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STORAGE BIN WITH PRESSURE-RELIEVING BAFFLES

Filed April 16, 1948

2 SHEETS.—SHEET 1

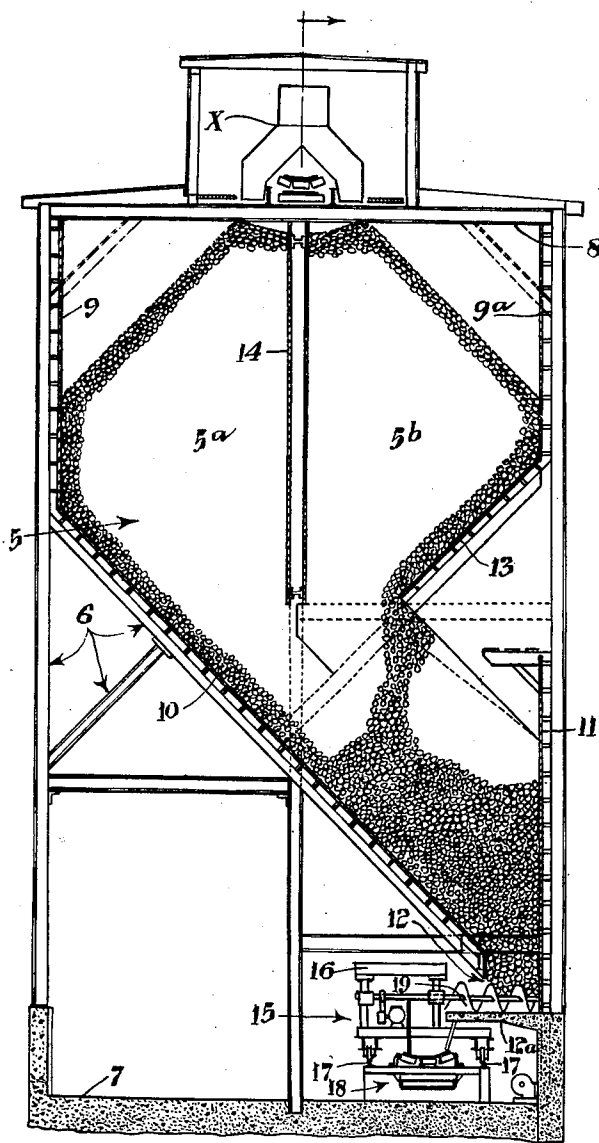


FIG.1

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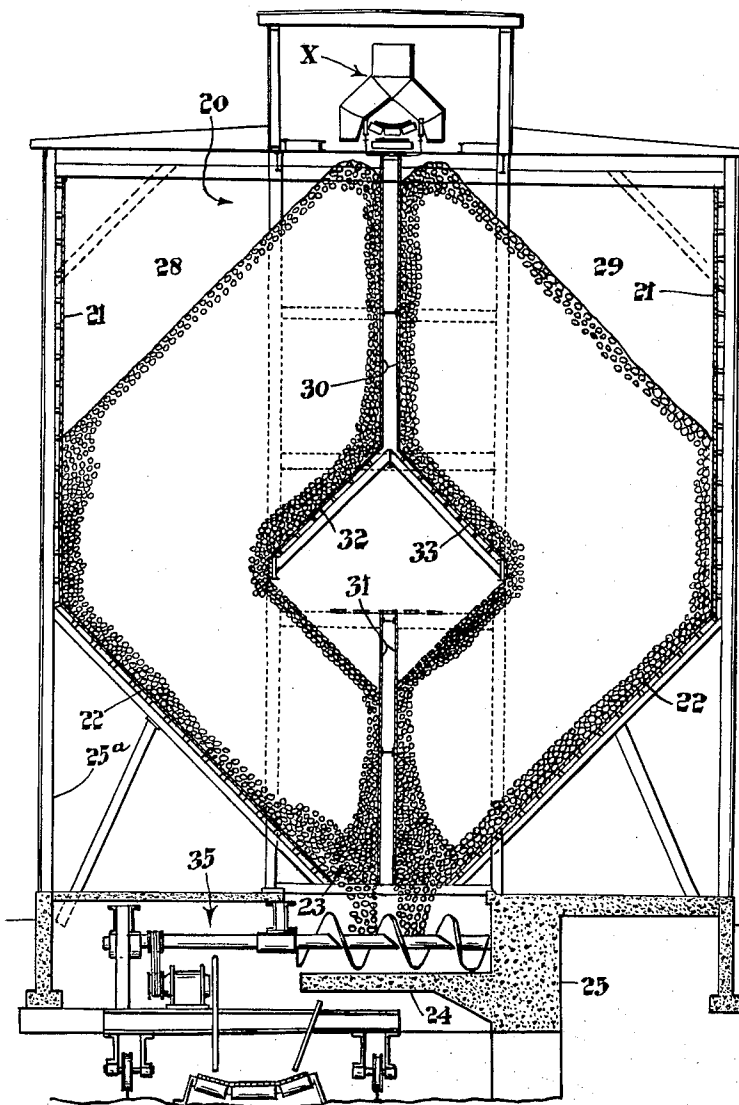


