(No Model.) 4 Sheets—Sheet 1.

L. MILLER.

GRAIN BINDING HARVESTER.

No. 480,113. Patented Aug. 2, 1892.

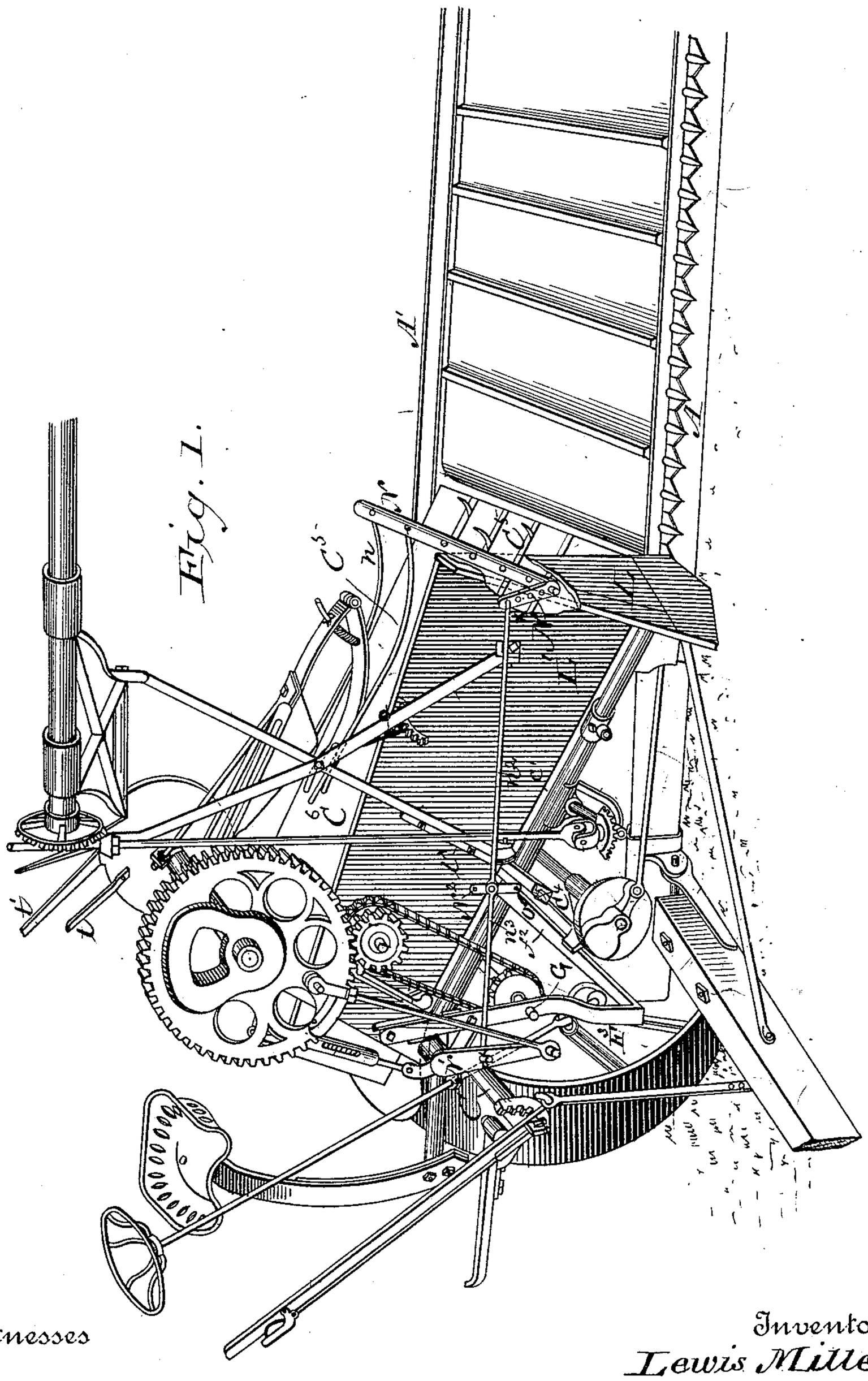

Fig. 1.

