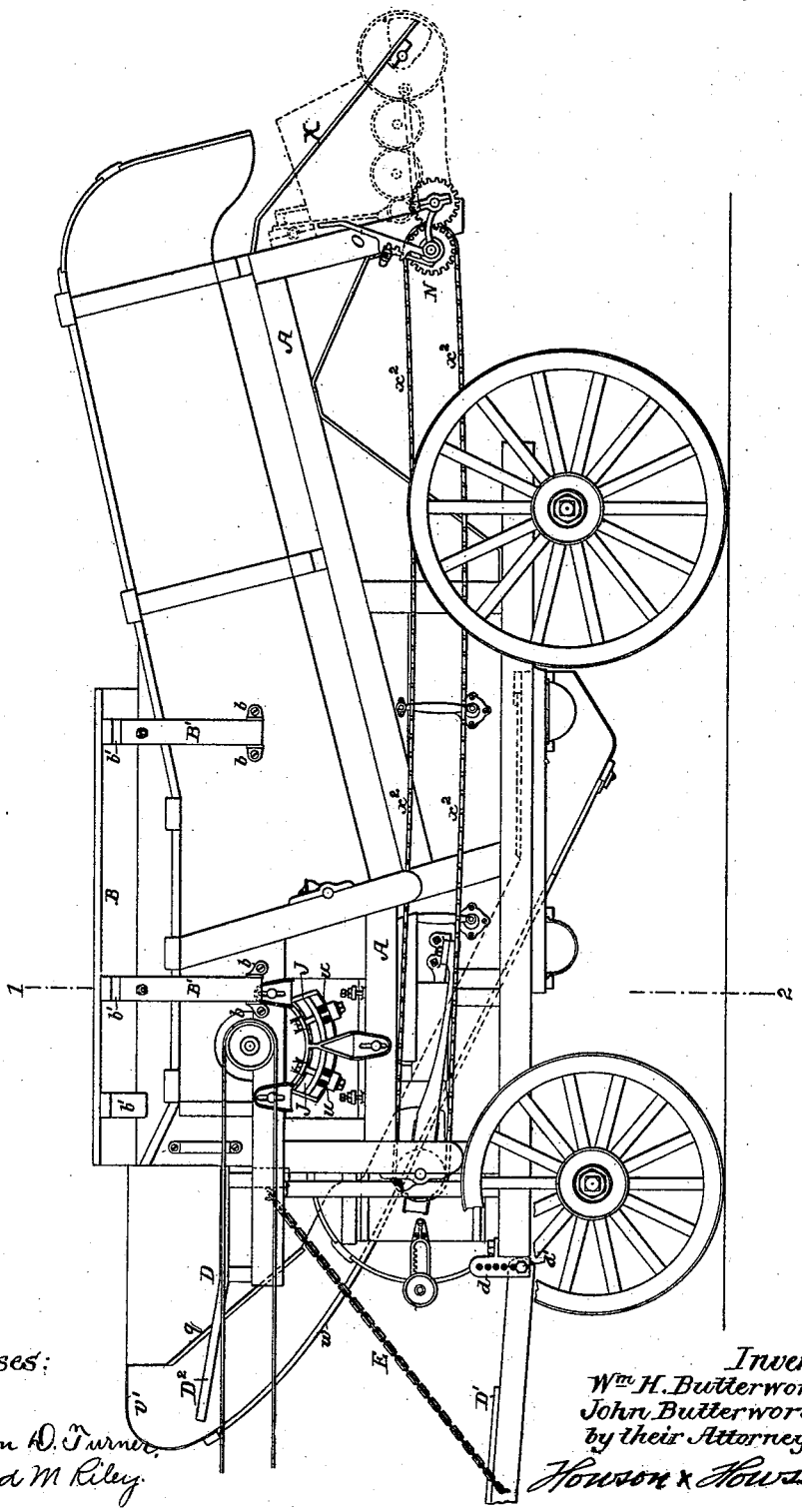
(No Model.) 6 Sheets—Sheet 1.

W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

No. 490,944. Patented Jan. 31, 1893.

FIG. 1.



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Edward M Riley.

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(No Model.) 6 Sheets—Sheet 2.

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FIG. 3.

