Aug. 17, 1965 S. A. PARKER, JR 3,200,859

HOLLOW-CENTERED COMPACTING DEVICE

Filed March 6, 1963 4 Sheets-Sheet 1

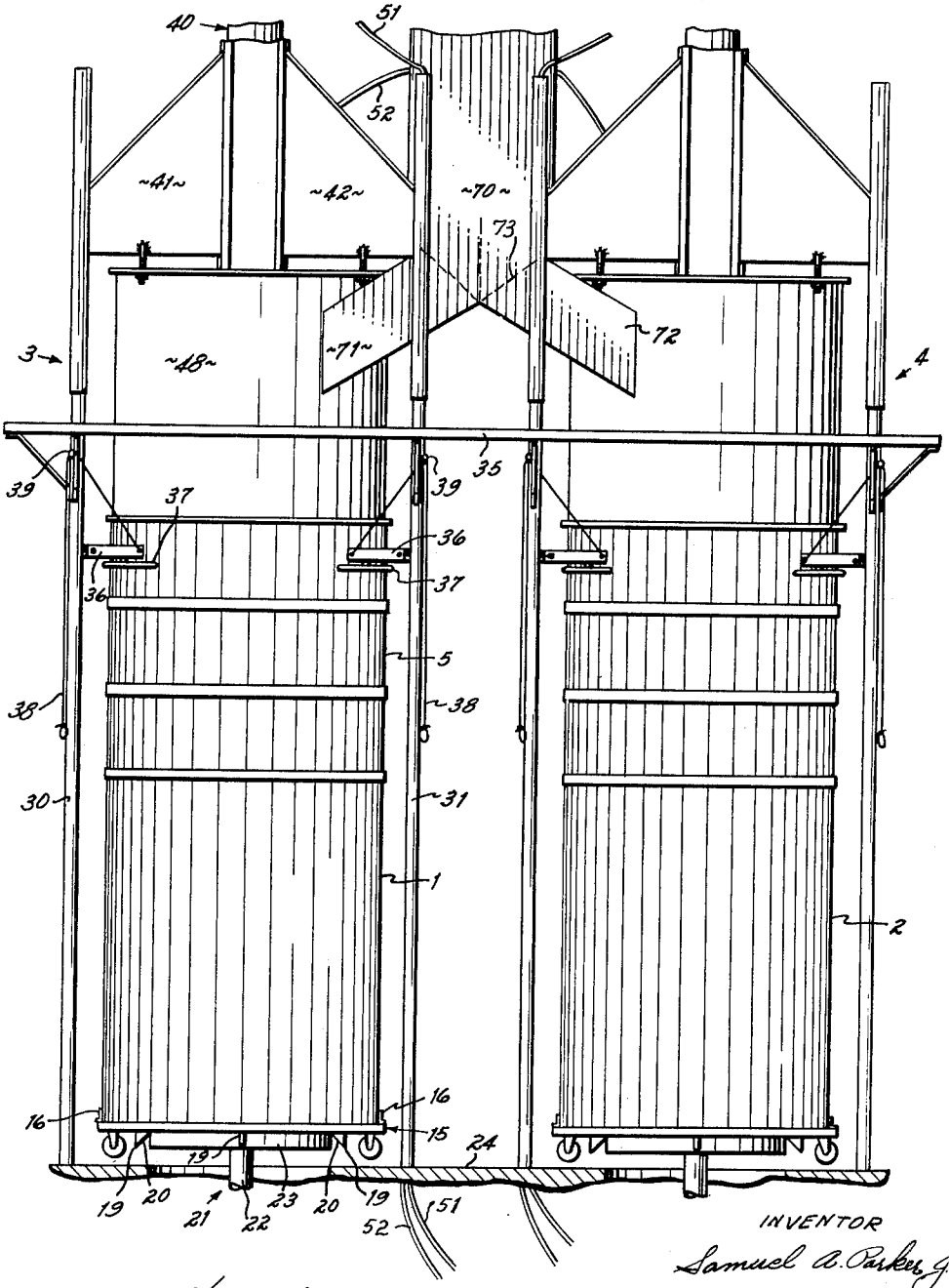


Fig. 1

