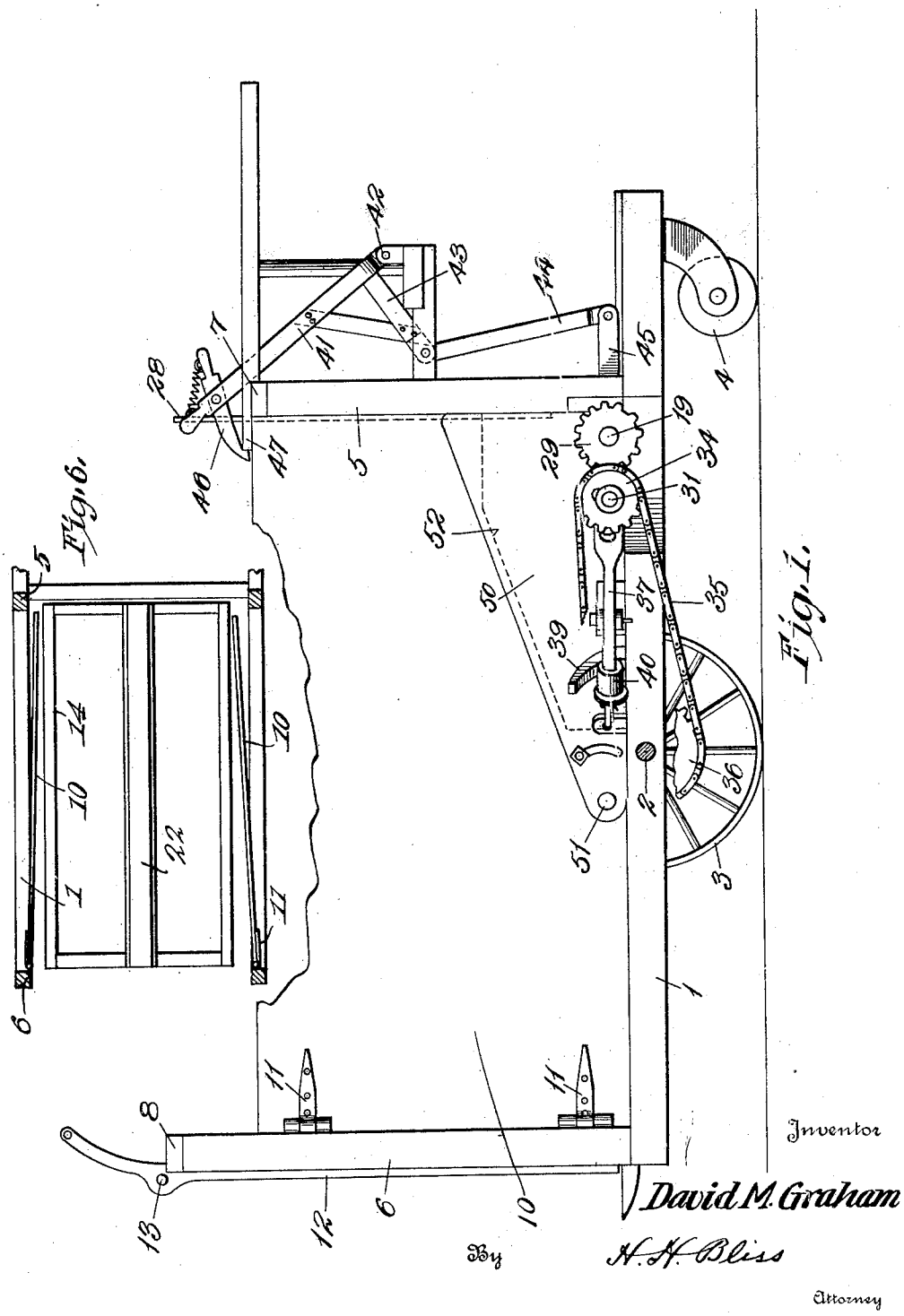
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STACK FORMER.

APPLICATION FILED MAY 17, 1917. RENEWED SEPT. 10, 1920.

1,381,869. Patented June 14, 1921.

