

(No Model.)

5 Sheets—Sheet 1.

L. MILLER.
GRAIN BINDING HARVESTER.

No. 451,975.

Patented May 12, 1891.

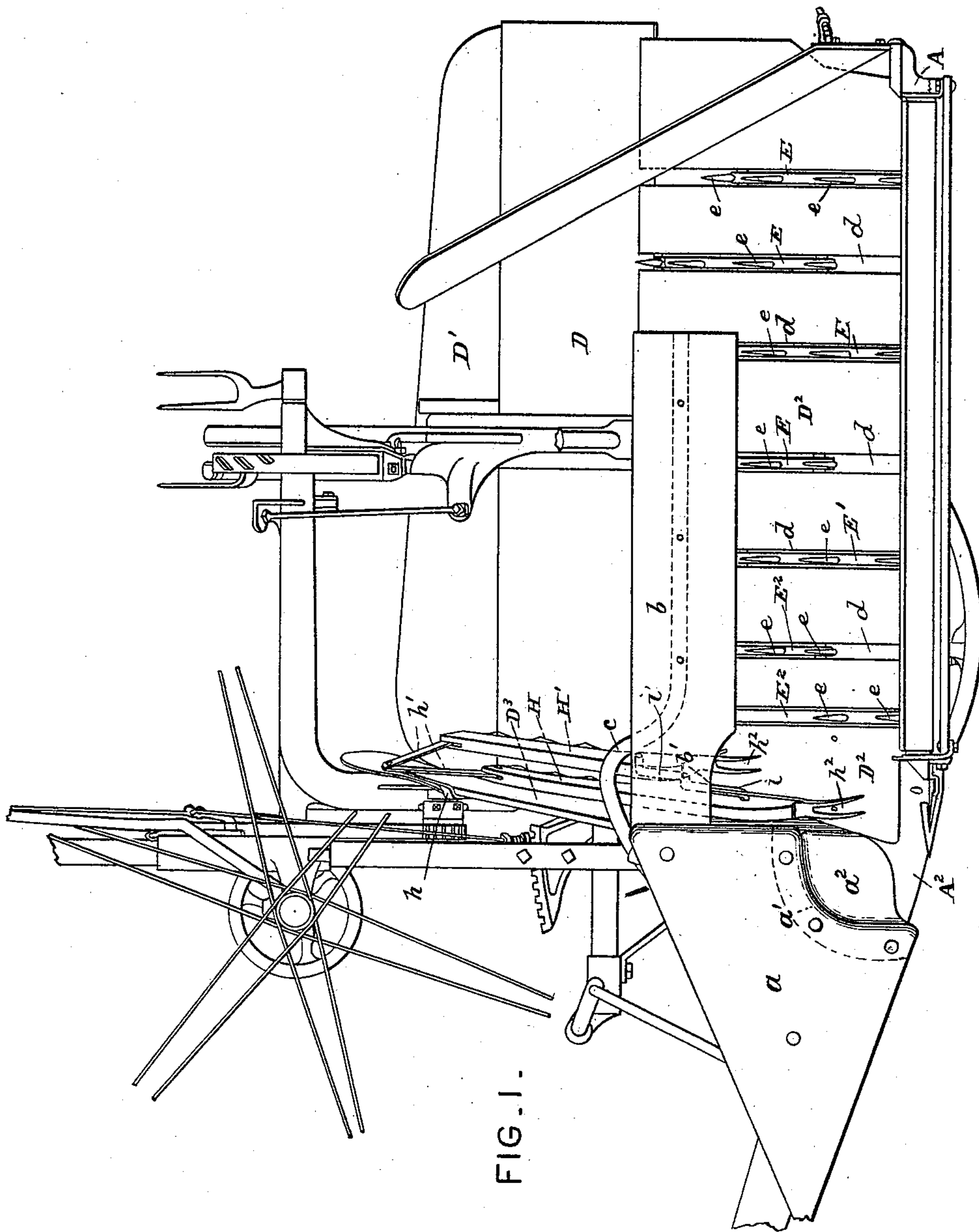


FIG. 1.