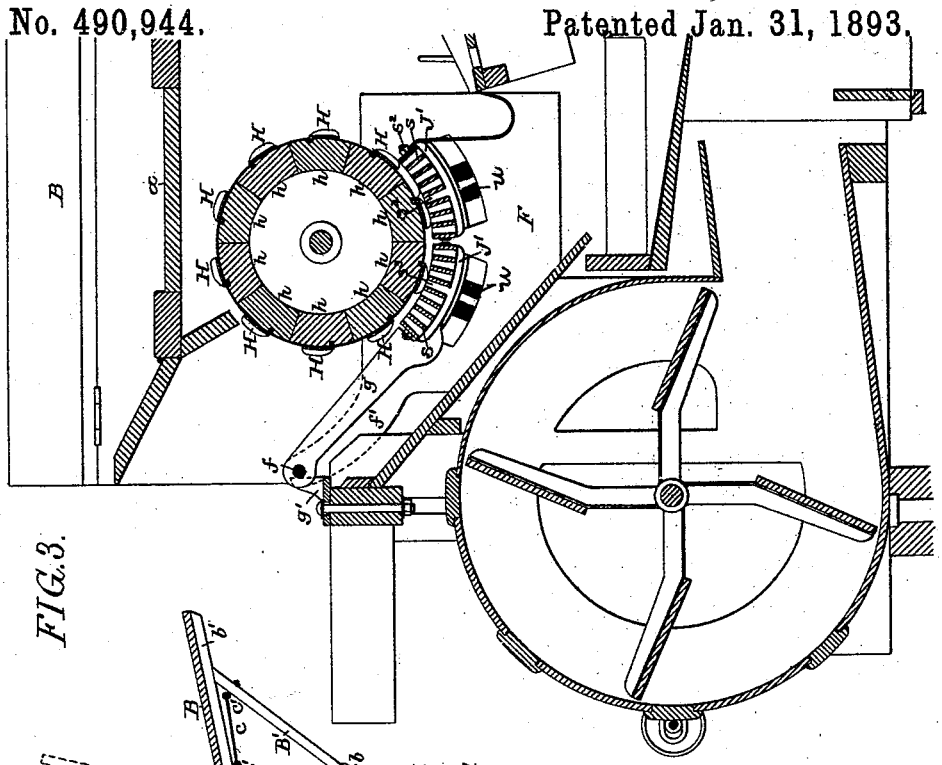
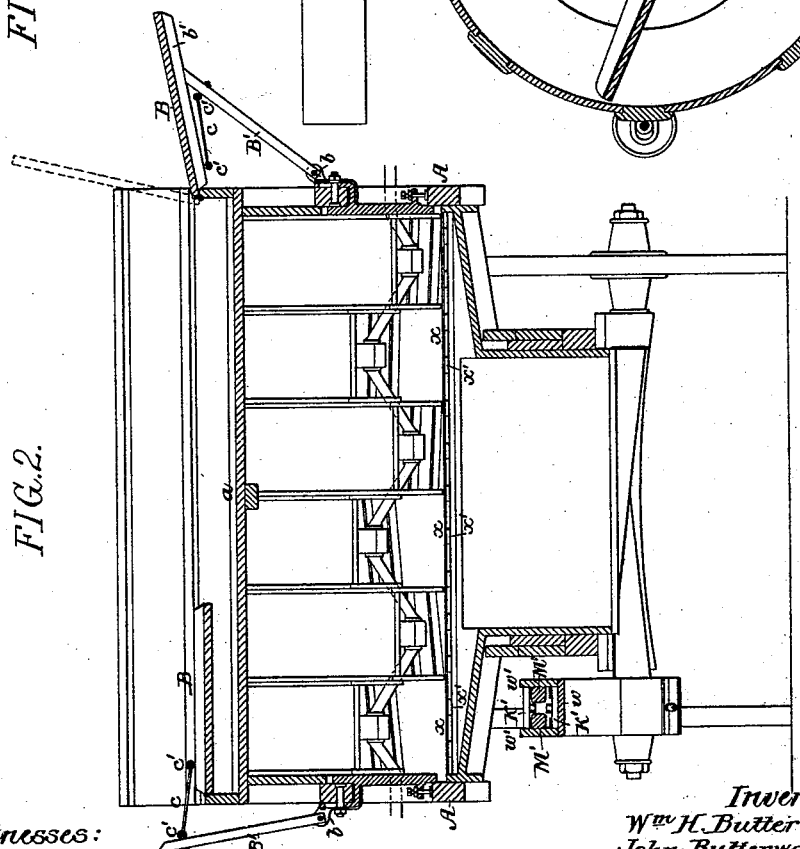


FIG. 2.



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(No Model.) 6 Sheets—Sheet 3.

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THRASHING MACHINE.

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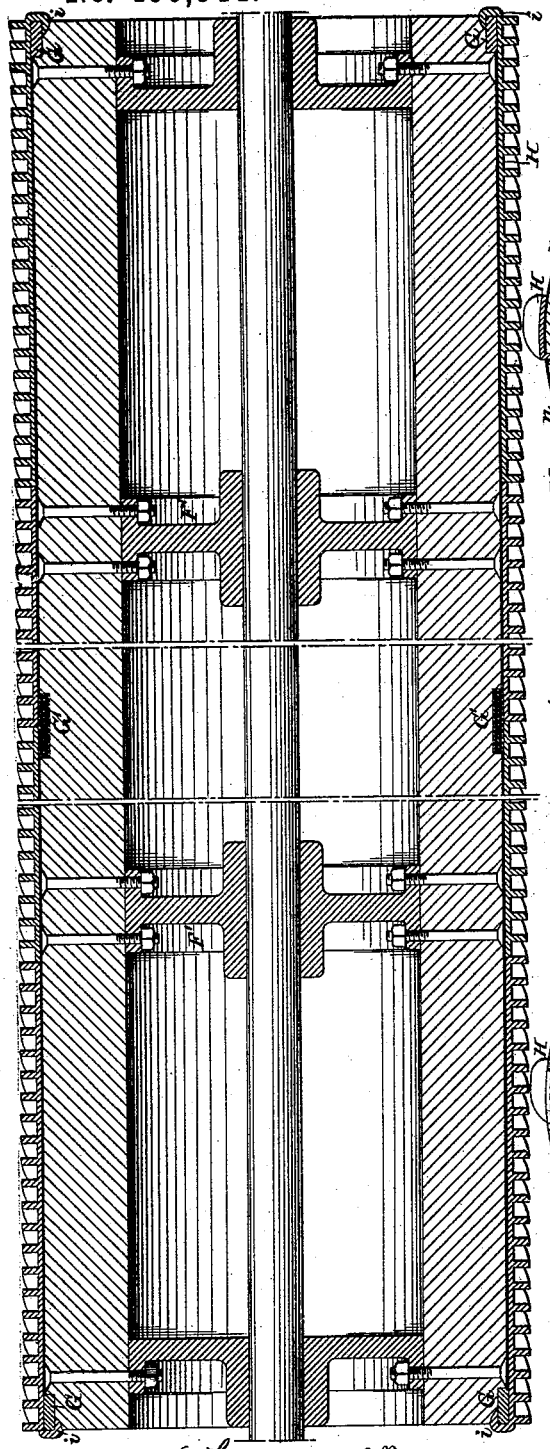

FIG. 4.