4 SHEETS—SHEET 1.



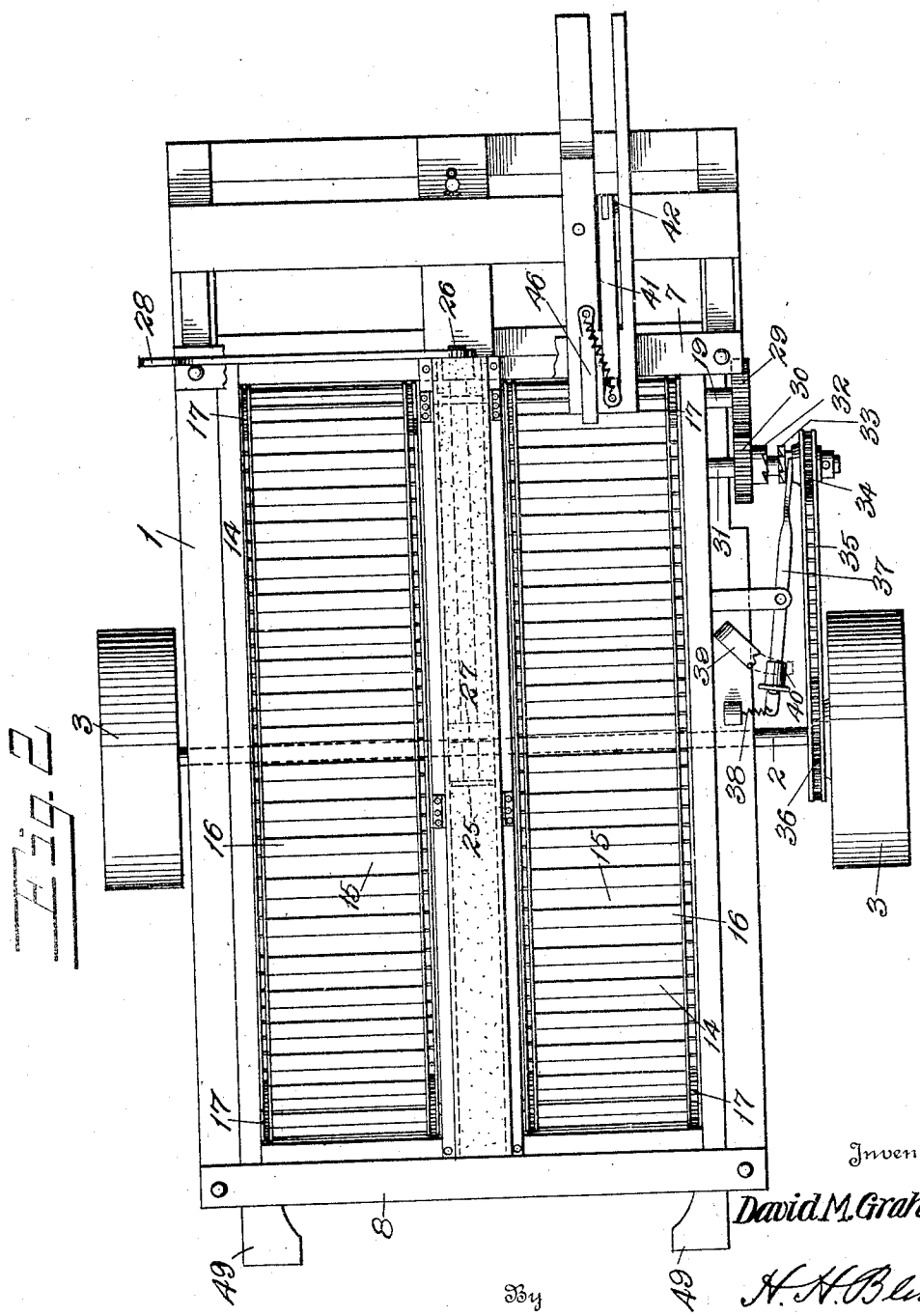
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4 SHEETS—SHEET 3.