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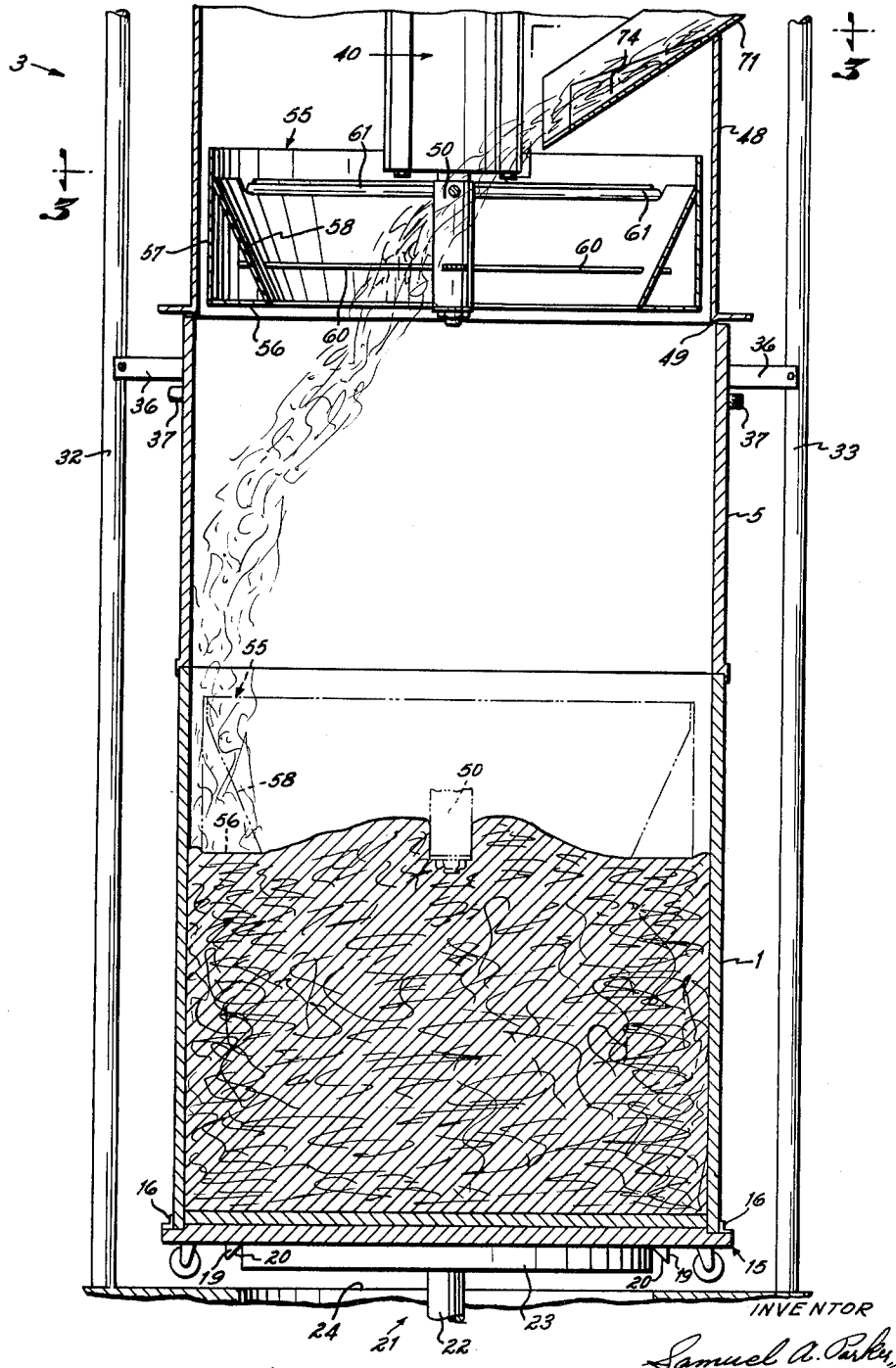


Fig. 2

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Filed March 6, 1963 4 Sheets-Sheet 3