WITNESSES

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Geo. K. McCutcheon

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By A. M. Smith & Son,
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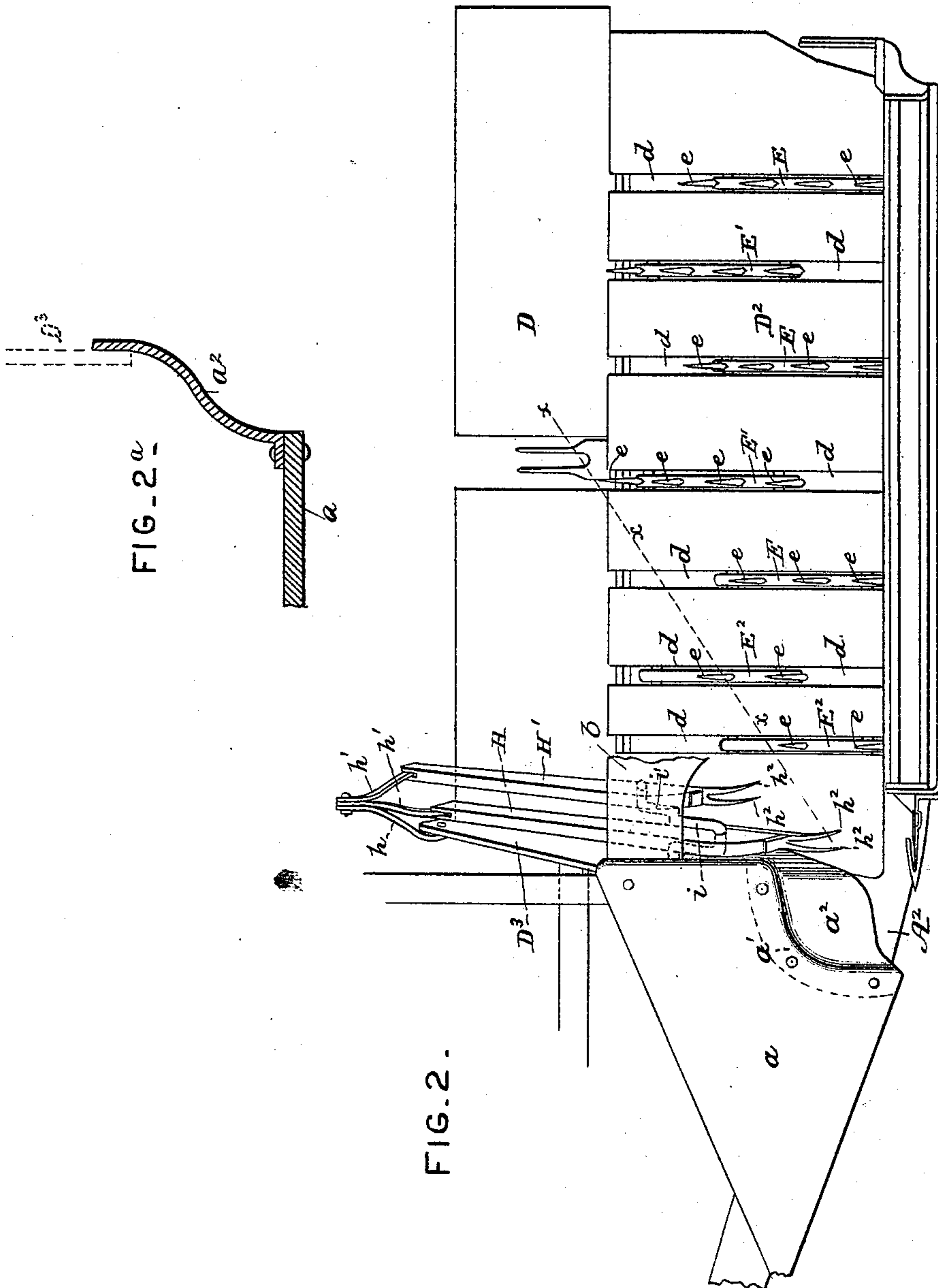
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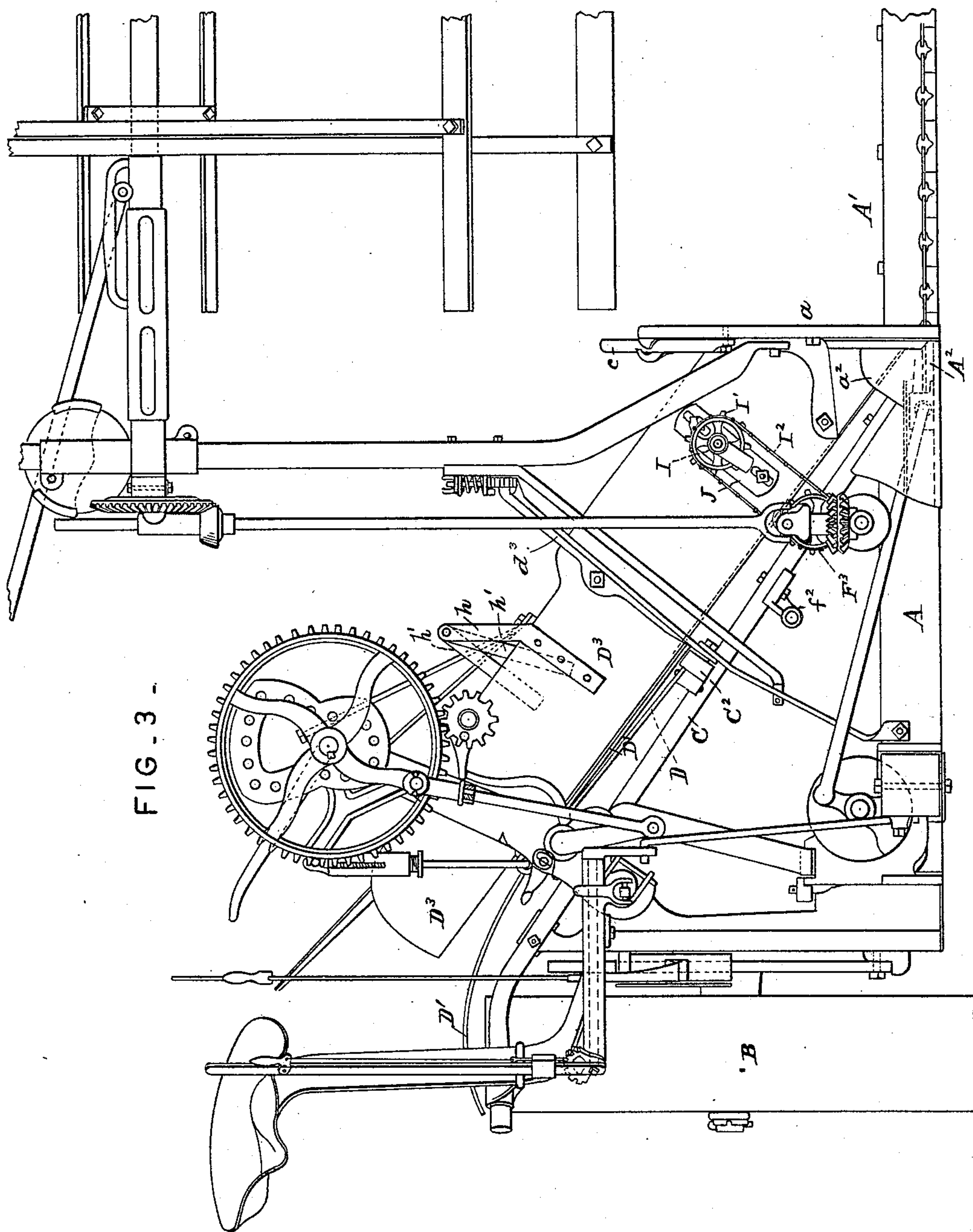