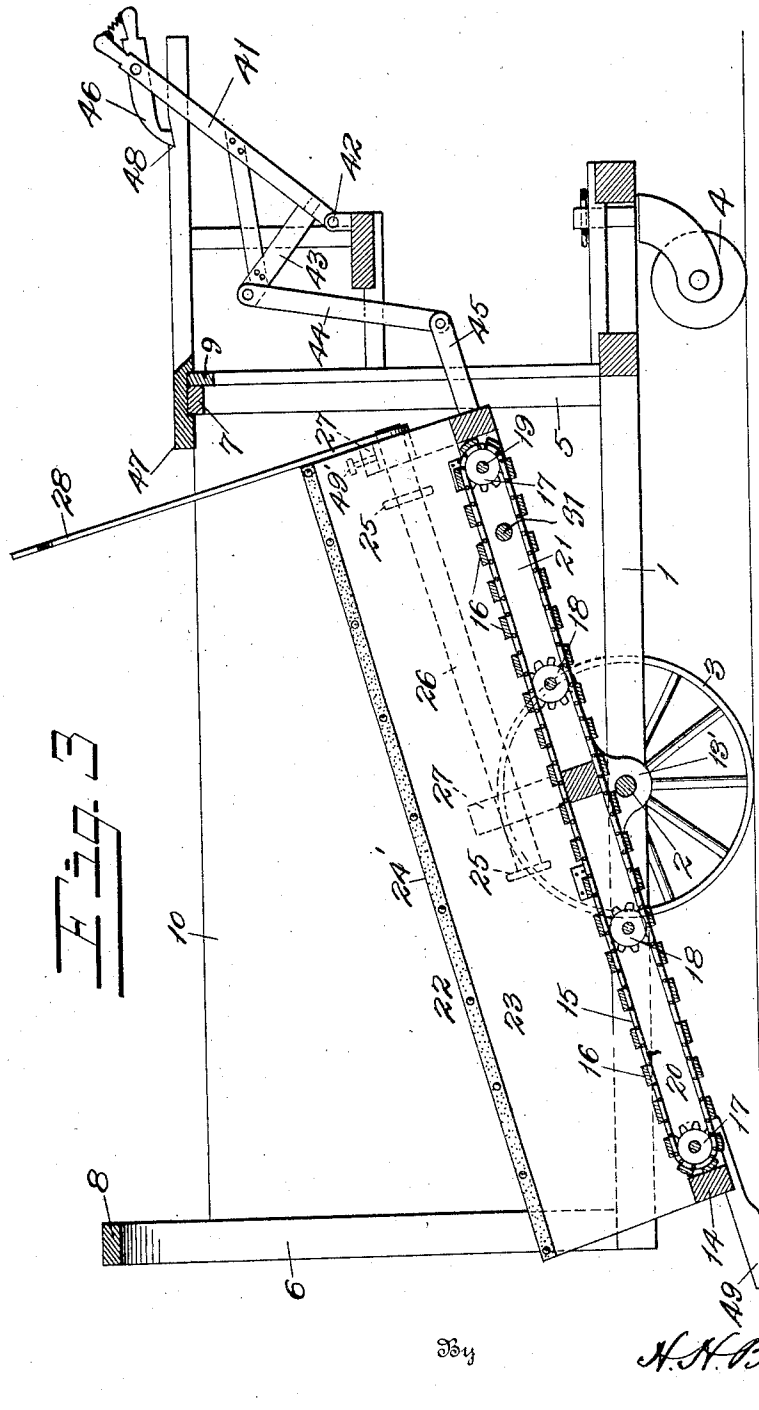


Fig. 3.

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4 SHEETS—SHEET 4.