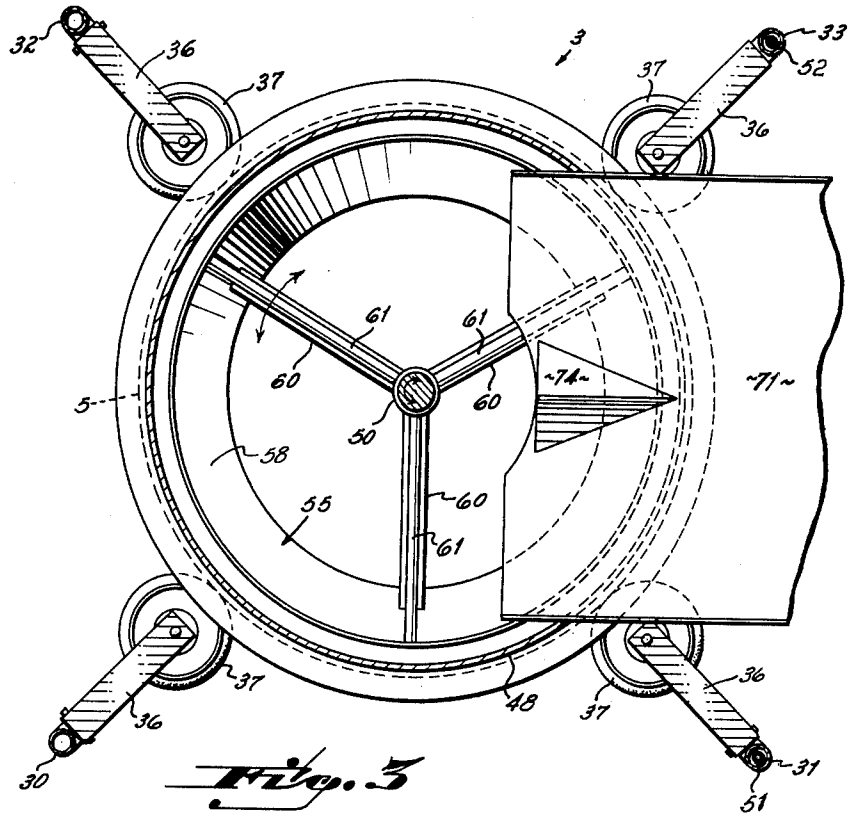


Fig. 3

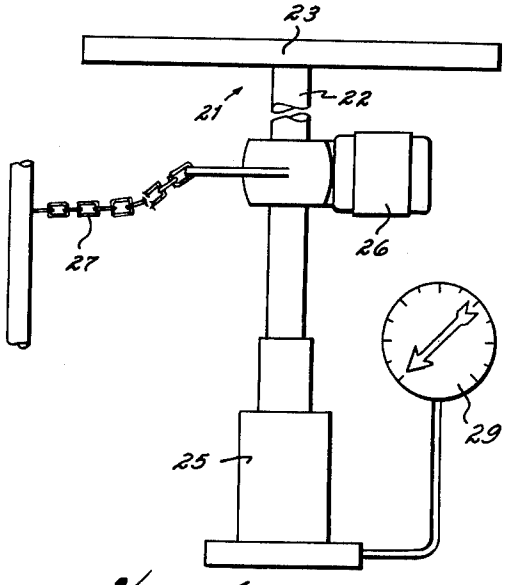


Fig. 4

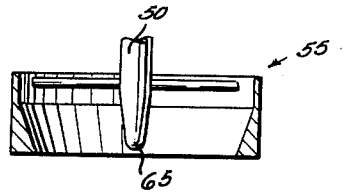


Fig. 5

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Filed March 6, 1963 4 Sheets-Sheet 4