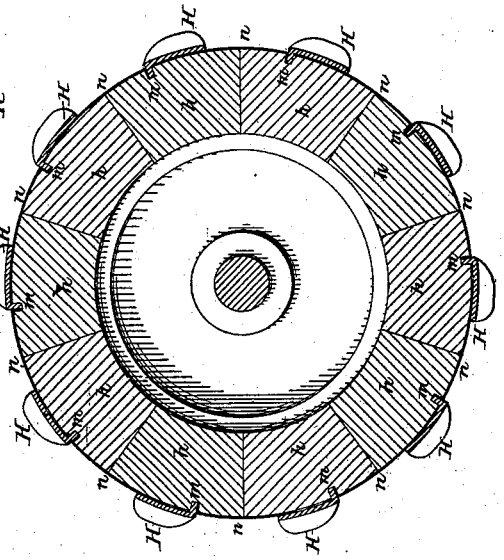

FIG. 6.

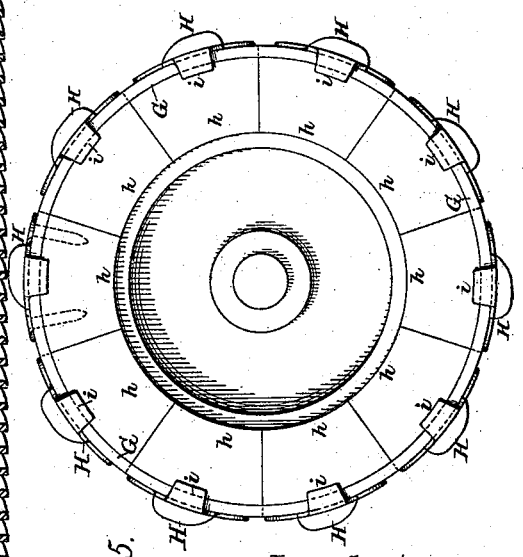

FIG. 5.

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(No Model.) 6 Sheets—Sheet 4.

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THRASHING MACHINE.

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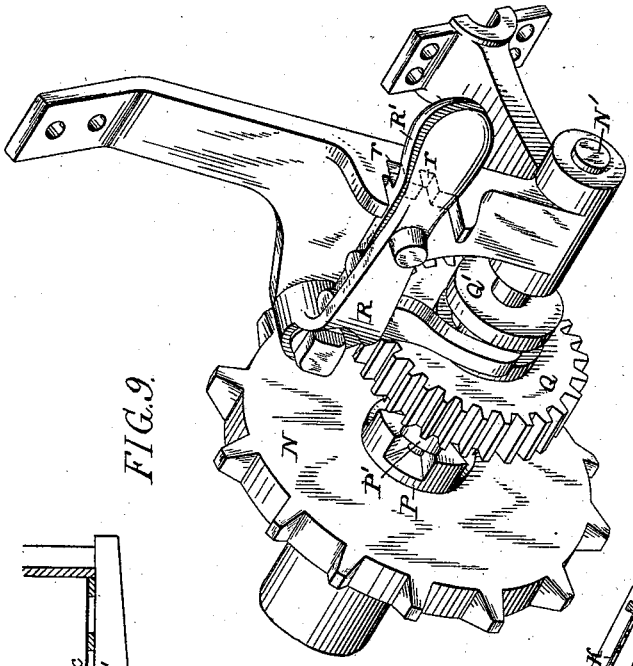

FIG. 9.

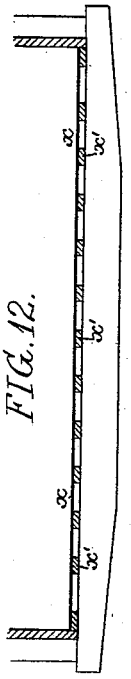

FIG. 12.

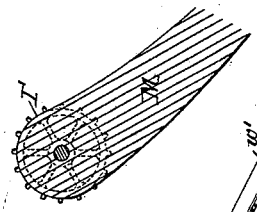

FIG. 15.

FIG. 7.

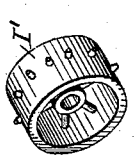

FIG. 14.

FIG. 8.

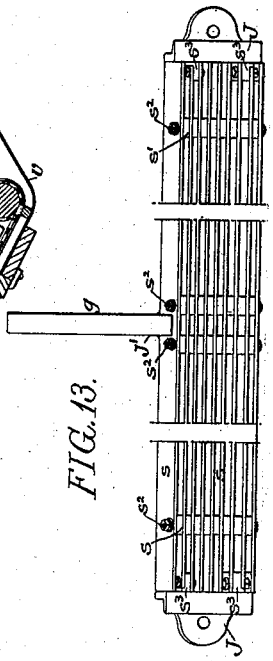

FIG. 13.

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(No Model.) 6 Sheets—Sheet 5.

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FIG. 11.