Fig. 4

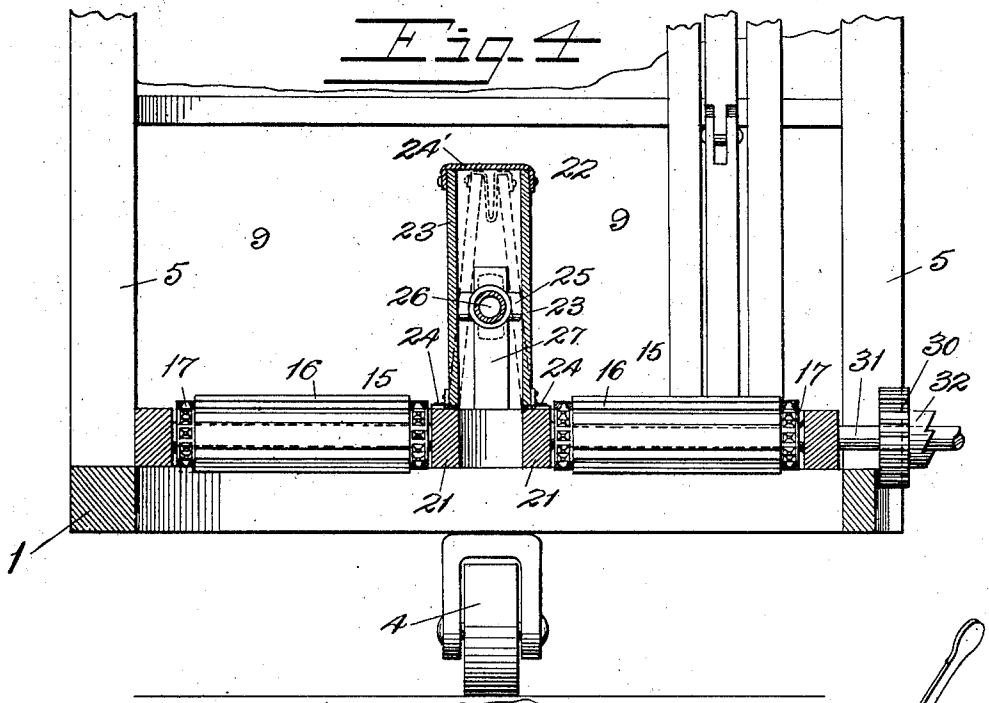
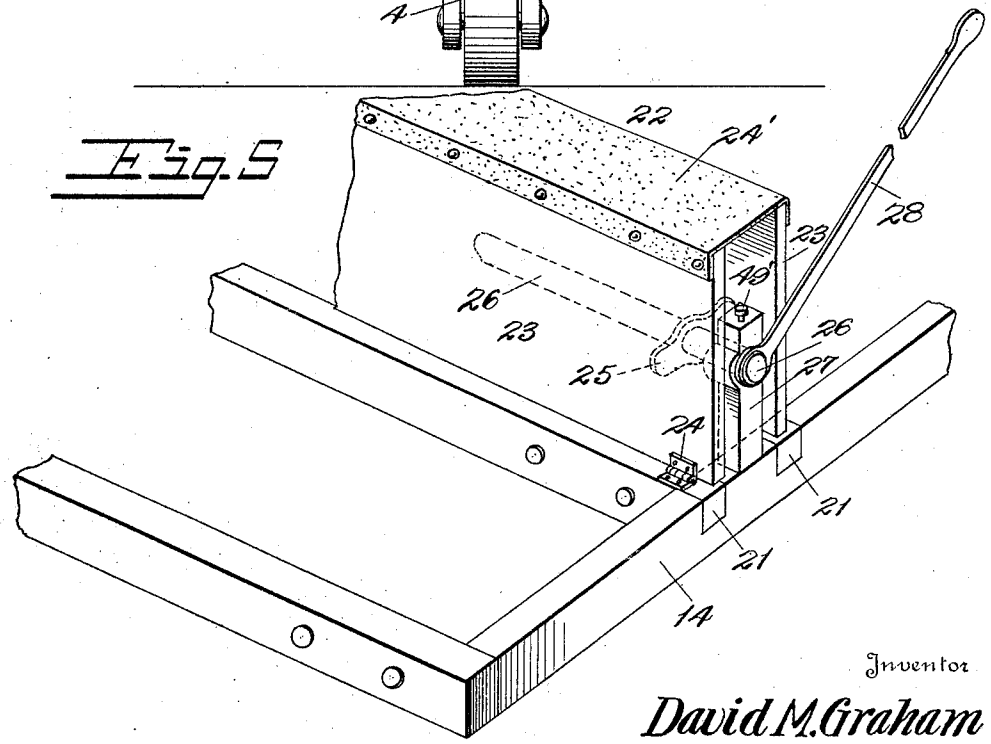


Fig. 5



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UNITED STATES PATENT OFFICE.

DAVID M. GRAHAM, OF BORDULAC, NORTH DAKOTA.

STACK-FORMER.

1,381,869. Specification of Letters Patent. Patented June 14, 1921.

Application filed May 17, 1917, Serial No. 169,254. Renewed September 10, 1920. Serial No. 409,498.