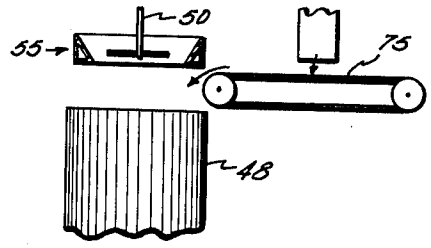


Fig. 6

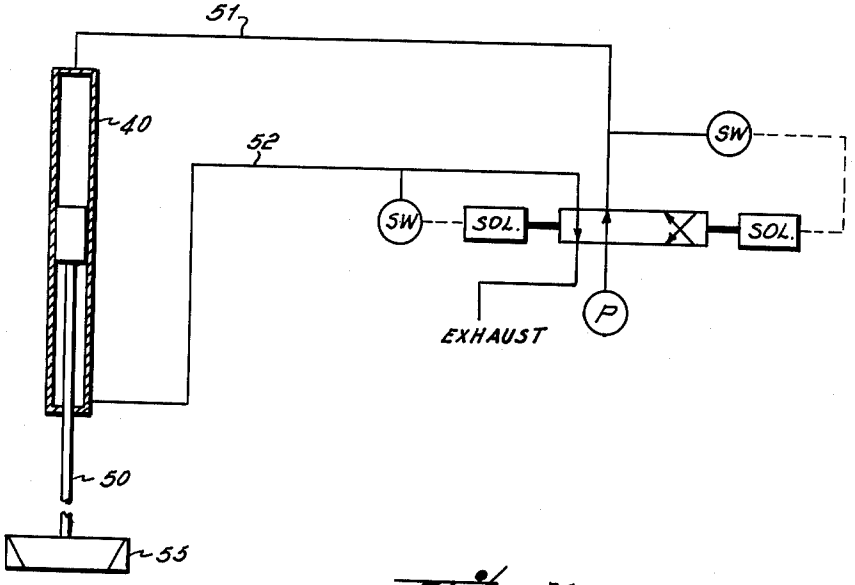


Fig. 7

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3,200,859

HOLLOW-CENTERED COMPACTING DEVICE

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13 Claims. (Cl. 141—73)

This invention relates to apparatus for compacting tobacco. More specifically, the invention relates to apparatus for compressing tobacco in hogsheads or containers at controlled density of compaction, in order to improve the uniformity of the curing process.

In the tobacco industry, after tobacco has been cut in the field, made into hands, and partially cured in the barn, the leaves are threshed or stemmed to remove the mid-rib or stem. After this is done, the leaves are dried to a moisture content of about 12–13%, and are shredded into relatively small flakes.

The next step in the preparation of tobacco for manufacture into cigarettes involves additional curing of the shredded material for a period of perhaps one or two years at controlled moisture conditions. This is done by compacting the tobacco into hogsheads, which are cylindrical containers about four feet in diameter and four feet high, and holding about 900 pounds of tobacco. The threshed, shredded tobacco, which is loose and fluffy, is charged into the hogsheads and compressed perhaps as much as 5 to 8 times in volume, and is stored for a prolonged period during which a mild curing process takes place. Following this, the tobacco, still contained in the hogsheads, is subjected to a step known as "ordering" in which the hogsheads are placed in a partially evacuated room and subjected to steam whereby their moisture content is brought to a desired level, prior to actual manufacture into cigarettes.

In the ordering process, it is of the utmost importance that the steam acting on the hogshead permeate its entire contents more or less evenly, so that the entire quantity of tobacco in the hogshead, that is, the tobacco in the center as well as that adjacent the container wall, will have a uniform moisture content. Moreover, in the prior curing operation the compaction or densification of the tobacco must be such as to establish uniform curing throughout.

Because of the large size of the hogsheads, and the relatively high density to which they are packed, it is difficult for the ordering steam acting upon the outside surface of the hogshead to penetrate effectively into the center of the hogshead, and as a result usually tobacco in the center of the hogshead is improperly or inadequately moisturized.

Proper curing and ordering thus depend on proper compaction of the tobacco in the hogsheads. Ideally, the density should be uniform along a vertical line through the hogshead, and should be substantially higher adjacent the wall than in the center. Otherwise expressed, the tobacco should not vary in density from bottom to top, and should have a "soft center." Obviously it is difficult to obtain perfectly controlled densities in both directions, but this is recognized to be the optimum condition to be sought after in practice.

An objective of this invention has been to provide a tobacco press whereby compaction is effected in a manner more nearly approaching these optimum density conditions.

Briefly, in a preferred embodiment of the press I have invented, the hogshead is supported on a piston beneath it and is rotated during feeding and tamping. The tamper has an annular or ring-like tamping area, and bears upon tobacco only in a band-like region adjacent the wall of the container. The tamper is in the shape of a funnel,

and the tobacco is fed through its open center area and is deposited generally toward the wall or outside edge of the hogshead. Tamping is done continually or intermittently during filling, and the annular shape of the tamper imparts a soft center to the densified tobacco.