FIG. 3 -

WITNESSES

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5 Sheets—Sheet 4.

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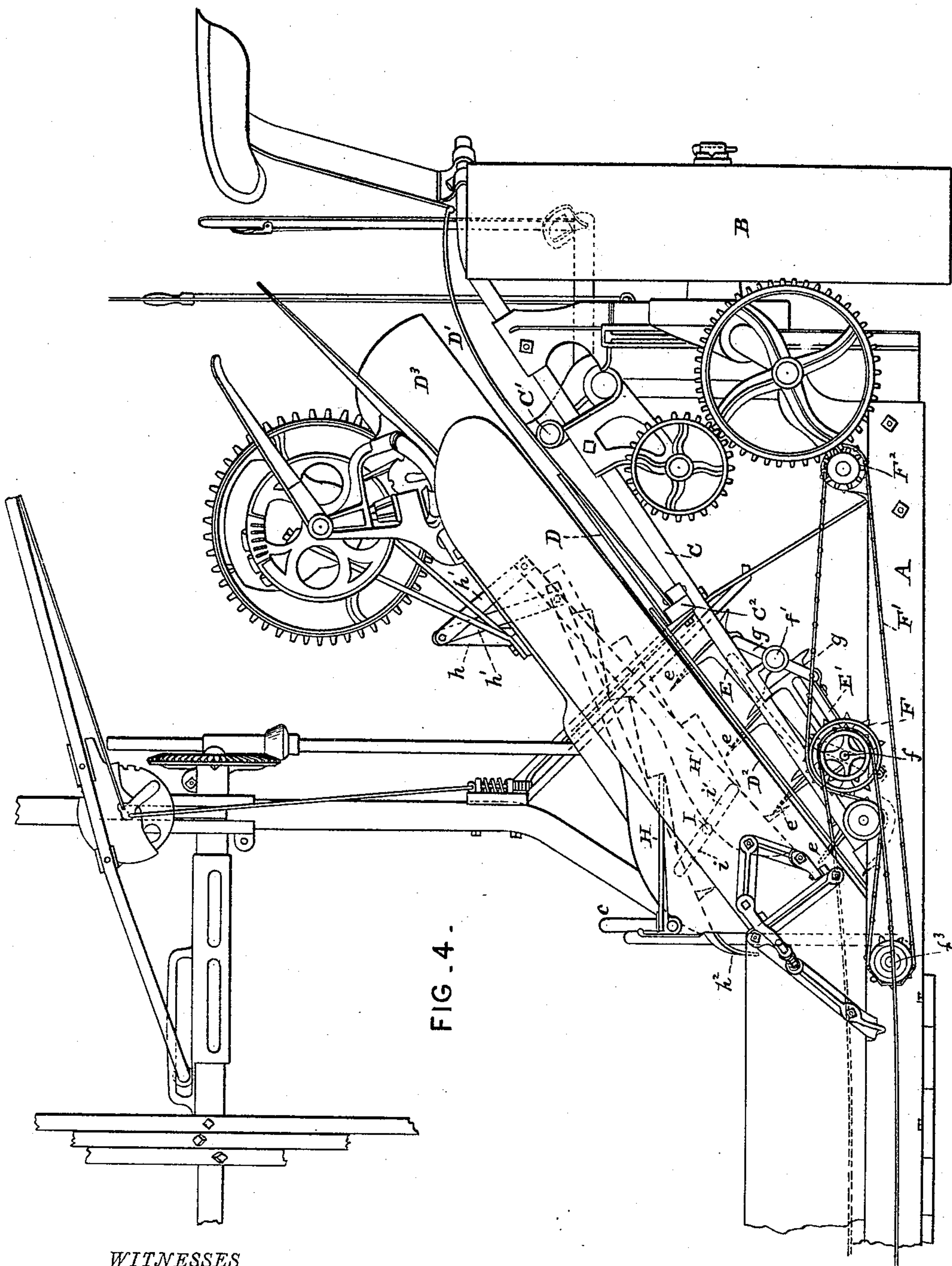


FIG. 4.

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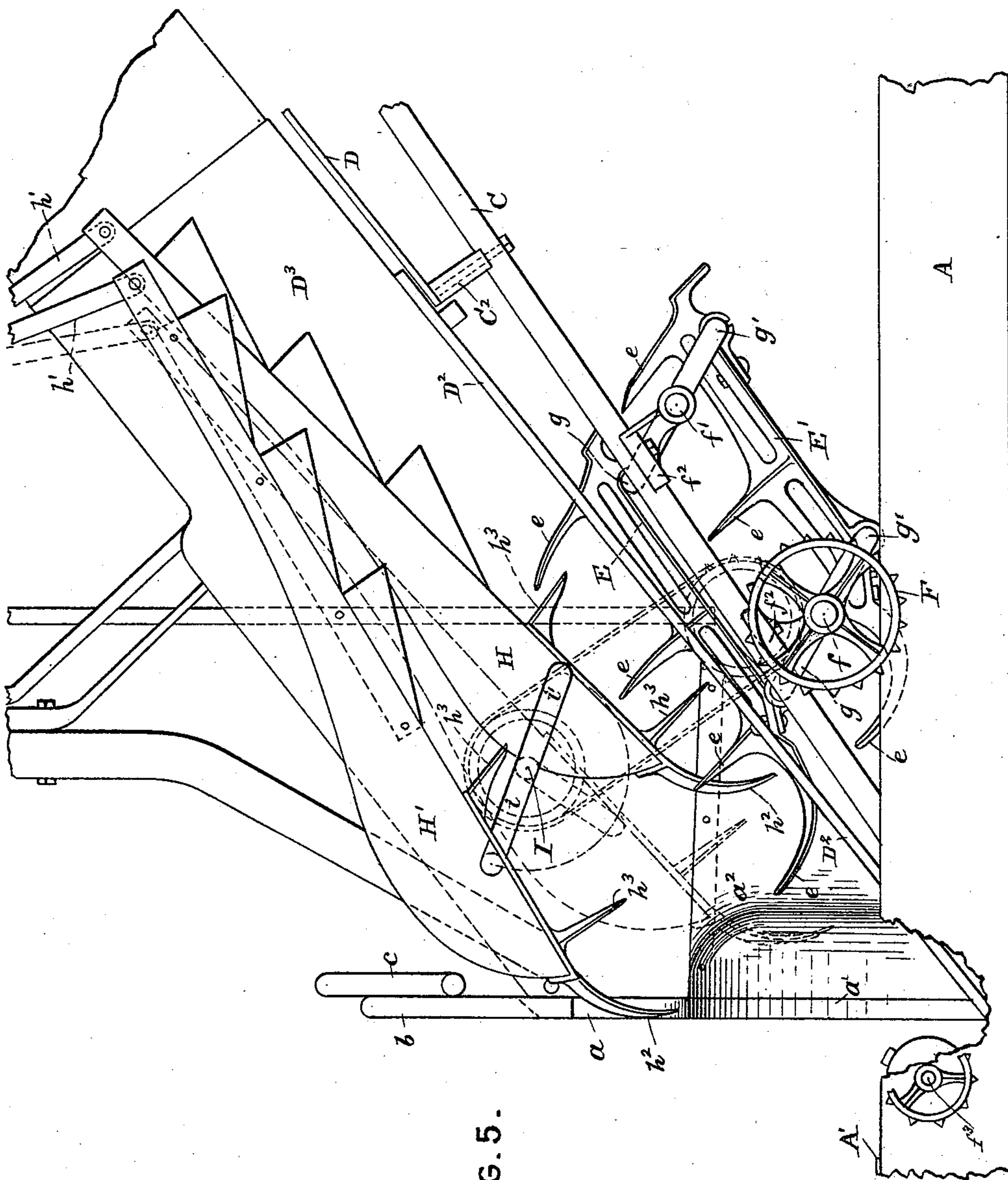