To all whom it may concern:

Be it known that I, DAVID M. GRAHAM, a citizen of the United States, residing at Bordulac, in the county of Foster and State of North Dakota, have invented certain new and useful Improvements in Stack-Formers, of which the following is a specification, reference being had therein to the accompanying drawing.

The invention relates to an apparatus for the stacking and maturing of cereal grains or the like, and consists in a stack forming and depositing apparatus having the parts and combinations thereof herein set forth and claimed, the same comprising a wheel supported means for forming and depositing a stack of the unbound straws and attached grain berries, adapted to travel with a cutting apparatus having grain carrying and distributing means by which the grain, as it is cut, is delivered into the stack former.

Among the objects and advantages of the invention are the saving of time and labor in cutting and handling the grain preparatory to threshing; the better drying and curing of the grain in loose form as distinguished from bound form; the saving of the expense incident to the binding system including cost of machinery and breakage or failure in operation of the same, with consequent loss of valuable time in the limited harvesting season; repairs of binding machinery; the cost of binding twine; the loss of grain rattled out from the grain heads by such machinery and in handling the bundles after binding; the further saving of labor and time in gathering up widely scattered bundles or small shocks, and also of time with respect to the occupation of the land by widely distributed harvested grain which delays the preparation of the land for the next crop; and, in general, the substitution for all of these operations of machinery which is relatively simple and inexpensive, requiring few and simple repairs, and which is nevertheless efficient in operation, in place of the more complicated and expensive machinery heretofore in general use. In addition to these considerations is the material improvement in the grain berries, in weight, grade and value, which is of the greatest importance.

With such objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists in the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportions and arrangement without departing from the nature and scope of the invention.

In order to make the invention more clearly understood there are shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements, in their useful applications, to the particular constructions which, for the purpose of explanation, have been made the subject of illustration. In the said drawings:—

Figure 1 is a side elevation looking at the off side, of a stack forming and depositing apparatus embodying the invention.

Fig. 2 is a plan view of the same.

Fig. 3 is a longitudinal vertical sectional view of the same, some of the upper parts of the stack former being omitted, and showing the apparatus in position for depositing a formed stack.

Fig. 4 is a rear view of the lower part of the apparatus, partly in section on a larger scale.

Fig. 5 is a perspective view looking at the forward off corner and illustrating a collapsible ventilating space former.

Fig. 6 is a plan view of the stack former body on a reduced scale, illustrating the rearward flaring of the side walls.

Certain features of the invention may be usefully employed for the handling of grain and the like irrespective of my method of stacking and maturing grain. In performing such method or process the formation of an air ventilating space in the stack is essential, as the airing of the interior of the stack and the removal of moisture therefrom, while the grain berries continue to mature and improve therein, enables me to form the stack of the freshly cut grain as and while it is coming from the harvesting apparatus, without preliminary drying and removal of moisture; and the present invention also provides a stack-ventilating space former for use in carrying out such process.

Referring to the drawings, 1 is a base frame mounted by an axle 2 on main ground wheels 3 arranged at the sides of the apparatus near the middle thereof. The base frame may be further supported by one or more ground wheels, one of such wheels being shown at 4 arranged as a caster wheel under the front portion of the machine.

Upstanding on the base frame are front and rear corner posts 5 and 6 connected respectively by top members or arches 7, 8. The stack-forming means comprise a front wall 9 preferably attached to the frame members 1, 5 and 7; side walls 10 hinged at 11 to the posts 6 and adapted to be moved inward and outward at their front ends by any suitable adjusting means; and a rear end gate 12 suitably pivoted at 13 near its top to the frame 6, 8 so as to swing in vertical planes for the release and deposit of the formed stack. Before the formation of a stack the front ends of the hinged side walls are adjusted and held in an inwardly inclined position so that they are nearer together than are the rear ends, and the interior of the stack former flares rearwardly as shown in Fig. 6. When said forward ends are released and moved outward and the stack is deposited the side walls become farther and farther away from the sides of the stack as it is moved rearwardly in the former and as the machine moves forward from the stack, so as to deposit the stack in as perfect form as possible and without undue friction. These matters need not be fully illustrated or further described herein, being set forth in my application Serial No. 168,533, filed May 14, 1917.