In the drawings:

FIG. 1 is a front elevation of apparatus including the features of the invention for compacting tobacco into a pair of hogsheads.

FIG. 2 is a vertical section through a single press and hogshead showing the manner in which the tamper compacts the tobacco.

FIG. 3 is a horizontal cross section taken on line 3—3 of FIG. 2.

FIG. 4 is a diagrammatic elevation of the lower piston which supports the hogshead during filling and compacting showing the means for rotating and weighing the hogshead.

FIG. 5 is a vertical section of a modified form of tamper.

FIGURE 6 is a diagrammatic illustration of alternative means for charging tobacco into the hogshead for compaction; and

FIGURE 7 is a diagram of a circuit for reversing the direction of ram movement, including press operated switches.

Although the apparatus of this invention may be used for loading a single hogshead, in practice it is more efficient to employ a plurality of presses in combination for alternately or simultaneously loading two or more hogsheads. Such apparatus is shown in FIG. 1.

Two hogsheads are designated by 1 and 2, and comprise wooden or cardboard, cylindrical containers. Tobacco is compacted in the hogsheads by presses 3 and 4 respectively, which are similar. With reference to the hogshead 1 and press 3 illustrated at the left in FIG. 1, the hogshead is fitted with a cylindrical, open ended charger or chute 5. The charger 5 acts as an extension of the hogshead 1 for containing the loose tobacco charge prior to compaction and directing it into the hogshead.

The hogshead is seated on a wheeled dolly or cart 15, whereby the hogshead may conveniently be moved into position in the press 3 before filling and moved away thereafter. As will be explained, the dolly 15 also acts as means centering the hogshead under the tamper of the press 3. The hogshead is centered with respect to the dolly within brackets or angles 16 mounted thereon. The underside of the dolly 15 is provided with three or more circularly arranged brackets or centering cams 19, each of which has an inclined or slanting inner edge 20. These brackets 19 center the dolly and hogshead with respect to a lower piston designated generally by 21, upon which they are lifted and rotated during the compacting operation.

The lower piston 21 includes a ram 22 having a cylindrical head or table 23 at its upper end. The diameter of table 23 is about equal to the diameter of the circle circumscribed within the inner ends of the brackets 19. When the lower piston 21 is in unextended position such that table 23 is substantially flush with the surface of the press room floor 24, the dolly 15 with the hogshead centered on it may be positioned approximately in position over the head 23, and as ram 22 is then raised, the slanting edges 20 of the brackets 19 cam the dolly into centered position on table 23.

The mechanism whereby the lower piston 21 is operated and table 23 revolved is illustrated in FIG. 4 of the drawings. The lower piston ram 22 slides in a cylinder 25 to which suitable hydraulic or pneumatic pressure is applied. Ram 22 is rotatably journalled in cylinder 25, and rotational motion is imparted to it by a torque motor 26

which is prevented from rotating itself by a chain or tie back 27. Alternatively, means may be provided to rotate table 23 relative to ram 22.

The function of the lower piston 21 is to support the dolly and hogshead slightly above floor 24 during the compacting operation, while the hogshead is being rotated. Rotation of the hogshead during compacting improves the distribution of the tobacco as it is filled into the hogshead, and tends to establish angularly symmetric density. In operation, when the piston table 23 is elevated as shown in FIGS. 1 and 2, the torque motor 26 is energized and rotates the table at a rate of approximately 4 to 13 revolutions per minute.

The pressure of the fluid in cylinder 25 which operates the ram 22 may be taken as a measure of the weight of the tobacco in the hogshead. The total downward force on the operating fluid, when the ram is stationary and the tamper is not operating, is the sum of the weight of the tobacco in the hogshead and charger plus the weight of the hogshead, charger, dolly and piston; knowing the weight of the latter items and the area of the piston, the pressure of the fluid may be taken as a measure of the weight of the tobacco. For this purpose the fluid pressure is preferably measured by a pressure gauge or indicator 29, the scale of which may read directly in pounds of tobacco.