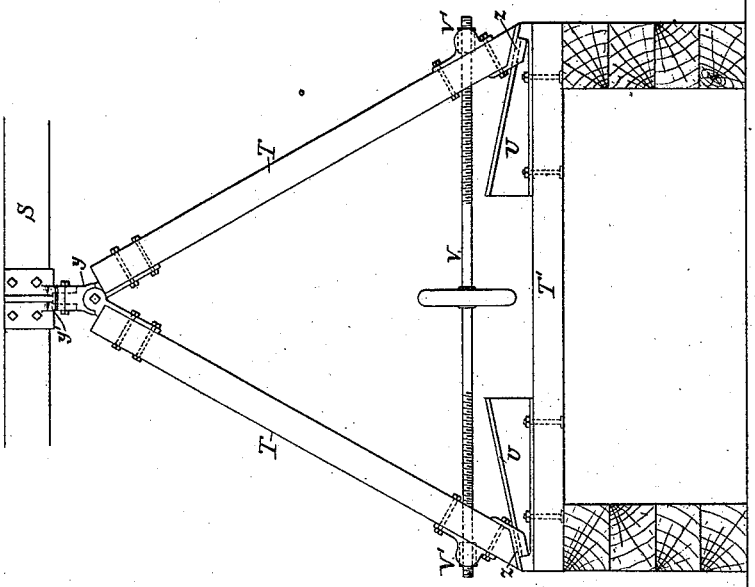
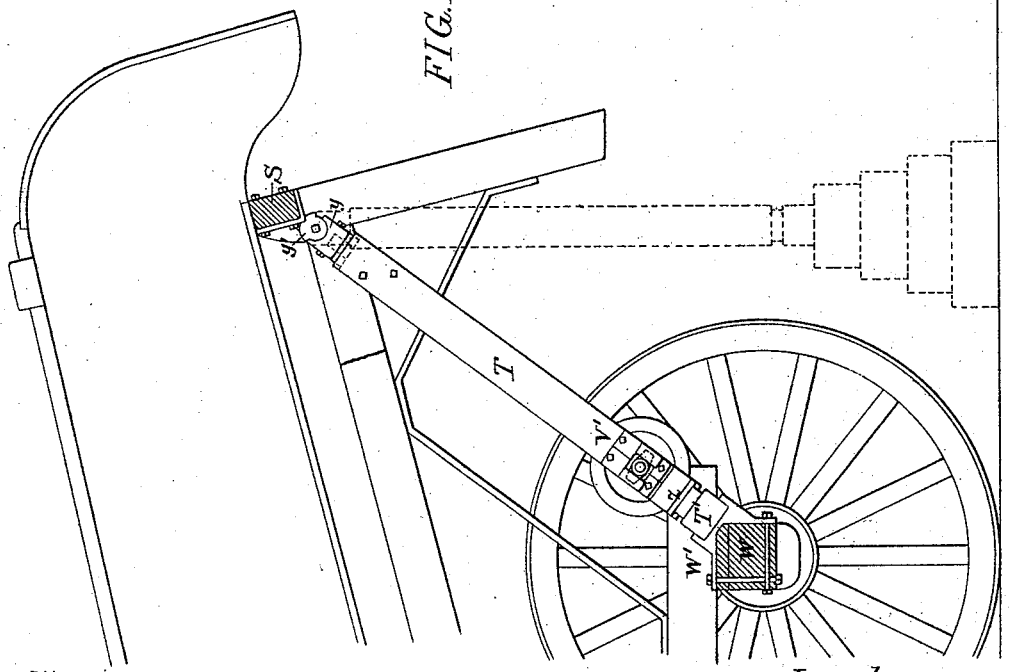


FIG. 10.



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W. H. BUTTERWORTH & J. BUTTERWORTH, Jr.

THRASHING MACHINE.

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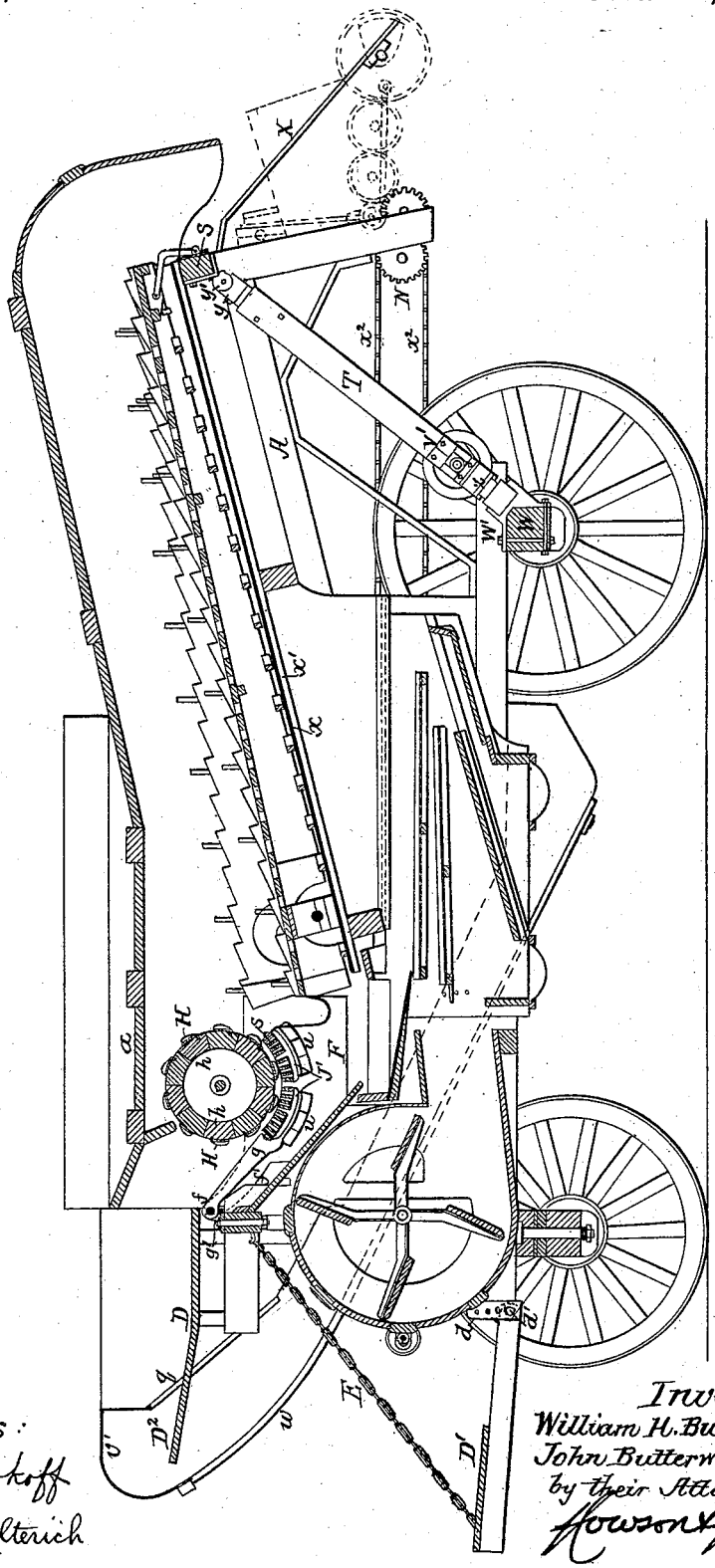
FIG. 16.