FIG. 2

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STORAGE BIN WITH PRESSURE-RELIEVING
BAFFLES

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2 Claims. (Cl. 222-459)

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This invention relates to wood chip storage bins in the pulp and paper industry and the object is to provide a storage bin designed to eliminate "bridging" or "arching" of the chips across the bottom opening or openings through which the chips are discharged from the bin.

The lower or bottom portion of the conventional wood chip storage bin is designed to provide opposing downwardly converging inclined sides along which the wood chips are guided to one or more bottom discharge openings arranged symmetrically in a central position between said inclined sides. In a bin of this type the continuous flow of chips to and through the discharge opening or openings is frequently interrupted by the "bridging" or "arching" of the chips across said opening or openings. This gives rise to serious stoppages and maintenance difficulties since the breaking up of the bridge or arch by the poking, vibrating, agitating, and other devices ordinarily employed for this purpose is frequently a difficult and time consuming operation.

The present invention is based on recognition and elimination of two design factors responsible for the "bridging" or "arching" which occurs in chip storage bins of conventional design. One of the factors here referred to is that the aforesaid opposing inclined sides along which the chips are guided to the bottom discharge opening or openings provide ideal abutments for supporting a bridge or arch formed by the chips. The second factor is that the pressure exerted by the chips in the upper part of the bin on the chips in the lower part of the bin compresses and consolidates the chips in the lower part of the bin to such an extent that they are no longer loose and free flowing with a large number of air spaces between them but are compressed to form the "building stones" which facilitate the "bridging" or "arching" of the chips across the abutments provided by the sloping sides of the lower portion of the bin.

In a chip storage bin or compartment designed in accordance with the present invention only one inclined side is provided in the lower portion of the bin or compartment for guiding the chips to the bottom discharge opening or openings. This inclined side is opposed to a straight vertical side which eliminates one of the abutments necessary to "bridging" or "arching" of the chips across said sides.

Another feature of chip storage bins or compartments designed in accordance with the present invention is that the pressure on the chips in the lower portion of the bin and the effective

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depth of the chips immediately above the discharge opening or openings are limited to values below those at which "bridging" or "arching" of the chips across said opening or openings is likely to occur.

A preferred embodiment of the invention is shown in the accompanying drawings, in which—

Fig. 1 is a transverse sectional view of a wood chip storage bin designed in accordance with my invention.

Fig. 2 is a similar view of a modified type of bin.

The installation shown in Fig. 1 comprises a storage bin 5 supported by a suitable frame structure 6 rising from a concrete foundation 7.

The upper part of the bin is defined by straight, vertical end walls 8 and side walls 9 and 9a. The opposite sides of the lower part of the bin are formed by a flat inclined side wall 10 and an opposing straight, vertical side wall 11. The inclined side wall 10 slopes downwardly from the lower edge of the vertical side wall 9 toward the lower edge of the vertical side wall 11. The walls 10 and 11 are spaced apart at their lower edges to define the sides of a bottom opening 12 through which chips are discharged onto an underlying platform 12a forming part of foundation 7.

A baffle wall 13 is arranged so that it slopes downwardly and inwardly from the lower edge of the upper side wall 9a toward the inclined side wall 10. This baffle wall 13 is positioned directly above the discharge opening 12 at a predetermined elevation above said opening. The lower edge of baffle wall 13 is spaced a suitable distance from the inclined side walls 10.

The upper part of bin 5 is divided into separate compartments 5a and 5b by an intermediate, longitudinally extending partition 14 which is preferably of hollow construction and extends downwardly from the top of the bin to a point below the upper edge of the inclined side wall 10. In addition to dividing the upper part of the bin into separate compartments the partition 14 is interposed between the inclined side surfaces afforded by the upper part of the inclined wall 10 and the baffle 13 and prevents arching of the chips across the abutments afforded by said surfaces. Arching of the chips between the upper part of the inclined wall 10 and the partition 14 and between said partition and the baffle wall 13 is prevented by reason of the fact that the sides of the partitions are straight and vertical and therefore do not provide suitable abutments for the formation of an arch.