14 is a stack former bottom tiltably mounted so as to swing in vertical planes independent of the frame 1 for the deposit of the formed stack, the frame 1 being open at the rear end for the same purpose. This bottom is conveniently mounted on the axle 2 by bearings 13'. Said bottom also comprises means for supporting the stack, consisting preferably of two endless belts or aprons 15 arranged longitudinally and having slats 16. Said aprons are mounted on front and rear sprockets 17, of which there are eight in the illustrated construction, with eight intermediate supporting sprockets or rollers 18. The end sprockets are fixed on front and rear through shafts 19, 20 mounted in suitable bearings on the bottom frame, inner frame members 21 or bars being provided for the inner ends of said shafts. The invention also includes means for positively forcing the formed stack out of the stack former, and this function is performed by the aprons 15 when they are suitably actuated.

22 is a stack-ventilating space-former mounted within the stack former, and conveniently on the frame members 21. It is or may be collapsible and for such purpose is composed of sides 23 secured at their lower parts to the bars 21 by hinges 24 (Fig. 5), and of a flexible top 24' of canvas or the like which connects the top parts of said sides. The said parts are held in their expanded position as shown in said figure by arms 25 on a longitudinal shaft 26 arranged between the sides 23 and mounted in bearings 27. This shaft 26 is operated by a crank handle 28, or other convenient appliances, so that when the stack is being formed the arms 25 will be in the position shown in Fig. 5, to produce the desired ventilating space within the stack; and when the completed stack is to be discharged the said shaft will be turned so that the arms 25 will be vertical and the sides 23 and top 24' will collapse inward as shown in dotted lines in Fig. 4, leaving the ventilating space properly formed, and the space former will offer no resistance to the discharge of the stack. It will be understood that this space former may be of any suitable width and height, as may be dictated by experience with different sizes of stack and the different kinds of grain.

For the positive forcing and discharge of the completed stack the forward conveyer shaft 19 is turned rearward by suitable mechanism. In the construction illustrated said mechanism consists of a gear pinion 29 on said shaft, an intermeshing pinion 30 on an intermediate shaft 31, a clutch member 32 on the latter pinion, a second clutch member 33 attached to a sprocket 34 and mounted on said shaft 31, a chain 35, a sprocket 36 fixed on a ground wheel or on the axle 2, a lever 37 for shifting the clutch member 33, a spring 38 which normally holds the clutch members disengaged and a cam 39 fixed on the frame 1 and adapted to engage a roller 40 on an arm of the lever 37. It results from this construction of mechanism that the conveyers 15 are actuated rearwardly for the discharge of the completed stack by the operation of a ground wheel in the course of the forward travel of the machine, and said mechanism is thrown into operation by the downward tilting of the rear end of the stack bottom which causes the roller 40 to contact with the cam 39 and force the clutch member 33 into engagement with the clutch member 32.

Means are further provided for holding the bottom positively in its horizontal position and also temporarily in its discharging position, consisting for example of a hand lever 41 pivoted at 42 on the frame of the machine at a convenient point and having an arm 43 which is connected by a link 44 with an arm 45 on the forward end of the bottom 14. The forward swinging of the lever 41 will cause the tilting of the bottom from the position shown in Fig. 1 to the position shown in Fig. 3. 46 is a spring dog or latch on the lever 41 adapted to engage a stop at 47 to hold the bottom horizontal or a stop 48 (Fig. 3) to hold the bottom in discharging position.

It will be understood that the shaft 26 may be of any desired length so as to properly operate the sides 23 of the space former.

It is shown as extending for a little more than half the length of the stack former and is provided at its rear end with a second pair of arms 25 (Fig. 3).

The rear end of the tilting bottom is or may be provided with small wheels or rollers or rearwardly extended shoes 49 adapted to rest on the ground during the deposit of the stack.

The desired results in maturing and curing the grain may be obtained by making the said ventilating air space in the lower part of the stack of less height than half the height of the stack, and it is preferable to lay the major part of the stack on the top of and above the said space former, thereby increasing the capacity of the stack as a whole.