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Eugene Elterich

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John Butterworth, Jr.
by their Attorneys
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UNITED STATES PATENT OFFICE.

WILLIAM H. BUTTERWORTH AND JOHN BUTTERWORTH, JR., OF TRENTON, NEW JERSEY.

THRASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 490,944, dated January 31, 1893.

Application filed June 12, 1888. Serial No. 276,856. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BUTTERWORTH and JOHN BUTTERWORTH, Jr., citizens of the United States, and residents of Trenton, Mercer county, New Jersey, have invented certain Improvements in Thrashing-Machines, of which the following is a specification.

Our invention consists of certain details in the construction of a thrashing machine, with the view of effecting general improvement in the operation of the machine, the specific features of the machine being fully set forth and specifically claimed hereinafter.

In the accompanying drawings—Figure 1 is a side view of a thrashing machine constructed in accordance with our invention; Fig. 2 is a transverse section of the same on the line 1—2, Fig. 1; Fig. 3 is a longitudinal section of the feed end of the machine, on a larger scale than Fig. 1; Fig. 4 is a longitudinal section of the cylinder on a still larger scale; Fig. 5 is an end view of the cylinder; Fig. 6 is a transverse section of the same; Fig. 7 is a longitudinal section of the tailings elevator; Fig. 8 is an enlarged perspective view of one of the end plates of the concave; Fig. 9 is an enlarged perspective view of part of the gearing for driving the binder; Figs. 10 and 11 are views illustrating a brace for the overhanging portion of the frame and conveyer of the machine; Fig. 12 is a transverse section of the floor or grain bottom of the conveyer portion of the machine; Fig. 13 is a plan view of the concave; Fig. 14 is a perspective view of the upper drum for the tailings elevator; and Fig. 15 is a view illustrating a modification of the same, and Fig. 16 is a longitudinal section of the machine.

A represents the main frame or casing of the machine, to the sides of which, at each side of the receiving table *a* on the top of the machine, are hung the side tables B, B, which can be turned outward, as shown at the right-hand side of Fig. 2, so as to increase the lateral capacity of the receving table, or can be lifted, as shown by dotted lines, when thrashing close to a stack, or in a narrow barn, or can be folded over the table *a*, as shown at the left-hand side of Fig. 2, so as to be out of the way when the machine is not in use or is being transported from place to place.

In order to properly support the side tables when the latter are extended, as shown at the right in Fig. 2, we hang to suitable brackets *b* on the side frame or casing of the machine, the lower ends of brace bars B′, the upper ends of which, when the side tables are extended, bear against the under sides of strengthening cleats *b′* on said side tables and serve to support the same, lateral deflection of the braces B′ being prevented by means of links *c* connecting eyes *c′* near the upper ends of the braces, to similar eyes *c′* secured to the cleats *b′* near the inner ends of the side tables. When the side tables are thrown in over the top of the machine, these links serve to draw inward the upper ends of the braces B′, the latter finally assuming a vertical, or nearly vertical position at the sides of the machine, so as to be out of the way.

It is obvious that the braces can be hinged at their lower ends, direct to the sides of the frame, and that the lateral deflection of the upper ends of the braces can be prevented by any flexible connection between said braces and the side or top tables.

In feeding machines of this class, it is necessary that the feed table D should occupy a certain height, dependent upon the stature of the attendant who is feeding the machine, in order that the latter may work to the best advantage, and as the feed table must always occupy a certain relation to the cylinder, it cannot conveniently be adjusted to suit the stature of the attendant, hence we provide the frame of the machine with hanger plates *d* having a vertical row or series of openings, to any of which may be adapted a bolt *d′*, which provides a support for the inner end of the platform D′, on which stands the attendant who is feeding the machine, so that the platform can be readily adjusted to suit the stature of the attendant. Chains E, one at each side of the platform D′ serve to support the outer portion of said platform, the upper ends of these chains being applied to suitable hooks on the fixed frame, so that they can be readily adjusted to properly support the outer portion of the platform in any

of the positions to which it may have to be adjusted. That portion of the feed table adjacent to the cylinder is horizontal, or substantially horizontal, so that the attendant can rest the straw thereupon without risk of its sliding into the machine. The outer portion D^2 of the feed-table D, however, is inclined upward, as shown in Fig. 1, so that it facilitates the forward feeding of the straw onto the horizontal portion of the table, and is less liable to permit the escape of grain and litterings than would be a table horizontal throughout.

We use, in our present machine, spring feed aprons, similar to those set forth in our patent No. 379,762, dated March 20, 1888, but in the present machine we have, in order to avoid confusion, omitted these aprons, and only shown the rod *f* to which they are hung, this rod being carried at its opposite ends by arms *f'* projecting from the opposite plates F, which carry the concave bars of the machine. Owing to the width of the machine, this rod *f* is so long that it has a tendency to spring unless it can be supported at one or more points between its opposite ends. We therefore, in the present machine provide the concave with one or more projecting arms *g*—which carry the rod *f*, and we apply to the fixed frame of the machine, one or more studs *g'*—, having vertical inner faces, against which the rod *f* bears, as shown in Fig. 3, so that while vertical and outward spring of the rod between its ends is effectually prevented, the rod can rise and fall freely with the end plates of the concave, as the latter are adjusted vertically to vary the distance between the concave bars and the bars of the cylinder.