FIG. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 451,975, dated May 12, 1891.

Application filed November 30, 1888. Serial No. 292,198. (No model.)

To all whom it may concern:

Be it known that I, LEWIS MILLER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have
5 invented certain new and useful Improvements in Grain-Binding Harvesters, of which the following is a specification.

My invention more especially relates to grain-binding harvesters of that class in which
10 the cut grain is conveyed by a platform-carrier to an elevating-conveyer, which delivers it to the binding mechanism.

In cutting grain too short to be fully acted upon by the reel the grain frequently falls
15 with its butts projecting in advance of the cutting apparatus. In such cases if the heads fall upon the platform-carrier the grain is apt to be dragged head foremost and discharged in this condition upon the elevator, while the
20 butts of that portion of the grain which fall close to the inner divider are apt to be caught against the corner of the inner end or heel of the divider and held there, while their heads are turned partly round and presented end-
25 wise to the elevating and binding mechanism, thus either escaping binding altogether or producing bad bundles.

The principal object of my invention is to obviate this difficulty by causing the grain,
30 whether long or short, to be presented squarely to the binding mechanism, and thus insuring symmetrical bundles. To this end I provide a rearwardly-unobstructed notch or opening in the adjacent inner lower ends of the inner
35 divider or grain-deflector and the butt guide-board, which recess is made concave in outline or of an ogee form, so that instead of catching on the shoulder ordinarily left at this point the butts of the grain enter this
40 opening, which tends to crowd them backward within reach of the elevating carrier-belts or pickers, at which point the butts are seized by butt-rakes working from overhead in a path practically parallel with the front butt
45 guide-board. These butt-rakes, moving more rapidly than the pickers, draw the butts of the grain forward even with the heads, and thus cause the grain to be elevated in the proper relation to the binding mechanism.
50 The pickers work through slots in an elevating binder-table and are provided with teeth, in-

creasing in number progressively from front to rear, so as to co-operate with the butt-rakes in advancing the grain.

The constructions, combinations, and or-
55 ganizations of instrumentalities constituting the subject-matter of the present invention are specifically designated in the claims at the close of this specification.

The accompanying drawings represent so
60 much of a grain-binding harvester embracing all of my improvements as is necessary to illustrate the subject-matter claimed. Some of these improvements may, however, be used without the others, and in machines differing
65 in their details of construction from those herein shown.

Figure 1 is a grain side elevation; Fig. 2, a similar view showing more particularly the inner divider, butt-rakes, and pickers, the
70 other parts being removed or broken away. Fig. 2^a represents a horizontal section through the adjacent parts of the inner divider and butt guide-board. Fig. 3 is a front elevation of the inner or stubble end of the machine.
75 Fig. 4 is a rear elevation thereof; and Fig. 5 a similar view on an enlarged scale, with certain parts removed, showing more particularly the organization of the butt-rakes and
80 pickers.