The axis of tilting of the bottom is so arranged that when the stack is completed a little more than half the stack will be at the rear of said axis so that the preponderating gravity of that part of the stack will cause the tilting of the bottom when the latter is released; and the front part of the bottom forward of the axis of tilting is made heavier than the part at the rear of said axis so that the bottom will automatically return to stack-receiving or horizontal position automatically as soon as the stack has been discharged therefrom. The front part of the bottom will ordinarily have such preponderating weight by reason of the discharging mechanism carried thereby, but it may be otherwise weighted for said purpose. It is not necessary that the axis of tilting be forward of the middle of the bottom, because the rear part of the stack will or may be heavier than the front portion when it is made wider by the rearwardly flaring arrangement of the side walls, and such latter arrangement would in that case be the equivalent of having the axis of tilting forward of the middle of the stack as measured from end to end.

The shaft 26 is properly held in its adjusted position preferably by friction, applied in a bearing 27 by means of an adjustable screw 49′ (Fig. 5).

50 indicates a vertically movable shield or portion of the stack former side wall 10 (Fig. 1), one of which shields will be applied at each side of the machines. The said shield is or may be pivotally connected at 51 with the side wall 10, and is otherwise attached to the tilting bottom 14 so as to move vertically with the forward end of the same. Opposite the shield 50 the side wall 10 is cut out or removed as indicated at 52, in dotted lines in Fig. 1, so that the transverse elements of the forward end of the bottom and of the gearing may move up and down relative to the vertically stationary side wall; but the side openings so made are closed by the shields 50 so that the straw is properly confined within the stack former chamber.

What is claimed is:

1. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, and mechanism for actuating such stack-carrying means.

2. A stack former for harvesting machines having in combination, a movable bottom and ground wheels, a support on which said bottom is movable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such stack carrying means, and means whereby said actuating mechanism is caused to be operated when the bottom is moved for the deposit of the stack.

3. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for confining and forming the stack, means on said bottom for carrying the formed stack therefrom and to the ground, mechanism connected with a ground wheel for actuating such stack-carrying means, and means whereby said actuating mechanism is caused to be operated when the bottom is tilted rearwardly for the deposit of the stack.

4. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means for carrying the formed stack out of the stack former and away from said space-forming means, mechanism

connected with a ground wheel for actuating such stack-carrying means, and means whereby said actuating mechanism is caused to be operated when the bottom is tilted rearwardly for the deposit of the stack.

5. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is tiltable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such stack-carrying means, and means whereby said actuating mechanism is caused to be operated when the bottom is tilted rearwardly for the deposit of the stack.

6. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for forming the lower part of a stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of said space-forming means and confining and shaping the sides of said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such stack-carrying means, and means whereby said actuating mechanism is caused to be operated when said bottom is tilted rearwardly for the deposit of the stack.

7. A stack former for harvesting machines having in combination, a movable bottom and ground wheels, a support on which said bottom is movable, front, rear and side walls for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means consisting of the upper parts of said walls for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, an endless conveyer on said bottom for carrying the formed stack out of the stack former and away from said space-forming means, mechanism connected with a ground wheel for actuating such conveyer, and means whereby said actuating mechanism is caused to be operated when the bottom is moved for the deposit of the stack.

8. A stack former for harvesting machines having in combination, a movable bottom and ground wheels, a support on which said bottom is movable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, endless conveyers on said bottom one at each side of the space-forming means for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such conveyers, and means whereby said actuating mechanism is caused to be operated when the bottom is moved for the deposit of the stack.

9. A stack former for harvesting machines having in combination, a movable bottom and ground wheels, a support on which said bottom is movable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means and comprising a clutch member, mechanism connected with a ground wheel for actuating such stack-carrying means and comprising a second clutch member, and means whereby said clutch members are caused to engage and said stack carrying means to be operated when the bottom is moved for the deposit of the stack.

10. A stack former for harvesting machines having in combination, a movable bottom and ground wheels, a support on which said bottom is movable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such stack-carrying means, means whereby said actuating mechanism is caused to be operated when the bottom is moved for the deposit of the stack, and means for holding said bottom positively in its stack-depositing position during the operation of said mechanism.

11. A stack former for harvesters, having ground wheels, a tiltable bottom, and means

for forcing a formed stack rearward out of the stack former, the axis of tilting being arranged to the rear of the center of gravity of the bottom when empty, so that the bottom returns to horizontal position by gravity and said axis being arranged forward of the center of gravity of the bottom and formed stack thereon so that the same tilt rearwardly by the preponderating gravity of the rear part of a formed stack when resting on said bottom.