The cylinder is constructed as shown in Figs. 4, 5 and 6 of the drawings, and consists of a barrel composed of staves bolted to internal frames or spiders F', as shown in Fig. 4, and further held together by confining bands G at the ends and by one or more intermediate bands G', one only of these intermediate bands centrally located in respect to the cylinder, being shown in the drawings, and this being sufficient in most cases. The end bands are adapted to recesses in the ends of the barrel of the cylinder, so that the outer faces of said bands are flush, or nearly so, with the periphery of said barrel, and the ribbed plates H, with which the surface of the barrel is provided, can be extended completely to the ends of said barrel, instead of having to be discontinued at the band, or covered by the band, as they must be when said band projects beyond the periphery of the barrel, and in order to retain the outer ends of the plates H, the latter have hooked lugs *i* engaging with the end bands G, as shown in Fig. 4. The end bands G are slipped over the ends of the barrel and shrunk thereon, as usual, but this plan cannot be adopted in applying the central band G' if the surface of the same is to be flush with the surface of the barrel, for the thickness of the central strengthening band must be greater than the extent of shrinkage which is possible, hence shrinkage cannot be relied upon to bring the surface of the band down flush with the surface of the barrel. We therefore discard a solid band for the center of the barrel, and form this band by wrapping wire or a thin metal strip or band in the central groove of the barrel, one, two or more layers being used, as the desired strength of the central band may suggest, and the end of the wire, strip or band being securely fastened in any available manner. By this means we are enabled to provide the barrel of the cylinder, at any desired point between its ends, with a retaining band of any desired strength, wholly sunk within the groove in the barrel, so that the ribbed plates H can be carried straight across the bands, whereas when an intermediate strengthening band projects beyond the surface of the barrel, said plates must either be discontinued at the band or the base of the plate must be made so thick that it can be recessed for the reception of the band, both of which plans are objectionable.

Each of the ribbed plates H of the cylinder has along one edge a projecting tongue *m*, adapted to a longitudinal slot in the barrel of the cylinder, and the surface of the barrel between the ribbed plates is covered by means of sheet metal strips *n*, one edge of each of which is overlapped by one of the plates, the other edge being bent to form a tongue, which occupies the slot along with the tongue *m* of the ribbed plate in advance of the sheet metal strip.

Usually, the slots for the reception of the tongues of the cylinder plates and covering strips have been made at the joints between the staves of the barrel, a plan which is objectionable, because in most cases, the staves are made of wood, and the shrinkage of the staves opens these joints and affords spaces for dirt to enter the interior of the cylinder, this dirt, in a short time, accumulating in such quantity as to seriously interfere with the balancing of the cylinder, and cause it to become unfit for use. For this reason, therefore, we form the slots for the reception of the tongues of the ribbed plates and covering strips in the bodies of the staves, instead of at the joints, the latter being covered by the sheet metal strips, so that however much the staves may shrink, no openings are afforded for the lodgment of dirt or foreign matters in any portion of the cylinder. (See Fig. 6.)

The concave of the machine consists of a number of sections,—two in the present instance, and each section is composed of a series of metallic bars *s*, placed side by side, with intervening spaces.

In the class of machines to which our invention relates, the thrashing is performed by a rubbing process, hence, when the concave is thus constructed, the edges of the bars form an efficient thrashing surface, and

the intervening spaces insure a very thorough separation of the grain from the straw before the latter leaves the thrashing cylinder,—a feature of great importance in preventing waste of grain.

In constructing the concave sections, we interpose between the bars at suitable intervals, filling blocks s' and secure the whole rigidly together by means of bolts s^2, curved to accord with the segmental form of the concave section. At each end of each concave section is a head J, (Fig. 8) this head having one or more inwardly projecting ribs s^3,—two of these ribs being shown in the present instance, and to each of these ribs are bolted two of the bars s of the concave section. (See Fig. 13.) At the center of each section is a bar J′, having one rib s^3 (Fig. 3) which takes the place of a filling block s' between the bars s of the concave, and from the bar J′ of the first concave section projects the arm g—, which carries the apron rod f. More than one of the bars J′ may be used if desired. The bars s are arranged radially, and as said bars are of uniform thickness throughout, the spaces between the bars are tapering, being narrowest at the inner face of the concave, so as to provide a free clearance for the grain and prevent choking of the concave. The filling pieces s' and ribs s^3 are of tapering form, as required by the taper of the spaces between the bars of the concave.

The end supports or heads J are provided with segmental flanges t, which fit against the upper sides of the segmental openings in the end plates F carrying the concave sections, and from each head projects a lug t' which rests upon the elastic supporting block u interposed between the lug and an ear on the carrying plate, as shown in Fig. 1, and as described in our former patent above alluded to.

A concave section constructed in accordance with our invention is comparatively cheap, and exceedingly strong, durable and efficient, as any one of the bars of the concave, when worn on one of the top edges, can be reversed to bring the wear on the other top edge, and when both of the top edges become worn, the bars can be inverted, two fresh edges being thus rendered available, strength and durability being also secured by making the concave bars of wrought iron or steel instead of cast metal. Bars arranged so as to provide intervening spaces, moreover, present a thrashing surface much superior to a corrugated surface, not only because the actual loosening or separation of the grain from the straw is facilitated, but also because these intervening spaces permit an efficient separation of the grain from the straw before the latter leaves the thrashing cylinder,—nearly four-fifths of the grain being thus separated from the straw and passed at once to the hopper of the cleaning shoe before the straw leaves the thrashing cylinder.

It is usual, in machines of this class, to return the tailings delivered by the cleaner to the cylinder for being re-thrashed, and the elevator which we use for this purpose is shown in longitudinal section in Fig. 7, the casing of the elevator consisting of a base w and opposite side pieces w', and this casing being inclosed at the lower end, so as to form a box with trough-shaped bottom v, for receiving the discharge from the tailings spout, the upper portion of the casing being also inclosed and terminating in a hood v' from which the tailings are discharged over an inclined chute q— onto the feed table, or into the opening in front of the cylinder in a direction toward the cylinder, so that they are automatically refed to the latter or in any event require very little care on the part of the attendant.

