supporting elements are released and may then freely adapt themselves to the shape of the log by

being forced into contact therewith by the hydraulic or mechanical means referred to. When a new working stroke starts the supporting elements are locked in position to effectively support the log during the cutting operation.

The system will operate particularly effectively if the known technique comprising a mounting of the saw blades with a suitable inclination relative to the path of reciprocation is used. In this case the log may be halted during the working stroke and be advanced only during the return stroke. This will provide the greatest precision of the sawing operation.

Surprisingly, the described device while easily adapting itself even to large irregularities and bends of the log, will at the same time provide a stable fixation of the log during the sawing operation without any tendency of yielding or twisting under the effect of the relatively large reaction forces from the cutting operation of the saw blades. Thereby, even very nonuniform logs can be easily advanced and fixedly supported in the frame saw without resulting defects in the sawn timber. BY concentrating the feeding to the return stroke, the largest possible precision will be obtained, since the log will be supported in a stable and fixed manner during the sawing operation. At the same time power is saved since the advancement of the log will take place against unstressed saw blades during the return stroke, provided the saw blades are inclined as referred to above, so that they are not in contact with the bottom of the kerf during the return stroke.

Further features and advantages of the support device according to the invention will appear from the following description, reference being had to the drawings.

Figure 1 shows a support device using an hydraulic system.

Figure 2 shows a device using a mechanical system including a counter weight and a wedge for biassing and locking the supporting elements.

Both figures are highly diagrammatical leaving out all details not required for understanding the invention.

In Figure 1 the round log 1 to be cut is advanced to the right as indicated by an arrow. A saw frame 3 is mounted for reciprocal movement up and down. The guides and the operating system for the frame are not illustrated since they may be conventional. A plurality of parallel saw blades are strapped in the frame in a conventional manner. The log 1 is advanced against and through the saw frame, while being supported at the ends on two trolleys 2 running on rails 11. The trolleys 2 are designed to allow the log 1 to be "fetched" and "delivered" through the saw frame past the saw blades without the trolley itself having to pass through the frame. The advancement or feed may be obtained by means of a winch (not shown) pulling the rear trolley forwards. Immediately upstream of the saw frame 3 there is positioned a supporting element in the form of a roller 4 which is mounted at the end of a one-armed lever 13 mounted on a pivot 6. The roller 4 is pressed into contact with the log 1 by a piston 12 of an hydraulic piston-cylinder unit 5. For sake of simplicity only one roller 4 is illustrated in Figure 1, but to support the log effectively several rollers with separate hydraulic systems should preferably be arranged side by side. Hydraulic liquid under pressure acts on one side of the piston 12 in order to raise the roller 4 and press it into good contact with the log 1. The pressure of the hydraulic liquid may be obtained by means of an hydraulic liquid tank 7 positioned at a high level and communicating with the cylinder through a conduit 14. In the conduit 14 there is provided a valve 8 which may be actuated by cams or dogs 9 and 10 on the saw frame 3. The cam 10 will open the valve 8 when the saw frame 3 arrives at its lower dead point, and the valve will be closed by the cam 9 when the saw frame arrives at its higher dead point. Thus, during the downward working stroke of the frame, when the saw blades are cutting into the log, the valve 8 will remain closed. Because of the low compressibility of the hydraulic liquid the piston 12 and the roller 4 cannot move up or down, but remains in a fixed position even if the downwardly directed reaction forces from the saw blades are large. When the frame 3 arrives at its lower dead point indicating the end of the cutting stroke, the valve 8 is opened by the cam 10 and remains open during the return movement of the frame. Thereby the piston 12 and the roller 4 will be movable in both directions, since hydraulic liquid can be supplied and displaced through the open valve 8. Consequently, the log is held in a fixed position during the working stroke, and the supporting roller 4 will adjust itself to the irregularities of the log during each return stroke.

As previously indicated the pressure of the hydraulic liquid in the cylinder 5 may be provided in any suitable manner. For instance, pressure can be imparted to the hydraulic liquid in a closed tank by means of a gas cushion, a spring or weight loaded piston or the like. The valve 8 may alternatively be controlled by the operating mechanism for the saw frame through cams or by transmission of electromagnetic impulses. It is essential for a proper functioning of the device that the valve 8 is kept closed during the working stroke, so that the roller 4 is fixed and can take up the reaction forces from the saw blades in the frame 3, which forces will act on the log 1 in the direction of movement of the saw frame during the working stroke. On the other hand, the valve 8 must be open during the return stroke for a sufficient period to release the roller and allow it to adapt itself to the shape of the log during advancement thereof. It is especially advantageous for the feeding means for advancing the log through the saw frame to be synchronized with the stroke of the saw frame, so as to be operative only when the supporting elements are released, the feeding being interrupted during the working stroke. Experience has shown that it is an advantage to be able to vary the static pressure in the hydraulic system according to the weight and

dimensions of the logs. Larger logs require a higher pressure in order to provide the correct contact pressure between the log and the roller 4, whereas long and thin logs will require a lower pressure to prevent the force from the roller 4 from deforming the log. If the system is provided with a closed tank having a pressure control, for instance in the form of a gas cushion, the pressure can be varied simply by increasing or reducing the pressure of the gas cushion, for instance by means of a compressor and a relief valve, respectively.

