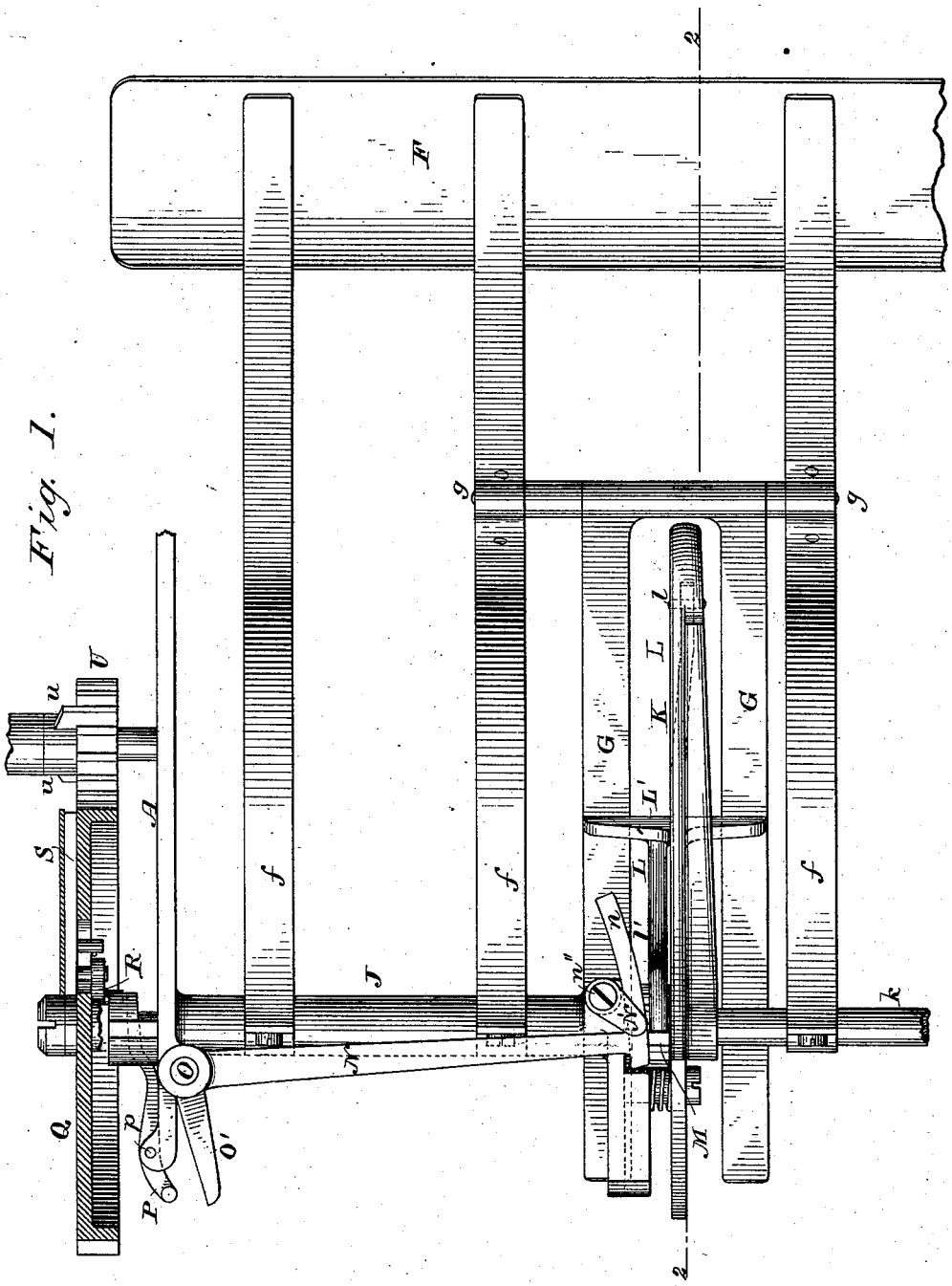
(No Model.) 3 Sheets—Sheet 1.

# J. S. DAVIS.

## GRAIN BINDER.

No. 261,591. Patented July 25, 1882.

Fig. 1.

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## GRAIN BINDER.