In the box at the lower end of the elevator casing is a shaft carrying a sprocket wheel I, around which passes an endless chain K, the latter also passing around a sprocket toothed drum I′ (Fig. 7) in the hood v' at the upper end of the casing, the drum preventing the dropping of the tailings as the chain passes over the same. The chain has transverse strips K′ at suitable intervals, and these strips, on the under portion of the belt, fit snugly against the bottom of the elevator casing, and carry up the tailings from the box at the lower end of the same. A carrier wheel L acts upon the endless chain on its return, this carrier wheel being notched to receive the scraping bars K′. The chain is guided in its return, partly by this carrier wheel, partly by a transverse block M, interposed between the side plates of the elevator casing at the upper portion of the same, and partly by inwardly projecting strips M′ on the sides of the lower portion of said casing, a space being afforded between these strips, so that any material falling on the upper portion of the chain in its return course can pass through and onto the bottom of the casing, so as to be carried up by the strips on the ascending portion of the chain. If desired, the block M may be extended, as shown in Fig. 15, so as to permit the use of a sprocket wheel I′, instead of a drum.

It will be noticed that the tailings are carried up the elevator in one direction and delivered to the thrashing cylinder in the opposite direction, hence we are enabled to place the elevator within the lateral limits of the thrashing machine frame, making the machine much more compact than when the elevator is placed beyond the lateral limits of the frame.

In operating a long-straw thrasher having a binder at the rear end, the breakage of the binding twine is, in many cases, a matter causing considerable loss, as the binder is driven directly from one of the operating shafts of the thrashing machine, and the stopping of the binder necessitates the stopping of the entire thrashing outfit, and owing to the high speed at which the cylinder of the machine is run, several minutes frequently

elapse before the momentum has been overcome and the machine comes to a full stop, so that the binder can be re-threaded, and several minutes more will elapse in getting the machine up to its proper speed again after starting. These stoppages, in fact, any stoppages in the continuous running of the machine, are a serious loss to the thrasher-man, who generally receives as compensation, a certain percentage of the amount of grain thrashed. We therefore discard the usual plan of driving the main shaft of the binder direct from one of the operating shafts of the thrashing mechanism, and instead of this, impart motion by means of the chain x^2, to a sprocket wheel N, which turns loosely on a shaft N′ carried by suitable hangers on the frame of the binder.

The sprocket wheel N carries one half of a clutch P, the other half P′ of which is carried by a spur wheel Q, also turning on the shaft N′ and connected, by suitable gearing, to the primary shaft of the binder. The hub Q′ of this spur wheel is grooved for the reception of one arm of a bell-crank lever R, the other arm of which carries a spring clip R′, which can be caused to engage with either of two notches r, r in the hanger O. When the spring catch engages with the upper of these notches the spur wheel and its clutch half are withdrawn, so that said clutch is free from engagement with that part carried by the sprocket wheel N, but when the spring catch engages with the lower notch in the hanger, the two parts of the clutch are in engagement with each other. It will therefore be seen that by the simple manipulation of the lever R the binder can be readily thrown into and out of operation without stopping the thrashing machine, so that there is no loss of time, and no decrease in the production due to the necessity of stopping the binder.

While it is preferred to have the clutching and releasing mechanism adjacent to the binder, as shown, said mechanism may, if desired, be used in connection with the driving mechanism at the front end of the machine.

In custom thrashing, farmers sometimes prefer to have their grain thrashed and the straw left loose or unbound, and to meet this requirement it is now considered necessary to unbolt the binder, and after disconnecting it, remove it from the thrashing machine frame. In order to obviate the necessity of doing this, we employ a movable deck or cover X, so arranged that in cases where loose straw is preferred, it can be placed over the binding mechanism so as to form a guide or chute to carry the loose straw over the binder and deposit it on the ground beyond the same, or onto a straw-stacker. This movable deck or cover is shown in Fig. 1. It may rest against the rear portion of the frame of the machine, above the working parts of binder, and be supported either by said frame or by some part of the binder. As shown, it rests against the frame at its upper end, and is supported at the lower end by a transverse shaft or rod at the outer portion of the binder.

In that class of thrashing machines to which our invention relates, the grain bottom on which the grain falls after being separated from the straw, is usually made of boards tongued and grooved together to insure tight joints, so that no waste of grain will be caused by open joints or cracks, and while this object is successfully attained, grain bottoms constructed in this way are very objectionable, and cause much trouble in damp or wet weather, because, owing to the width of the machine, (usually about six feet) a slight swelling of the boards will, owing to their close fit, cause the grain bottom to warp so as to obstruct the free passage of the grain, the bottom frequently warping to such an extent as to come in contact with the scrapers of the straw-separating devices, thus causing suspension of operation until the boards become dry and again assume their proper positions. To overcome this objection, we make the grain bottom of a sheet metal plate x extending from one side frame of the machine to the other, and galvanized or painted to prevent rusting. This plate is supported by longitudinal strips x' which, however, are placed at such distances apart that they can swell or expand to any desired extent without causing the grain bottom to warp and obstruct the action of the machine; moreover, the sheet metal plate affords a surface over which the grain can be easily moved, and one which affords no opportunity for leakage of the grain.

As the binder at the rear of the machine is quite heavy, and is carried by a portion of the frame which considerably overhangs the rear axle, it is advisable to provide some brace for this overhanging portion of the frame, in order to prevent the straining of the machine when it is being transported from place to place, or when it is in use. For this reason, we hang to one of the transverse bars S of the upper portion of the frame of the machine, a brace consisting of diagonal bars T, T, and a transverse brace bar T′ extending between the lower ends of the same, the bars T being hung at their upper ends to a block y—, which is hung to a lug y'— on the cross bar by means of a pivot at right angles to that between the block and the brace bars, so as to form, practically, a universal joint connecting the latter to the transverse bars of the frame.