The apparatus for charging and compacting the loose tobacco into the hogshead is supported above floor 24 on support members 30, 31, 32 and 33 (see FIG. 3). These support members 30–33 may be tubular so as to serve as pressure supply lines for carrying motive fluid to the press. Preferably, although not necessarily, the support members are four in number as shown and are joined above the hogshead and charger by a framework in the form of a catwalk 35. Each support member 30–33 has a short, swingable arm 36 pivotally connected to it, each arm 36 having a wheel 37 mounted at its opposite or free end for rotation about a vertical axis, as best shown in FIG. 2. These wheels 37 act as guides or bearings to center the upper end of the hogshead or charger during rotation. When the hogshead is being positioned or removed from the press 3, the arms 36 are swung into vertical position by suitable means such as lifting lines 38 connected to their outer ends and passing over pulleys 39. In vertical position the wheels 37 do not block movement or contact the hogshead or charger, so that the hogshead may be rolled into proper position within the support members 30–33.

The upper or tamping cylinder is designated generally by the numeral 40 and is aligned with lower piston 21. The cylinder 40 is supported between the members 30–33 by several brackets 41, 42 which are welded between the respective supports at one end and to the cylinder at their inner ends. Below the brackets 41, 42 a cylindrical filling tube 48 is mounted. (See FIG. 2.) This filling tube 48 is open ended and is of the same approximate diameter as the charger 5, and is aligned with the charger. Filling tube 48 has a downwardly extending lip 49 around its lower periphery which fits loosely into the charger to direct the loose tobacco falling through the filling tube into the charger and hogshead below. The filling tube 48 thus does not rotate with the hogshead but provides a fixed extension into which the tobacco is chuted.

The cylinder 40 operates a tamping rod or ram 50 which is sufficiently long to extend almost to the bottom of the hogshead. The ram 50 may be either hydraulically or pneumatically operated; preferably it is operated with oil-less air. As previously mentioned, the support members 30–33 may serve as conduits to carry the fluid for operating the ram 50. In the embodiment shown, support 31 carries a pressure supply line 51 which supplies air at operating pressure from a pump P through a valve (see FIGURE 7) to the top of cylinder 40 for moving ram 50 downwardly. Support 33 carries a pressure supply line 52 from the pump to the lower end of cylinder 40 below the piston which operates the ram 50.

At the lower end of ram 50 is a tamper designated generally by 55. This tamper 55 includes an annular or ring shaped tamping surface 56, having an outer diameter slightly less than the inner diameter of the hogshead, and having a width of preferably about six inches.

I have discovered that an annular tamping member such as that designated by 56 surprisingly provides an excellent radial density distribution. As is shown in FIG. 2, this tamping member 56 directly compresses the tobacco only over an area close to the container wall, and the centrally distributed tobacco is not directly compressed but is compacted only by the compression of adjacent tobacco upon which the tamper surface 56 acts. Together with other processing factors, tamping in this manner provides a highly desirable soft center having a relatively low density, and provides a higher density adjacent the outside of the container, which establishes more uniform curing and ordering of the tobacco.

A cylindrical sheet metal member 57 extends upwardly from the outer periphery of the tamping surface 56, to which it is secured as by welding, and a frusto-conical or funnel shaped member 58 is connected between the inner rim of tamping surface 56 and cylindrical member 57.

The tamper 55 is connected to the ram 50 through arms 60 extending from the lower end of the ram 50 through the funnel member 58 to cylindrical member 57, and also by an upper set of arms 61 which are connected to the tamper approximately where the funnel member 58 meets cylindrical portion 57.

As the hogshead is being filled, the inner surface of tamping member 55, that is, funnel member 58, directs the loose tobacco through the center of the tamper. The tobacco falls diagonally in a generally diametric direction through the tamper, and exclusively, toward the hogshead wall, as shown in FIG. 2. During this operation, ram 50 may be operated either automatically or manually in reciprocating tamping movement. Preferably the cylinder 40 should apply a total force of between 2000 and 4200 pounds to the tamper, for optimum densification.