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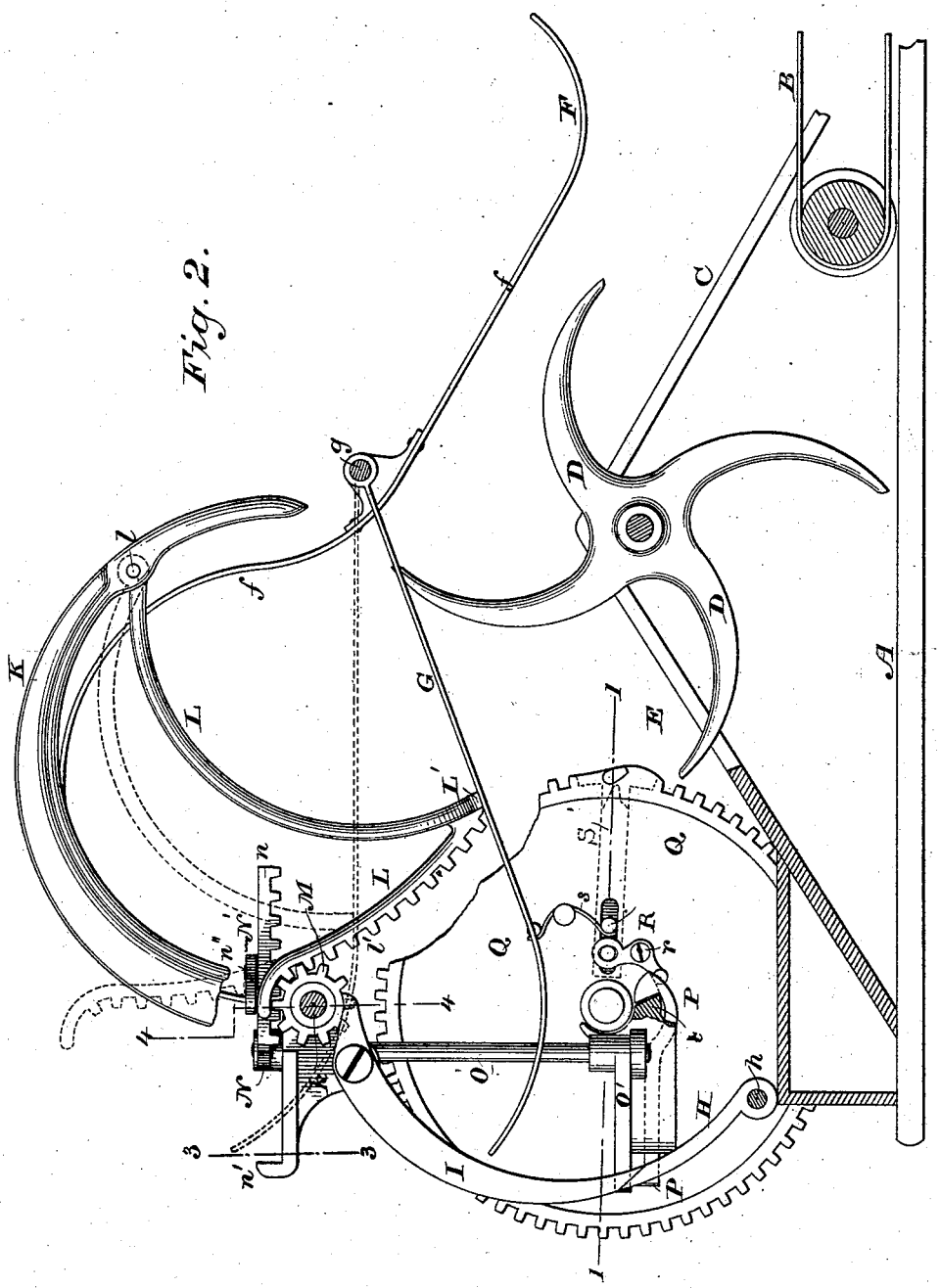
Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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## GRAIN BINDER.

No. 261,591. Patented July 25, 1882.

Fig. 3.