At the lower ends, each brace bar T has a clip z engaging with a flanged plate U secured to the transverse bar T′, these plates being inclined in opposite directions, so that by drawing the lower ends of the braces T toward each other, the bar T′ will be thrust downward, and by forcing the lower ends of the braces T apart, said bar T′ will be raised. This movement of the lower ends of the braces T from and toward each other is effected by a right and left screw shaft V, the threaded portions of which are adapted to swivel nuts

V′ carried by suitable plates on the brace bars T.

On the rear axle W of the machine are notched shoes W′ in which the transverse bar T′ of the brace rests when said brace is adjusted to the position shown in Fig. 11, which is the position assumed when the machine is being transported from place to place. On arriving at the scene of work, however, the transverse bar T′ of the brace is lifted by means of the devices shown, so as to be free from the notched shoes on the rear axle, and is then swung around to the vertical position shown by dotted lines, being blocked up so as to serve as a brace for the overhanging portion of the frame while the machine is at work, and when the machine is to be again prepared for the road, the brace is swung up to the inclined position and the transverse bar T′ again projected so as to rest in the shoes of the rear axle.

Having thus described our invention, we claim, and desire to secure by Letters Patent:

1. The combination of the main frame or casing, the hinged side tables at the top of the same, braces for said tables pivoted at their lower ends, and connections between the upper portions of the braces and the tables, whereby as the latter are thrown inward the braces will likewise be drawn inward toward the sides of the machine, all substantially as specified.

2. The combination of the feed aprons, and the supporting rod therefor, with a brace for said rod comprising one or more arms projecting from the concave, and one or more studs carried by the fixed frame of the machine, and each having a straight face along which the rod is free to move in its vertical adjustment, all substantially as specified.

3. The combination of the cylinder, with a strengthening band consisting of a series of coils or wrappings of wire or its equivalent as described, adapted to a groove in the cylinder and ribbed thrashing plates applied to the periphery of the cylinder outside of said band, substantially as specified.

4. A cylinder for thrashing machines having sunken strengthening bands and ribbed metal thrashing plates secured to the cylinder outside of said bands and extending from the outer edge of the cylinder at one end to the edge of said cylinder at the opposite end, and having on their faces diagonal ribs carried out full to the ends of the cylinder, substantially as specified.

5. The combination of the cylinder, having end strengthening bands adapted to recesses in the cylinder, and ribbed plates extending from end to end of the cylinder and overlapping said strengthening bands, all substantially as specified.

6. The combination of the cylinder, and strengthening bands adapted to recesses at the ends of the same, with the ribbed plates extending from end to end of the cylinder and overlapping said strengthening bands, said plates having hooked lugs engaging with the strengthening bands, all substantially as specified.

7. The combination of the barrel of the cylinder composed of staves, with the ribbed plates secured to the staves and having tongues adapted to grooves formed in the bodies of the staves, and intervening sheathing plates covering the joints between the staves and having tongues, likewise adapted to said grooves, all substantially as specified.

8. The combination of the end plates of the concave, the transverse metal bars secured to said end plates and having discharge spaces between them, and one or more interposed stiffening bars having lugs projecting between the transverse bars and forming filling pieces, substantially as specified.

9. The combination of the transverse metal bars of the concave, with the end plate consisting of a segmental block having ribs for the attachment of the bars, a segmental flange, and a projecting lug for bearing upon the supporting spring, all substantially as specified.

10. The combination of the casing of the tailings elevator, with the endless chain, its scraping bars, the opposite carrier drums, and the intermediate directing roll notched for the passage of the scraping bars, all substantially as specified.

11. The combination of the tailings spout and cylinder of the machine, with the tailings elevator curved backward at the upper end so as to discharge the tailings in a direction the reverse of that in which they are carried up and forwardly over the feed table and toward the cylinder, substantially as specified.

12. The combination of the thrashing machine, the binder, means for driving said binder from one of the shafts of the thrashing machine, and clutching devices whereby the binder can be stopped and started independently of the thrashing mechanism, all substantially as and for the purpose set forth.

13. The combination of the thrashing mechanism and the binder, a driving belt adapted at one end to a pulley or wheel on one of the shafts of the thrashing machine and at the other end to a wheel or pulley adjacent to but free to turn independently of the primary shaft of the binder, and a clutch and gearing whereby the movement of said loose wheel or pulley may be transmitted to the primary shaft of the binder, all substantially as specified.

14. The combination of the thrashing machine, and the binding mechanism, with a detachable deck adapted to cover the binding mechanism and guide the loose straw over the same as it comes from the machine, all substantially as and for the purpose set forth.

15. The combination of the framework of the machine, overhanging the rear axle and carrying the binder, with a brace pivoted to the upper part of said frame and adjustable so as to bear either upon the axle or upon a

support beneath the frame, all substantially as specified.

16. The combination of the rear axle, and the overhanging frame, with the brace comprising the opposite pivoted bars and the transverse bar extending from one of said pivoted bars to the other, all substantially as specified.

17. The combination of the rear axle having one or more notched shoes thereon, with a brace comprising a transverse bar adapted to said shoes, and opposite bars pivoted at their upper ends, and bearing at their lower ends upon said transverse bar, all substantially as specified.

18. The combination of the base bar of the brace and its inclined bearing plates, with the pivoted side bars of the brace engaging with said bearing plates, and a screw stem and nuts whereby the side bars of the brace can be drawn together or forced apart, all substantially as specified.

19. The combination of the overhanging frame of the machine, with the opposite side bars of the brace, and with a block to which said bars are pivoted, said block being hung to the fixed portion of the frame by a pin at right angles to the pivot pin of the brace bar, so as to form a universal joint for the latter, all substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM H. BUTTERWORTH.
JOHN BUTTERWORTH, JR.

Witnesses:
J. W. DIGNAN,
GEORGE MUIRHERD.