As previously stated, the hogshead is revolved as charging and compacting takes place, and tamping may be done while the hogshead is rotating. To this end either the ram 50 or tamper 55 is preferably journalled for rotation relative to cylinder 40, as indicated by the arrows in FIGURE 3, so that it can rotate as the tamping surface 56 engages the tobacco in the hogshead. In any event, it is not necessary that rotation be stopped during actual tamping, and to the contrary it is preferred that rotation continue during tamping, or at least up to the very moment that the tamper comes into contact with the tobacco.

I have described the structure of the press 3 which appears at the left in FIG. 1. The press 4 at the right is substantially identical and need not be described in detail. Both presses 3 and 4 are fed through a common central delivery chute 70, into which tobacco is introduced from a conveyor belt. At its lower end, delivery chute 70 divides into a pair of oppositely angulated chutes 71 and 72, chute 71 extending angularly downwardly to the left over the upper edge of the filling tube 48 toward cylinder 40. Tobacco falling through the central chute 70 is directed either to the left or right chute 71 or 72 by a swingable shutter or flap 73 (shown in FIGURE 1 by dotted lines indicating its different positions), whereby the flow may be divided between the two chutes 71 and 72, or directed into either depending upon the status of the hogsheads being filled. Each chute 71 and 72 has a raised, triangular central portion 74 (see FIGS. 2 and 3), which directs the flow to either side of the cylinder 40 and ram 50, through the center of the tamper 55. Alternatively, as shown in FIGURE 6, a centrally fed reversible belt 75 may be used to deliver the tobacco into the hogsheads.

In the operation of the press I have invented, the dolly 15 with the hogshead 1 seated on it, and the charger 5 fitted above the hogshead, is rolled into position above

the lower piston 21. The lower piston is then actuated to lift the dolly slightly above the floor, whereby the charger 5 comes into loose interfitting relation with lip 49 on filling tube 48 so that the tobacco will be guided into the charger. The rollers or guides 37 are dropped into position to keep the hogshead centered as it is rotated. The rate of rotation established by the torque motor 26 is roughly 4 to 13 revolutions per minute.

Ram 50 is reciprocated at least about 4 or 5 times during filling of the hogshead, although it is preferably operated more frequently; more frequent tamping tends in general to establish more uniform density from bottom to top of the hogshead. It is not necessary that filling be discontinued during the actual tamping operation. Measurements may be taken from time to time of the weight of tobacco contained in the hogshead by reference to pressure gauge 29.

When the hogshead has been filled, the tamper 55 is actuated to apply greater pressure to the tobacco and thereby compress it sufficiently that the header may be fitted to the hogshead.

The stroke of the tamping ram 50 is preferably controlled in accordance with the pressure of the operating fluid in cylinder 40, for example, as shown in FIGURE 7, through a pressure actuated switch which operates a four-way valve, so that when pressure exceeds a predetermined value, the ram is raised. In FIGURE 7, actuation of either pressure operated switch SW energizes one or the other solenoid of a double solenoid operated four-way valve to reverse the direction of ram movement.

During compacting the tobacco in the center of the hogshead is not directly compressed by the tamping surface. Repeated tamping or compacting in the peripheral area with rotation of the hogshead, establishes more or less uniform vertical density and imparts the soft center condition which is so desirable. In this connection, the end of the ram 50 may be fitted with a rounded, conical, or parabolic tip 65, as shown in FIG. 5, to open the center of the hogshead during tamping to insure a soft center.

While the press of this invention has been described primarily as a tobacco press, it will be appreciated that it is suitable for use in compressing other loose particulate or shreaded materials such as paper, cotton and the like.

What is claimed is:

1. A press for compacting loose particulate flake material into a hogshead, said press comprising,
- a lifting piston for raising the hogshead,
- means for rotating said hogshead when said hogshead is raised on said lifting piston,
- a tamping piston for compacting flake material in the hogshead, means supporting said tamping piston above said lifting piston in vertical alignment therewith,
- said tamping piston having a tamper at the lower end thereof,
- said tamper comprising an annular tamping member, a funnel shaped member joining the inner rim of said annular tamping member, and arms connecting said tamper to said tamping piston,
- means for delivering flake material into the upper end of said hogshead and through the center of the annular tamping member such that said flake material is deposited primarily adjacent the side of said hogshead,
- and means for reciprocating said tamping piston to compact flake material in said hogshead, said tamper applying direct compressing force only to flake material adjacent the wall of said hogshead, a soft center thereby being imparted to said flake material.