From the foregoing description it will be seen that each inclined arch abutment forming sur-

face of the bin is directly opposed to a straight vertical surface so that the "bridging" or "arching" of the chips which occurs in the conventional bin is eliminated. In a bin of the design shown in Fig. 1 the provision and relative arrangement of the inclined wall 10, the opposing vertical wall 11, the baffle 13 and the partition 14 serve to substantially reduce the pressure exerted by the chips in the upper part of the bin on the chips in the lower part of the bin and keeps this pressure at a low value which is not conducive to "arching" or "bridging" of the chips across the discharge opening 12. It is particularly important that the effective depths of the chips immediately above and in line with the discharge opening 12 be kept at a low value so that the chips in the vicinity of the discharge opening will be sufficiently loose and free flowing to ensure continuous movement of the chips through said opening. This is provided for by the provision of the baffle 13 in cooperation with the inclined side wall 10 and the straight vertical wall 11 between which the discharge opening 12 is formed.

The chips fed to the platform 12a may be removed therefrom by any suitable conveying means generally indicated at 15. Briefly stated, this conveying means comprises a portable screw conveyor truck 16 arranged to run on rails 17 over an underlying belt conveyor 18 to which the chips are delivered by one or more screw conveyors 19 carried by said truck.

In the installation shown in Fig. 2 the upper part of the bin is defined by straight vertical end walls 20 and side walls 21. The opposite sides of the lower part of the bin are formed by converging side walls 22 sloping downwardly and inwardly from the side walls 21 and having their lower edges spaced apart to define a bottom discharge opening 23 through which the chips are delivered to a platform 24 corresponding to the previously mentioned platform 12a and forming part of a concrete foundation 25 on which the bin is supported by a suitable frame structure 25a.

The bin shown in Fig. 2 is divided into two compartments 28 and 29 by an upper longitudinally extending partition 30 and a lower longitudinally extending partition 31. The lower partition 31 is preferably of hollow construction arranged with its lower edge extending into the discharge opening 23 and its upper edge extending slightly above the upper edges of the inclined side walls 22. The partition 30 is also of hollow construction and extends downwardly from the top of the bin. Partition 30 is also provided, at its lower end, with downwardly and outwardly diverging baffles 32 and 33 opposed to the side walls 21. Baffle 32 directly overlies that part of the discharge opening 23 which serves compartment 28 while baffle 33 directly overlies that part of the discharge opening which serves compartment 29. "Bridging" or "arching" of the chips across the discharge opening 23 is prevented by the fact that the lower inclined wall 22 of each of the compartments 28 and 29 is opposed to a flat, vertical surface of the lower partition 31 and by reason of the fact that the inclined surfaces afforded by the baffles 32 and 33 are opposed by flat, vertical surfaces afforded by the upper side walls 21. With this arrangement it will be obvious that the pressure of the chips in the upper part of each compartment on the chips in the lower part of said compartment and the effective pressure of the chips located

in each compartment 22 above the discharge opening 23 is predetermined and kept to a safe low value in substantially the same manner as described in connection with the single compartment bin shown in Fig. 1.

It will be understood that each of the bins shown in Figs. 1 and 2 may be of any desired length and may be provided with any suitable number of transverse partitions cooperating with the longitudinal partitions to divide the interior of the bin both longitudinally and transversely into any desired number of compartments to which the wood chips may be selectively delivered by any suitable chip distributing means diagrammatically indicated at X.

The chips delivered to the platform 24 of the installation shown in Fig. 2 may be removed therefrom by conveying means 35 of the type previously described in connection with Fig. 1.

Having thus described the nature of my invention and several preferred embodiments thereof it will be understood that various modifications may be resorted to within the scope and spirit of the appended claims.

I claim:

1. A wood chip storage bin provided with a bottom discharge opening and having its ends and the upper portions of its sides defined by straight vertical end and side walls, the opposite sides of the lower portion of said bin being defined by inclined side walls sloping downwardly from the straight vertical side walls and having their lower edges disposed to define the sides of said discharge opening, a lower, straight vertical partition wall extending between the lower portions of the straight end walls of the bin and lying between and in spaced relation to the inclined lower side walls of the bin, an upper straight vertical partition wall extending between the upper portions of the end walls of the bin in spaced relation to the upper portions of the side walls of the bin and pressure relieving baffles inclining downwardly and outwardly in opposite directions from the lower portion of said upper partition wall, each baffle being disposed directly over the portion of the discharge opening lying at one side of said lower partition.

2. A wood chip storage bin as set forth in claim 1 in which the baffles are opposed to the straight vertical side walls of the bin and are located a slight distance above the upper edges of the inclined side walls of the bin.

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