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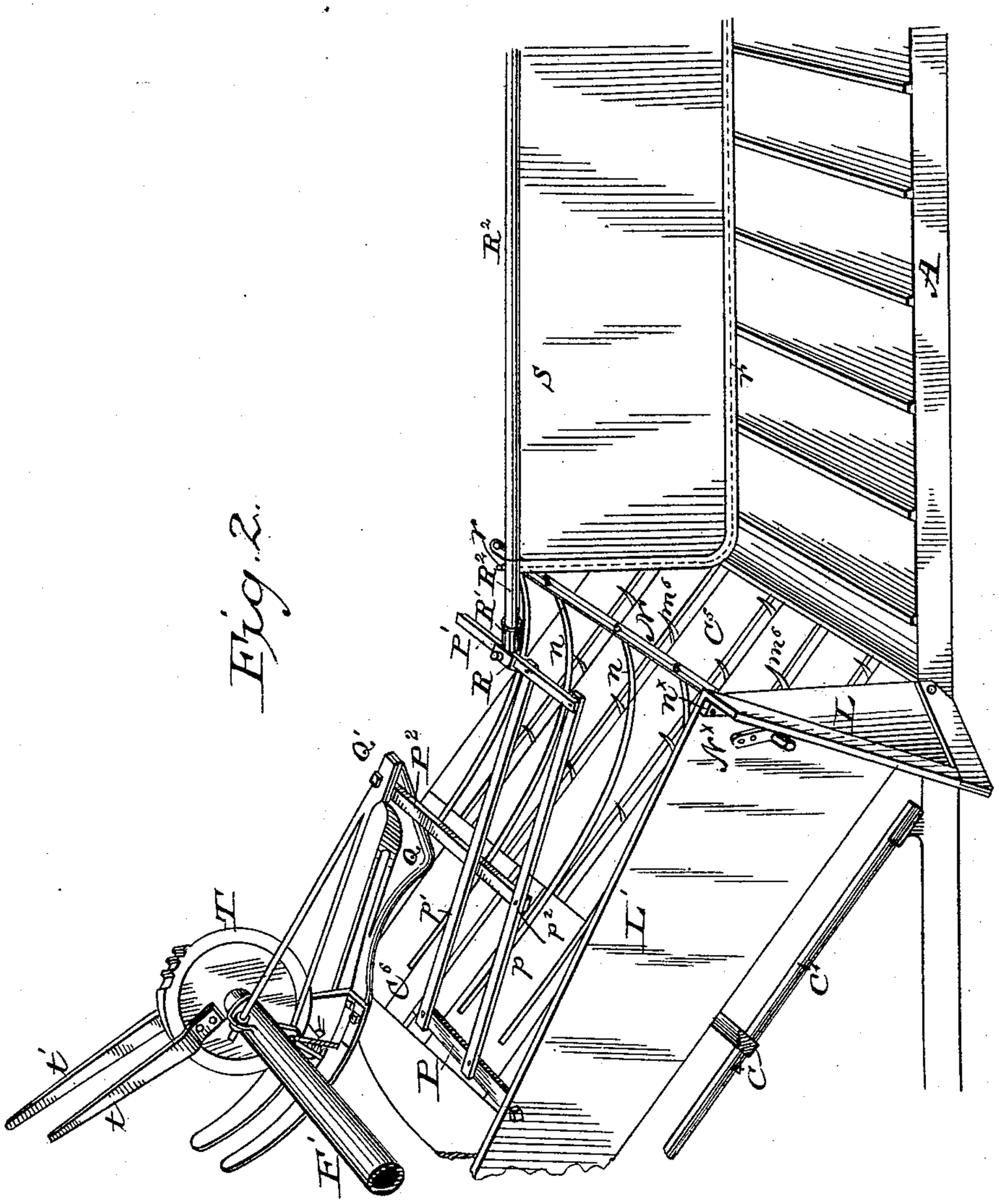
Fig. 2.