2. A press as defined in claim 1 wherein the outside diameter of said annular tamping member is slightly less than the inside diameter of said hogshead and wherein the width of said annular tamping member is about 6".

3. A press for compacting tobacco into a hogshead, said press comprising,
- a hogshead support for raising the hogshead,
- means for rotating said hogshead support when said hogshead is supported thereon,
- a tamping piston for compacting tobacco in the hogshead, means supporting said tamping piston above said hogshead support in vertical alignment therewith,
- said tamping piston having a tamper mounted to the lower end thereof,
- said tamper comprising an annular tamping member, a funnel shaped member joining the inner rim of said annular tamping member, and arms connecting said tamper to said tamping piston,
- means for delivering tobacco into the upper end of said hogshead and through the center of said annular tamping member such that said tobacco is deposited in said hogshead mainly adjacent the side thereof,
- and means for reciprocating said tamping piston to compact tobacco in said hogshead, said tamper applying direct compressing force only to tobacco adjacent the wall of said hogshead, a soft center thereby being imparted to said tobacco.

4. A press in accordance with claim 3 wherein said means for rotating said hogshead support comprises a torque motor.

5. A press in accordance with claim 3 wherein said means for rotating said hogshead support rotates said hogshead support at a rate of about 4–13 revolutions per minute.

6. A press for compacting tobacco into a hogshead, said press comprising,
- a lifting piston for raising the hogshead,
- means for rotating said hogshead when said hogshead is raised on said lifting piston,
- a tamping piston for compacting tobacco in the hogshead, means supporting said tamping piston above said lifting piston in vertical alignment therewith,
- said tamping piston having a tamper mounted to the lower end thereof,
- said tamper comprising an annular, open centered tamping member having a diameter slightly less than the diameter of said hogshead, a funnel shaped member joining the inner rim of said annular tamping member, and arms connecting said tamper to said tamping piston,
- a chute arranged to deliver tobacco into said hogshead diagonally into the open center of said tamper such that said tobacco is deposited mainly adjacent the wall of said hogshead,
- and means for continually reciprocating said tamping piston to compact tobacco in said hogshead, said tamper applying direct compressing force only to tobacco adjacent the wall of said hogshead, a soft center thereby being imparted to said tobacco.

7. A press in accordance with claim 6 wherein said tamping piston delivers a total compressing force of about 2000–4200 pounds.

8. A press in accordance with claim 6 wherein said means for reciprocating said tamping piston automatically reciprocate said tamping piston at least 4 times as said hogshead is being filled.

9. A press in accordance with claim 8 wherein said means for reciprocating said tamping piston are actuated to lift said tamping piston when the force thereon exceeds a predetermined value.

10. A press in accordance with claim 6 wherein said tamper is rotatable and rotates with said hogshead when said tamper is compressing tobacco in said hogshead.

11. A press in accordance with claim 6 including means operated by the pressure of the motive fluid applied to the lifting piston for indicating the weight of tobacco in

said hogshead while said hogshead is being rotated on said lifting piston.

12. A press in accordance with claim 6 wherein said tamping piston has a tapering nose for opening the center of the tobacco in said press as it engages said tobacco.

13. The combination comprising, a press for compacting tobacco into a hogshead, said press comprising,

a lifting piston, said lifting piston having a circular table at its upper end,

means for rotating said lifting piston,

a tamping piston for compacting tobacco in the hogshead, means supporting said tamping piston above said lifting piston in vertical alignment therewith,

said tamping piston having a tamper mounted to the lower end thereof,

said tamper comprising an annular tamping member, a funnel shaped member joining the inner rim of said annular tamping member, and arms connecting said tamper to said tamping piston,

means for delivering tobacco into the upper end of said hogshead and diagonally into the center of the funnel shaped member of said tamper,

means for reciprocating said tamping piston to compact tobacco in said hogshead, said tamper applying direct compressing force only to tobacco adjacent the wall of said hogshead, a soft center thereby being imparted to said tobacco,

a wheeled dolly, said dolly having centering cams on its underside to center said dolly on said table,

and means for centering a hogshead on said dolly.

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