In Figure 2 a mechanical system is shown strictly diagrammatically. The reference numerals 1, 2, 3 and 11 designate the same elements as in the embodiment in Figure 1. The saw frame 3 is driven by a connecting rod 16 connected to a crankshaft having a flywheel 15. The supporting element may be a roller as in Figure 1, but the element 17 shown in Figure 2 is a plate with a curved upper side. The supporting element 17 is provided with a stem 18 guided for vertical reciprocal movement in a suitable guide 19. Through a two-armed lever 21 a weight 20 acts on the stem 18 to press the supporting element 17 into contact with the log 1. A "wedge" or stepped stop 26 is mounted at the end of a two-armed lever 24, and is biassed to a position below the lower end 27 of the stem 18 by means of a spring 25. At the other end of the two-armed lever 24 there is mounted a cam follower 23 which engages a cam surface 22 on the circumference of the flywheel 15. When the cam surface 22 engages the cam follower 23, the stepped stop or "wedge" 26 will be retracted from the position below the lower end of the stem 18, as illustrated in Figure 2. When the crankshaft rotates as indicated by the arrow 28, the "wedge" 26 will be retracted from the stem 18 when the saw frame 3 is moving upwards, i.e. during the return stroke. The supporting element 17 will then be freely movable in the guide 19, following the shape of the log 1 under the influence of the weight 20. When the saw frame 3 is moving downwards during its working stroke, there is no cam surface to influence the lever 24 through the cam follower 23, and the "wedge" 26 will then be pulled by the spring 25 to a position below the stem 18. The log 1 will then be rigidly supported by the supporting element 17, except for a possible small downward movement which cannot exceed the pitch of the stepped stop 26.

Also in this embodiment it is convenient, but not essential that the log 1 is advanced only during the return strokes of the saw frame 3. The log may be advanced by means of a feeding device, which is not illustrated since it may be of a conventional type.

The two embodiments illustrated or corresponding devices functioning in the same manner will permit ripping even very irregular, bent logs in a frame saw with a good result, which has heretofore been impossible. Thereby new possibilities are opened for using previously nonacceptable logs in the production of sawn timber.

Claims

1. Support device for supporting a log (1) advancing through a frame saw, said device comprising one or more supporting elements (4, 17) positioned adjacent to the saw frame (3), characterized in that these supporting elements (4, 17) are adapted to be resiliently pressed into contact with the log (1) with a predetermined force and to be locked for fixedly supporting the log and taking up the forces from the saw blades during the entire working stroke thereof, said elements (4, 17) being releasable during at least a part of the return stroke to allow the elements to adapt themselves to the varying shape of the advancing log.

2. Support device as claimed in claim 1, characterized in that the force with which the elements (4, 17) are pressed into contact with the log (1) in released condition, is adjustable in accordance with the weight and shape of the log.

3. Support device as claimed in claim 1 or 2, characterized in that each supporting element (4) is associated with an hydraulic system (5, 7, 8, 14) pressing the element (4) into contact with the log (1).

4. Support device as claimed in claim 1 or 2, characterized in that each supporting element (17) is associated with a mechanical device (18—21) providing the force pressing the element into contact with the log (1).

5. Support device as claimed in claim 3, characterized in that each hydraulic system has a valve (8) which when closed blocks the flow of hydraulic medium thereby locking the supporting element (4), and when open releases the supporting element.

6. Support device as claimed in claim 3 or 4, characterized in that the supporting elements (17) are blocked during the working stroke by mechanical means (26) such as wedges, stepped stops or brakes.

7. Support device as claimed in any of the preceding claims, characterized in that it comprises further supporting element arranged over the length of the log path.

8. Support device as claimed in any of the preceding claims, characterized in that the supporting elements (4) are rollers or wheels.

9. Support device as claimed in claim 8, characterized in that at least one of these rollers or wheels are rotatably driven in such a manner as not to impede its movement transversely to the log, said driven wheels or rollers transmitting to the log at least a part of the force necessary for advancing the log.

10. Support device as claimed in any of the preceding claims, characterized in that a feeding means for advancing the log through the saw frame is synchronized with the stroke of the saw frame (3) so as to be operative only when the supporting elements are released.