Unless otherwise indicated the apparatus is of usual well-known construction—such, for instance, as the main frame A, drive-wheel B, transverse inclined binder-frame bars C, and longitudinal bars C' C²—upon which the
85 binder-table and binder mechanism are mounted, and upon which they may be adjusted or moved backward or forward to adapt the binder mechanism to the length of the grain being bound.
90

The binder-table is shown as consisting of an inclined stationary slotted lower part D², the lower part of which lies adjacent to the platform-carrier to receive the grain there-
95 from, while its upper portion overlaps the lower edge of the upper portion D, forming the binder-table proper, and centrally slotted for the passage of the binder-arm. The upper edge of this portion of the binder-table overlies the inner edge of a flap or apron D',
100 the outer portion of which projects over the driving-wheel.

The above-described parts of the apparatus may be constructed substantially as shown in my Letters Patent No. 276,448, dated April 24, 1883, and No. 290,459, dated December 13, 1883.

An inner divider or grain-deflector a , secured upon the usual inner shoe A^2 of the cutting apparatus, has its rear lower corner cut away in a curve a' to allow free passage for the butts of the grain, which, as before remarked, are liable to overhang the cutting apparatus and crowd against the heel of the inner divider at that point. Moreover, the heads of grain adhere more closely to the carrier, and are consequently advanced at uniform speed thereby, while the smooth hard butts frequently slip on the carrier, and their traverse is thereby retarded, consequently leaving them behind, thus bringing the grain into an oblique position at the inner end of the carrier, and thereby causing the butts to project over the cutters at that point.

An upright stationary butt guide-board D^3 is secured to the front end of the inclined binder-table D , above described, and the inner end of this butt guide-board is secured to the corresponding end of the inner divider or grain-deflector a , and is notched or cut away at its inner lower corner in a manner similar thereto, thus forming a notch or recess in which a curved or concave plate a^2 , preferably of ogee form in horizontal section, the edges or flanges of which are secured to the divider and butt guide-board by rivets or otherwise, which plate serves to deflect or crowd the grain backward endwise as it is moved upward on the inclined binder-table. This arched plate or hood a^2 , it will be observed, lies above and normally in front of the cutting apparatus with its concave side thereto. The rear end of the divider and the inner end of the butt guide-board, it will be observed, also occupy substantially the same relative position, so as to leave ample room for the passage of the grain and for the operation of the devices hereinafter described.

The fender b is shown as overhanging the path of the grain, being arranged longitudinally over and parallel with the inner end of the platform-carrier and at or near the foot of the inclined elevating binding-table. This fender is shown as supported at its front end only by means of a rod or bar c , secured to the rear upper corner of the divider a , extending along the inner side of the fender, to which it is rigidly secured in any suitable manner. The fender itself has a notch b' at its forward end, next the divider, and the supporting-rod c is also provided with an upward curve or goose-neck, which organization enables the butt-rakes to work underneath the guide-board at a steeper angle of inclination than they could otherwise do. The fender serves to keep the grain down upon the elevating-table and prevents it from rolling back upon the platform-carrier as it accumulates during

intermissions in its upward travel. As usual in such cases, the butt rakes and pickers both travel faster than the platform-carrier, so as to clear the grain therefrom and crowd it into the binding mechanism, so as to assist in forming a distinct separation between the gavels.

Parallel longitudinal shafts ff' , mounted at different levels in suitable brackets f^2 underneath the binder-frame and elevating-table, are each provided with a series of cranks $g g'$, arranged in pairs on opposite sides of the axis of the shaft, as usual. The respective corresponding cranks on each shaft are connected by picker-bars $E E'$, &c., each provided with upwardly-projecting teeth or fingers e , which work upwardly through slots d in the lower portion D^2 of the binder-table as the cranks rotate, and carry the grain delivered thereon by the platform-carrier upward to the binder, as usual. A sprocket-wheel F on the rear end of the lower shaft f is driven by a chain F' from a sprocket-wheel F^2 , actuated from the main driving-wheel in any suitable manner. The chain F' likewise drives the platform-carrier by a sprocket-wheel f^3 on its inner roller F^3 . (See Fig. 4.)

I arrange the teeth on the picker-bars in a peculiar manner. The two front picker-bars E^2 are each provided with two picker-teeth only, arranged on the lower part of the bar, or that nearer the platform-carrier. The next picker-bar E' , the third one from the front, has three such teeth similarly arranged, while the fourth picker-bar E , which in this instance coincides with the slot for the binder-arm, is provided with four teeth, all the bars in rear of it being provided with a similar number.