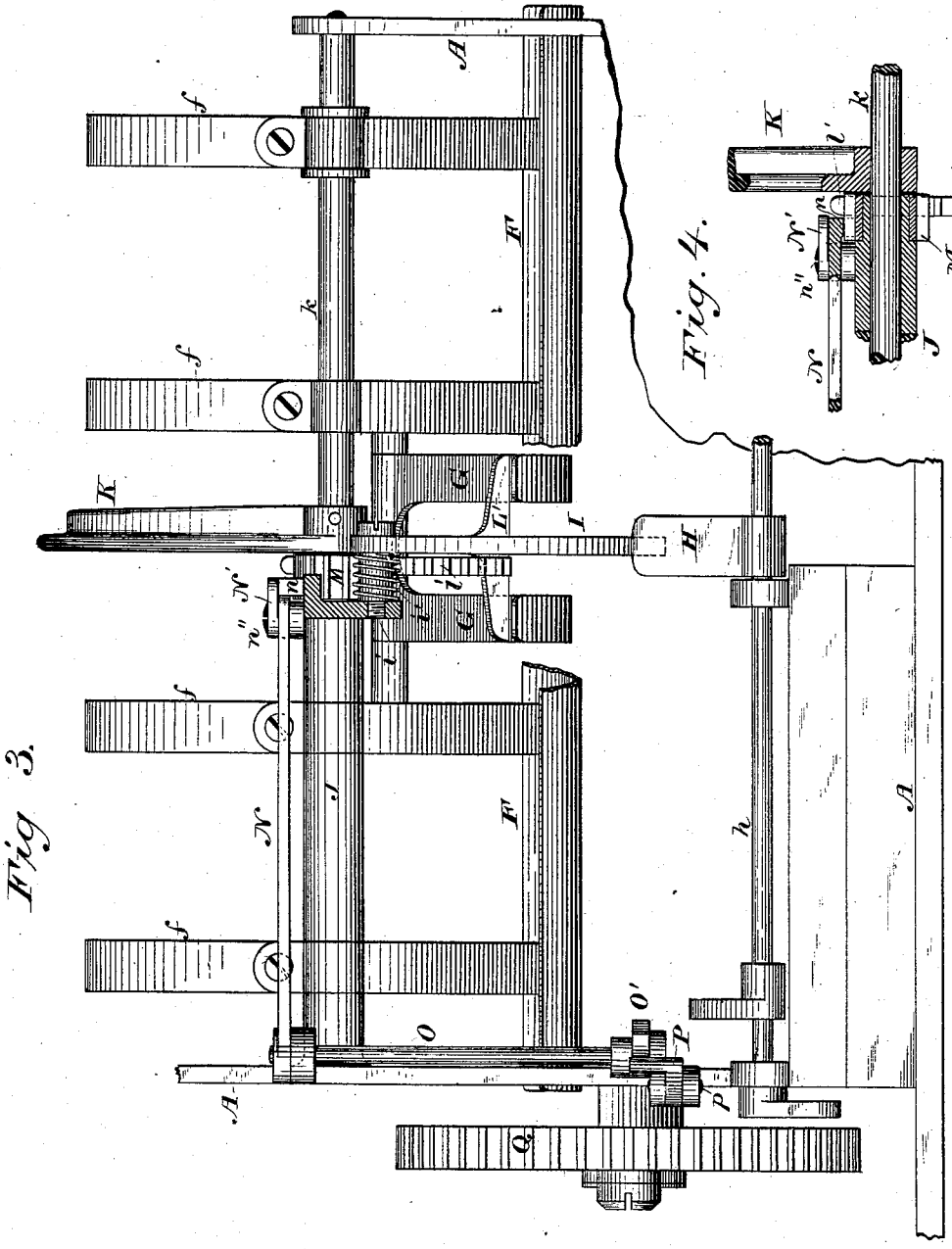


Fig. 4.




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# UNITED STATES PATENT OFFICE.

JOHN S. DAVIS, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO MOWER AND REAPER COMPANY, OF SAME PLACE.

## GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 261,591, dated July 25, 1882.

Application filed April 23, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. DAVIS, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Grain-Binders, of which the following is a specification.

My invention mainly relates to improvements in binders of the class in which the grain is delivered from the platforms upon which it falls as cut into binding-receptacles at about the levels of the platforms, and to that type of binders in which the pressure of the grain, acting upon compressors controlling clutch mechanism, throws the binding mechanism into operation to bind the bundles.