Patentansprüche

1. Haltevorrichtung zum Halten eines durch eine Gattersäge vorgeschobenen Stammes (1) mit einem oder mehreren Halteelementen (4, 17) anliegend des Sägegatters (3) dadurch gekennzeichnet, dass diese Halteelemente (4, 17) so beschaffen sind, dass sie mit einer bestimmten Kraft federnd an den Stamm angepresst und zum Festhalten des Stammes und zur Aufnahme der Kräfte von den Sägeblättern während deren gesamten Arbeitshub verriegelt werden, wobei diese Elemente (4, 17) wenigstens während eines Teils des Rücklaufhubes lockerbar sind, um die Elemente sich der veränderlichen Form des vorgeschobenen Stammes anpassen zu lassen.

2. Haltevorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Kraft, mit der die Elemente (4, 17) an den Stamm (1) in gelokkertem Zustand angepresst werden, entsprechend dem Gewicht und der Form des Stammes einstellbar ist.

3. Haltevorrichtung nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass jedes Halteelement mit einer Hydraulik-Einrichtung (5, 7, 8, 14) verbunden ist, die das Element an den Stamm anpresst.

4. Haltevorrichtung nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass jedes Halteelement (17) mit einer mechanischen Einrichtung (18—21) verbunden ist, die die Kraft zum Anpressen des Elements an den Stamm liefert.

5. Haltevorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass jede Hydraulik-Einrichtung ein Ventil (8) aufweist, das im geschlossenen Zustand den Durchfluss der Hydraulik-Flüssigkeit sperrt und dadurch das Halteelement (4) verriegelt und im geöffneten Zustand das Halteelement lockert.

6. Haltevorrichtung nach einem der Ansprüche 3 oder 4, dadurch gekennzeichnet, dass die Halteelemente (17) während des Arbeitshubs durch mechanische Mittel (26), wie Keile, gestufte Anschläge oder Bremsen blockiert werden.

7. Haltevorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass sie ein zusätzliches, über die Länge des Weges des Stammes angeordnetes Halteelement enthält.

8. Haltevorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass die Halteelemente (4) Rollen oder Räder sind.

9. Haltevorrichtung nach Anspruch 8, dadurch gekennzeichnet, dass wenigstens eine(s) der Rollen oder Räder derart drehend angetrieben ist, dass ihre Bewegung quer zum Stamm nicht beeinträchtigt ist, wobei diese angetriebenen Räder oder Rollen auf den Stamm wenigstens einen Teil der für dessen Vorschub erforderlichen Kraft übertragen.

10. Haltevorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, dass Zuführmittel, um den Stamm durch das Sägegatter vorzuschieben, mit den Hüben des Sägegatters (3) synchronisiert sind und daher nur arbeiten, während die Halteelemente gelockert sind.

Revendications

1. Dispositif de support pour supporter une bille de bois (1) avançant à travers une scie à châssis, ledit dispositif comprenant un ou plusieurs éléments supports (4, 17) adjacents au châssis (3) de la scie, caractérisé en ce que ces éléments supports (4, 17) sont adaptés à être appliqués élastiquement contre la bille (1) avec une force prédéterminée et à être bloqués pour supporter fixement la bille et supporter les forces exercées par les lames de la scie durant toute leur course active, lesdits éléments (4, 17) étant débloquables durant au moins une partie de la couse de retour pour leur permettre de s'adapter aux variations de forme de la bille en mouvement.

2. Dispositif de support selon la revendication 1, caractérisé en ce que la force avec laquelle les éléments (4, 17) sont appliqués contre la bille (1) dans leur état débloqué est ajustable en fonction du poids et de la forme de la bille.

3. Dispositif de support selon l'une des revendications 1 et 2, caractérisé en ce que chaque élément support (4) est associé à un système hydraulique (5, 7, 8, 14) qui applique l'élément (4) contre la bille (1).

4. Dispositif de support selon l'une des revendications 1 et 2, caractérisé en ce que chaque élément support (17) est associé à un dispositif mécanique (18—21) fournissant la force d'application de l'élément contre la bille (1).

5. Dispositif de support selon la revendication 3, caractérisé en ce que chaque système hydraulique possède une valve (8) qui, à l'état fermé, coupe la circulation du milieu hydraulique, bloquant ainsi l'élément support (4) et, à l'état ouvert, débloque ce dernier.

6. Dispositif de support selon l'une des revendications 3 et 4, caractérisé en ce que les éléments supports (17) sont bloqués durant la course active par des moyens mécaniques (26), tels que des coins, des butées en échelons ou des freins.

7. Dispositif de support selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comporte en outre un élément support disposé sur la longueur du trajet de la bille.