The butt guide-board D^3 is shown as secured near its lower end to the rear end of the inner divider a and at an intermediate point it is connected to a bracket d^3 , which, in this instance, also supports the reel-adjusting detent. The upper end of this board D^3 is shown as extending beyond and in rear of the upright arm of the binder-gear standard. (See Figs. 1, 3, and 4.) As a consequence of this organization, the butt-board D^3 , instead of lying in the same vertical plane as the back end of the divider, or, in other words, instead of being parallel with a vertical plane passing through the cutting apparatus, extends obliquely backward and upward over the binder-table, as clearly shown in Fig. 1. An arm h projects above and in rear of the butt guide-board near its upper end. Pendent links $h' h'$ are pivoted to this arm at their upper ends, and at their lower ends to the handles or stales of butt-rakes $H H'$, made substantially in ordinary pitchfork form. The lower or operative ends of these rakes are carried by crank-arms $i i'$, set on opposite sides of a shaft I , journaled in suitable bearings in a slotted plate J' , longitudinally adjustable on the butt guide-board D^3 , as shown in Fig. 3. A sprocket-wheel F^3 on the forward end of the picker-shaft f drives a sprocket-wheel I' on the shaft I by means of a chain

12. By this organization the adjustment of the plate J serves to regulate the tension of the drive-chain, as well as to adjust the relation of the butt-rakes to the binder-table and to the opening b' in the fender b , through which they work.

The handles or stales of the butt-rakes are provided at their lower working ends with teeth h^2 , and, if desired, with additional teeth h^3 . In Fig. 5 the teeth are shown as extending the entire length of the rake-stales. These teeth, it will be observed, are so set as to seize the butts of the grain on their upward stroke and carry them upward on the table. The rakes work close to the butt-guide board D^3 , parallel therewith, and reach out through the opening b' , behind and beyond the rear end of the divider a , and seize the butts of the grain lying in the hood a^2 , drawing them rapidly inward and upward over the binding-table, so as to bring the butts even with the heads as they move upward. This hastening of the butts is due to the fact that the rakes work more rapidly than the picker-bars, and the absence of the upper teeth on the two forward bars allows the butt-rakes to carry the grain over these blank spaces faster than the heads are being moved by the other pickers. But for this compensating action the heads of the grain would move faster than the butts and cause the straw frequently to assume a position parallel with the dotted line X, Fig. 2, which would tend to crowd the butts forward against the rear end of the inner divider, which tendency is overcome by the action of the hood a^2 , as hereinbefore explained.

The blank space left on the two forward picker-bars E^2 by the omission of their upper teeth enables the butt-rakes to elevate the butts more rapidly than the heads, as above set forth, the inclined curved hood a^2 co-operating to crowd the butts of short grain backward far enough to pass behind the butt guide-board D^3 , and being always in substantially the same relation thereto, thus dispensing with the necessity for any backward or forward adjustment of the binding mechanism beyond that ordinarily required to adapt it to the length of the grain to be bound.

Undescribed apparatus shown in the drawings may be of any usual or preferred construction and organization.

The reel supporting and adjusting mechanism herein shown is not herein claimed, as it constitutes the subject-matter of application No. 256,249, filed Nov. 26, 1887, patented October 1, 1889, as No. 411,820.

The operation of the apparatus will be readily understood from the foregoing description. The grain is swept backward by the reel, severed by the cutting apparatus, and delivered by the platform carrier upon the lower portion of the inclined slotted binder-table, up which the heads are carried by the picker-bars, while the butts are more rapidly elevated by the conjoint operation of

the butt-rakes and the teeth on their handles, and thus delivered squarely to the binding mechanism. This is more particularly the case with grain of ordinary length. Very short grain, as before explained, would not ordinarily overlie any but the forward picker-bar, which has only two teeth. The heads consequently would not be carried above these teeth until the more quickly moving butt-rakes bring the butts up even with the heads, simultaneously shoving them backward and endwise in conjunction with the hood a^2 and butt guide-board d^3 , as above explained.

Having thus fully described my improved apparatus, what I claim therein as new and of my own invention is—

1. The combination, substantially as hereinbefore set forth, of the inner divider or grain-deflector having a notched or recessed rear end, the butt guide-board secured thereto, having a coinciding notch or opening on its under side next the divider, and a recessed butt-guiding hood occupying these openings.

2. The combination, substantially as hereinbefore set forth, of the cutting apparatus, the inner divider or grain-deflector having a rearwardly-unobstructed notch or recess in advance of the cutting apparatus, and a butt guide-board having a notch or opening coincident with that of the divider.

3. The combination, substantially as hereinbefore set forth, of the inner grain-deflector or divider provided with the notched rear end and the stationary grain-fender secured thereto, overhanging the path of the grain, and having a notch or opening on its under side adjacent to the divider for the passage of the butt-rakes.