My objects chiefly are to provide improved means for feeding the grain into the binding-receptacle and compacting it therein, for throwing the binding mechanism into and out of gear to bind and release or discharge each bundle, for varying the sizes of the gavels, and for positively controlling the range of movement of the bundle-sizing mechanism and securing it in locked position while bundles are being bound.

My improvements consist in certain combinations of old instrumentalities specified in the claims at the end of this specification.

The accompanying drawings represent all my improvements as embodied in one machine in the best way now known to me. Some of the improvements, however, may be used without the others and in machines differing in construction from that herein shown, and the details of such construction may be varied to some extent in well-known ways without departing from the principle of my invention.

The accompanying drawings represent so much of the apparatus as is necessary to illustrate the subject-matter claimed.

My invention is to be ingrafted upon the most approved apparatus of the present day, the construction of which is well known, and need not therefore be herein described.

My improved binding mechanism is represented in the drawings as organized for adaptation to binding mechanism fully set forth in another application for Letters Patent of the United States filed by me simultaneously herewith, to which reference is hereby made.

In the accompanying drawings, Figure 1 represents a plan or top view of the pressure-bar, the float, the compressor, the binding-arm, the clutch-actuating mechanism, and a portion of the gearing of my improved apparatus, with the main gear-wheel, partly in section, on the line 1 1 of Fig. 2. Fig. 2 represents a vertical longitudinal section through the apparatus on the line 2 2 of Fig. 1; Fig. 3, a rear elevation of the same, partly in section on the line 3 3 of Fig. 2, and Fig. 4 a vertical transverse section through the clutch-actuating mechanism on the line 4 4 of Fig. 2.

The mechanism is mounted on a suitable frame, A, as usual. The cut grain is delivered upon an endless apron or series of carrying-belts constituting a carrier, B, which may have either a continuous or intermittent motion imparted to it in well-known ways. A cut-off may also be provided to interrupt the passage of the grain from the grain-platform or carrier thereof to the binding-receptacle, and to straighten it before its delivery thereto. The grain may be forced from the platform over a fixed way, C, by the pressure of the carrier or by means of an auxiliary carrier.

I prefer to employ a packer, D, consisting of a series of S-shaped arms revolving in slots in the fixed receptacle E and unyielding way C, which packer tends to straighten the grain and forces it positively into said receptacle. In its passage from the endless apron to the packer the grain is held down by a pressure-bar, F, of well-known construction, supported upon elastic arms *f*, pivoted upon the binder-arm shaft.

To compact the bundle thoroughly as it is presented to the receptacle and to a compressor, hereinafter to be described, I employ a supplementary pressure frame or float, G, preferably consisting of one or more elastic or yielding arms rocking on a pivot, *g*, on some portion of the apparatus, preferably on the arms *f* of the pressure-bar, as that insures a greater freedom of movement or resilience.

Under the organization shown one side of the low-down stationary binding-receptacle—

that side next the packer—is made with an inclined surface, the other side being composed of retaining-teeth H, mounted on a rock-shaft, *h*, automatically vibrated at suitable intervals in well-known ways to permit of the discharge of the gavel. The retention of the grain in the receptacle is also assisted by means of a retaining-lever, I, rocking on a pivot, *i*, and held in its normal position by a coil-spring, *i'*. This retainer is also positively locked by the overlapping retaining-teeth H, being thrown back when the retaining-teeth are thrown down by the pressure of the bound bundle as it is thrown out of the binding-receptacle by the action of a suitable kicker, as fully explained in my before-mentioned application.

Under the organization shown the curved binder-arm K is represented as mounted on a shaft, *k*, rocked in suitable bearings in the frame in well-known ways. This shaft passes through a tube, J, constituting a frame upon which the clutch-actuating mechanism is mounted. A compressor, L, is jointed at its inner or heel end by a pivot, *l*, with the binder-arm, so as to rock on the binder-arm at a point remote from the heel of said arm—say about one-fourth of the distance from its nose to its heel or shaft. The compressor is forked or V-shaped at its outer end, and the main branch or compressor proper is circularly curved, its concave side being toward the receptacle. The other branch or backwardly-projecting portion of the compressor constitutes a rack, *l'*, which is so shaped that while the compressor is swinging around its pivot the rack-teeth will always mesh with those of the corresponding spur-gear, M, which turns freely about a journal on the end of the tubular frame J (see Fig. 4) and concentrically with the binder-arm. A cross-bar, L', at the point of junction of the two members of the compressor bears upon the float G, above mentioned, in order that the pressure of the inflowing grain may readily be brought to bear upon the compressor. In operation the binder-arm and the curved portion of the compressor pass between the branches of the float.