8. Dispositif de support selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments supports (4) sont des cylindres ou des roues.

9. Dispositif de support selon la revendication 8, caractérisé en ce qu'au moins l'un de ces cylindres ou l'une de ces roues est entrainé en rotation, de manière à ce que son mouvement ne soit pas gêné transversalement à la bille, ledit cylindre ou ladite roue transmettant à la bille au moins une partie de la force nécessaire pour la faire avancer.

10. Dispositif de support selon l'une quelconque des revendications précédentes, caractérisé en ce qu'un moyen d'alimentation pour

faire avancer la bille à travers le châssis de la scie est synchronisé avec la course du châssis (3) de façon à être actif seulement lorsque les éléments supports sont débloqués.

FIG. 1

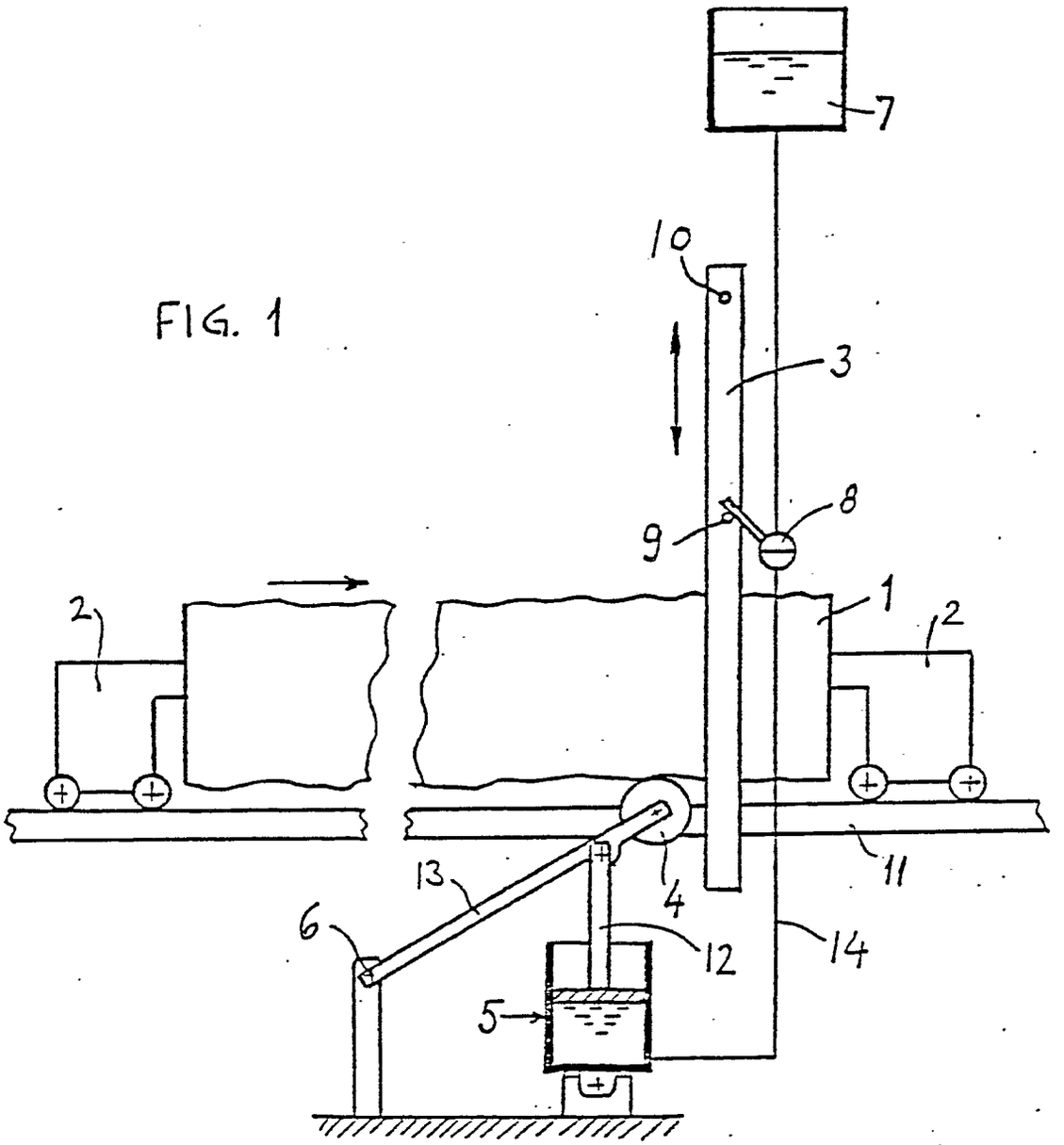

Fig.2.