4. The combination, substantially as hereinbefore set forth, of the cutting apparatus, the divider or grain-deflector having a rearwardly-unobstructed notch or opening in its lower corner, the coincidently-notched butt guide-board, and the butt-rakes operating on the grain during its passage through said opening.

5. The combination, substantially as hereinbefore set forth, of the cutting apparatus, the platform-carrier, the notched divider and butt guide-board, and the butt-rakes operating on the grain from above during its passage through the notch or opening.

6. The combination, substantially as hereinbefore set forth, of the cutting apparatus, the platform-carrier, the notched divider and butt guide-board, the fender overhanging the path of the grain, and the butt-rakes working beneath the fender to lift the butts.

7. The combination, substantially as hereinbefore set forth, of the cutting apparatus, the platform-carrier, the notched divider and butt guide-board, the slotted grain-elevating table, and the pickers working therethrough from below to elevate the grain.

8. The combination, substantially as hereinbefore set forth, of the cutting apparatus,

the platform-carrier, the notched divider and butt guide-board, the slotted grain-elevating table, the pickers working therethrough from below, the fender overhanging the table, and
5 the butt-rakes working over the table and beneath the fender to reach the butts of the grain.

9. The combination, substantially as here-
inbefore set forth, of the slotted grain-elevat-
10 ing table, the pickers operating therethrough from below to move the grain upward thereon, the butt-rakes operating above and at the forward end of said table, the notched inner divider, and the notched grain-fender, under-
15 neath which the butt-rakes operate.

10. The combination, substantially as here-
inbefore set forth, of the cutting apparatus, the platform-carrier, the slotted inclined elevating-table at the inner end thereof, paral-
20 lel picker-bars operating therethrough from below in planes parallel with the cutting apparatus, parallel crank-shafts actuating said bars, picker-teeth on said bars increasing progressively in number from front to back,
25 and butt-rakes operating from above and co-operating with the teeth to elevate the butts faster than the heads.

11. The combination, substantially as here-
inbefore set forth, of the slotted elevating
30 grain-table, a series of picker-bars working upward therethrough from below in planes parallel with the cutting apparatus, parallel crank-shafts actuating said bars, and picker-teeth set on said bars, progressively increas-
35 ing in number from the inner and front end of the picker-bars backward, and butt-rakes co-operating with the picker-teeth, for the purpose set forth.

12. The combination, substantially as here-
40 inbefore set forth, of the platform-carrier, the inclined slotted elevating binding-table, picker-bars working upward therethrough from below to elevate the grain, crank-shafts actuating said bars, picker-teeth on said bars pro-
45 gressively increasing in number from front to rear, the divider, the butt guide-board, and butt-rakes operating on the butts of the grain near the butt guide-board.

13. The combination, substantially as here-
50 inbefore set forth, of the slotted elevating-table, pickers operating therethrough from

below, butt-rakes working above said table, the butt guide-board, the recessed inner divider, its butt-guiding hood, and the notched fender overhanging the path of the grain. 55

14. The combination, substantially as here-
inbefore set forth, of the notched inner di-
vider, the notched butt guide-board, the butt-
guiding hood interposed at their point of in-
tersection, the platform-carrier, the plane- 60
surfaced binder-table, the slotted lower portion of the binder-table, pickers operating therethrough from below to elevate the grain, and butt-rakes operating above said table in co-operation with the butt-guiding hood. 65

15. The combination, substantially as here-
inbefore set forth, of the platform-carrier, its
rollers, the elevating-table, the upwardly and
backwardly inclined butt-guide board, butt-
rakes moving parallel therewith faster than 70
the pickers, bars mounted on crank-shafts parallel with the carrier-rollers, and picker-teeth so arranged on said bars that from front to back they shall progressively move the grain farther up the elevating-table. 75

16. The combination, substantially as here-
inbefore set forth, of the adjustable or shift-
ing binder mechanism, the platform-carrier,
its rollers, the horizontally-divided sectional
elevating binder-table, the lower section be- 80
ing fixed and the upper one movable with the binder mechanism, pickers mounted on crank-shafts parallel with the carrier-rollers, the upwardly and backwardly inclined or oblique butt guide-board, and butt-rakes moving par- 85
allel therewith.

17. The combination, substantially as here-
inbefore set forth, of the platform-carrier, the
elevating binder-table, the butt guide-board,
the butt-rakes moving faster than the pick- 90
ers, and the picker-bars with teeth so arranged thereon that from front to back they shall progressively move the grain farther up the elevating-table.

In testimony whereof I have hereunto set 95
my hand this 15th day of November, A. D.
1888.

LEWIS MILLER.

Witnesses:

O. L. SADLER,
W. K. MEANS.