12. A stack former for harvesters, having ground wheels, front, rear and side stack-forming walls, a nearly balanced and tiltable bottom the front half of which is heavier than the rear half, a pivotal support for said bottom arranged forward of the middle of the stack, and means for ejecting a formed stack from said former, whereby the empty bottom returns to horizontal position by gravity and tilts rearward by the gravity of a formed stack for the deposit thereof.

13. A stack-former for harvesters, having a ground wheel support, a nearly balanced tiltable bottom, and mechanism at the forward end of said bottom for forcing a formed stack therefrom when the rear end of said bottom is tilted downward, the axis of tilting being arranged forward of the middle of the stack so that the weight of said mechanism returns the empty bottom to stack-receiving position by gravity and the preponderating weight of the rear part of a formed stack overcomes the weight of said mechanism and tilts the bottom to depositing position by gravity.

14. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, and mechanism for actuating such stack-carrying means, the axis of tilting of said bottom being arranged forward of the middle of the stack so that when empty the bottom may return to stack-receiving position by the preponderating gravity of the forward end of the bottom, and when the formed stack is thereon the bottom will tilt to depositing position by the preponderating gravity of the rear part of the stack.

15. A stack former for harvesting machines having in combination, ground wheels, a tiltable bottom the forward half of which with attached parts is heavier than the rear half, a support on which said bottom is adapted to be tilted, means for confining and forming the lower part of the stack, means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, mechanism connected with a ground wheel for actuating such stack carrying means, and means whereby said actuating mechanism is caused to be operated when the bottom is moved for the deposit of the stack, the axis of tilting of said bottom being arranged forward of the middle of the stack so that when empty the bottom may return to stack-receiving position by the preponderating gravity of the forward end of the bottom, and when the formed stack is thereon the bottom yill tilt to depositing position by the preponderating gravity of the rear part of the stack.

16. A stack former for harvesters having in combination, a ground wheel support, a tiltable and nearly balanced bottom, and means for positively forcing a formed stack out of the former while said bottom is tilted for the deposit of the stack.

17. A stack former for harvesters having in combination, a ground wheel support, a movable bottom, means for carrying a formed stack out of the former to be deposited, and mechanism whereby said carrying mechanism is actuated from a ground wheel when the bottom has been moved for the deposit of the stack.

18. A stack former for harvesting machines having in combination, a tiltable bottom and ground wheels, a support on which said bottom is nearly balanced and is tiltable, means for confining and forming the lower part of the stack, inwardly collapsible means for forming a permanent ventilating space in said lower part of the stack, means for forming the upper and major part of the stack on the top of the space-forming means and confining and shaping the sides of the said upper part of the stack, means on said bottom for carrying the formed stack therefrom and away from said space-forming means, and mechanism for actuating such stack-carrying means.

19. A stack former for harvesters having in combination, a ground wheel support, a tiltable and nearly balanced bottom, a stack ventilating space former within the stack former, and means for positively forcing a formed stack out of the former while said bottom is tilted for the deposit of the stack.

20. A stack former for harvesters having in combination, a ground wheel support, a movable bottom, a stack ventilating space-

former thereon, means for carrying a formed stack out of the former to be deposited, and mechanism whereby said carrying mechanism is actuated from a ground wheel when the bottom is moved for the deposit of the stack.

21. A stack former for harvesting machines, having therein an inwardly collapsible stack-ventilating space-former.

22. A stack former for harvesting machines, having therein a stack-ventilating space-former comprising hinged sides and a flexible top, said space former being inwardly collapsible after being inclosed with grain, and means for releasing and expanding said sides.

23. A stack former for harvesting machines, having therein an inwardly collapsible space-former, the bottom of the stack former having at each side of said space-former a rearwardly movable stack-supporting section.

24. In a stack former for harvesters the combination of a wheeled frame, stack-forming walls thereon including side walls, a tiltable stack-sustaining bottom, the forward ends of which said side walls are removed to form side openings, and shields attached to said tilting bottom and arranged opposite to said openings to close the same against the escape of straw.

In testimony whereof, I affix my signature, in presence of two witnesses.

DAVID M. GRAHAM.

Witnesses:
H. N. Law,
N. Curtis Lammond.