The spur-pinion M, it will be observed, is longer than the width of the compressor-rack *l'*, and in turn gears with a sector-rack, *n*, on a radius-bar, N, vibrating about the axis of a vertical rock-shaft, O, to which it is fastened. A toe, O', also fast on this rock-shaft, abuts, when thrown into its extreme forward or outward position, against the end of a shipping-lever, P, rocking on a pivot, *p*, and engaging with a releasing-lever, R, rocking on a pivot, *r*, on a main actuating-gear, Q, and controlling a sliding bolt, S, sliding in guides in said actuating-gear, which slide-bolt, when released from the tripping-lever, is thrust forward by a spring, *s*, to engage with one of the teeth *u* on a driving-pinion, U, in a way fully explained in my application above mentioned, to stop and start the binding mechanism. After the gavel has been bound, and as the binder-arm returns to its normal position to begin a new stroke, the bolt-actuating lever R passes over a cam, *t*, fixed on the frame, which retracts the sliding bolt or spring-tooth S, and thus holds the binding mechanism out of gear until the tripping-lever P is again operated in manner above stated, and as more fully explained in my application hereinbefore referred to. Under this organization it will be seen that as the packer forces the grain into the receptacle it would crowd back the compressor from the position shown in full lines in Fig. 2 to that shown in dotted lines in the same figure, thereby revolving the pinion M, moving the sector-rack and radius-bar, and throwing the driving mechanism into gear, as above explained. As the binding-arm descends to encompass the gavel the pressure of the gavel forces the compressor back until the end of the sector-rack *n* abuts against a stop, *n'*, on the frame, which prevents the further backward movement of the compressor, and thereby locks it positively in position while the gavel is being bound. The compressor may be thrown out again to its normal position, as the binder-arm rises by its own gravity, by a recoil-spring, or, if preferred, by positively actuating it. I have shown this movement as dependent upon gravity alone to avoid complication of parts.

Under the organization and adjustment shown it will be obvious that the compressor would move to the same relative position every time of securing a bundle, and so compress the gavels into bundles of a uniform size. The range of movement of the compressor required for starting the mechanism may be varied, and the amount of grain allowed to accumulate to form a gavel, and the size of the bundle correspondingly altered, by adjusting the radius-bar N, rock-shaft O, and toe O' so as to require more or less movement of the rock-shaft and toe to cause the latter to act upon the lever P and a corresponding change in the amount of movement of the compressor and its rack. For securing this adjustment I provide a button, N', by which to hold the controlling-rack *n* of the radius-bar down upon its actuating-gear M. To vary the sizes of the bundles by varying the upward movement required to be given to the rack of the compressor to start the mechanism, the button is turned to release the radius-bar rack, this rack is lifted, placed in a different position relatively to its length, in contact with the pinion M, and again held down by the button. The distance which the sector-rack *n* has then to travel to be dogged by the stop *n'*, if lessened, results in correspondingly lessening the distance the compressor moves in yielding to the pressure of the grain upon it through or by way of the float, and obviously the shorter the distance traveled by the sector-rack the smaller the amount of grain required to be accumulated to

exert the pressure for moving the compressor-rack upward the distance requisite to give the pinion M the proper turning movement for actuating the toe on the rock-shaft by moving the sector-rack to its stop.

By my above-explained improvements I am enabled to deliver the grain to the receptacle in compact gavels, to throw the binding mechanism into gear by the pressure of the accumulated grain on the compressor, and to vary the sizes of bundles by regulating the movements of the compressor, and consequently varying the area of the space afforded for accumulation of grain, the advantages of which will be obvious to those skilled in the art.

The details of the driving-gearing, the knotting mechanism, the tripping apparatus, and the discharging devices are fully shown in my pending application above mentioned, and entitled "improvements in grain-binding mechanism," which application relates to improvements of earlier invention than those covered herein, and therefore I do not in this patent claim by themselves any of the improvements or novel features shown and described in my before-recited application, but limit my claims to devices or combinations of parts differing from those shown in my said application.

I claim as of my own invention—

1. The combination of the stationary binding-receptacle, the fixed way to which the grain is delivered from the platform and along which the grain is conducted and supplied directly to the receptacle without intermission in the supply until accumulated in quantity sufficient to form a gavel, the vertically-yielding pressure bar or frame overhanging the way and acting upon the grain as delivered to and moved along it, and the float independent of and overhanging the binding-receptacle, crossing from side to side thereof and bearing upon the grain with a yielding pressure as accumulated, confined, and compacted in the receptacle, substantially as and for the purpose hereinbefore set forth.

2. The combination, substantially as hereinbefore set forth, of the binder-arm, the binding-receptacle, the carrier, the way extending therefrom to the binding-receptacle, the vertically-yielding pressure bar or frame supported on the binder-arm shaft and overhanging the way, the packer, and the float crossing from side to side of the binding-receptacle, and to and beneath which the grain is presented by the packer as forced into the receptacle.

3. The combination of the carrier, the stationary slotted way, the slotted binding-receptacle, the packer working in the slots of the way and receptacle, the pressure bar or frame, and the float, substantially as and for the purpose hereinbefore set forth.

4. The combination of the rocking binder-arm, the compressor pivoted to rock on the binder-arm remote from its heel end or near its nose and actuated by the pressure of the grain as the gavel is accumulating, and clutch mechanism actuated by the movement of the compressor to start the binder-arm and co-operating binding mechanism into action when the grain to form a bundle has been accumulated, substantially as hereinbefore set forth.

5. The combination, substantially as herein set forth, of a grain-receptacle, a float, a binder-arm, a compressor pivoted to the binder-arm and actuated by the pressure upon the float caused by the inflowing grain, and clutch mechanism actuated by the compressor to throw the binding mechanism into action.

6. The combination, substantially as herein set forth, of the grain-receptacle, the packer, the float, the binder-arm, the compressor actuated by the float, and clutch mechanism actuated by the compressor.

7. The combination, substantially as herein set forth, of the binding-receptacle, the packer, the pressure bar or frame, the float, the binder-arm, the compressor actuated by the float, and clutch mechanism actuated by the compressor.

8. The combination, substantially as herein set forth, of the binding-receptacle, the packer, the endless apron, the pressure bar or frame, the float, the binder-arm, the compressor, and clutch mechanism actuated thereby.

9. The combination, substantially as herein set forth, of the binder-arm, the compressor pivoted thereto, the rack carried by the compressor, the pinion actuated thereby, and the sector-rack on the radius-bar of the shipping mechanism, which is thus actuated by the movement of the compressor.

10. The combination of the compressor pivoted to the binder-arm and yielding to the pressure of the grain as the gavel is accumulating, clutch mechanism actuated by the movement of the compressor to start the binder-arm and co-operating binding mechanism into action when the grain to form a bundle has been accumulated, and adjustable mechanism by which to regulate the range of movement of the compressor to vary the size of the gavels, substantially as hereinbefore set forth.

11. The combination of the receptacle, the binder-arm, the compressor pivoted to the binder-arm and yielding to the pressure of the grain, clutch mechanism actuated by the compressor to start the binding mechanism, and mechanism by the adjustment of which the range of movement of the compressor about its pivotal connection with the binder-arm may be varied to alter the size of the gavels, substantially as hereinbefore set forth.

12. The combination, substantially as hereinbefore set forth, of the binder-arm, the compressor pivoted thereto, clutch mechanism actuated by the movement of the compressor as it yields to the pressure of the grain, and a stop acting to dog the compressor against yielding movement when the clutch mechanism acts to start the binding mechanism.

13. The combination, substantially as herein set forth, of the compressor, the pinion actuated thereby, the sector-rack on the radius-bar, and the turning button, for the purpose described.

14. The combination, substantially as herein set forth, of the compressor, the pinion actuated thereby, the sector-rack on the radius-bar, the turning button, and a stop which limits the motion of the rack, for the purpose described.

In testimony whereof I have hereunto subscribed my name this 21st day of April, A. D. 1881.

JOHN S. DAVIS.

Witnesses:
WM. D. BALDWIN,
L. B. WIGHT.