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GRAIN BINDING HARVESTER.

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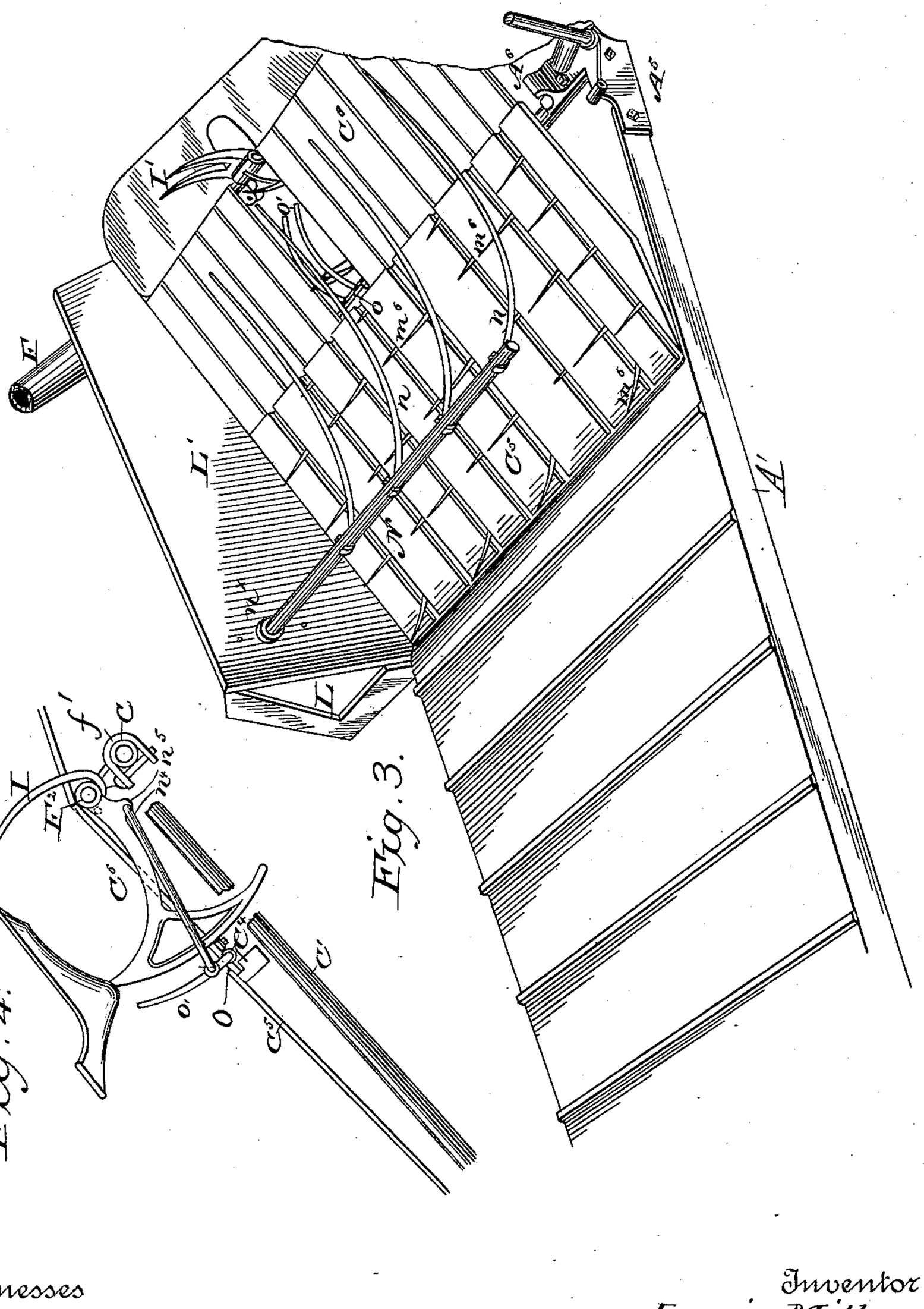

Fig. 3.

Fig. 4.

Witnesses

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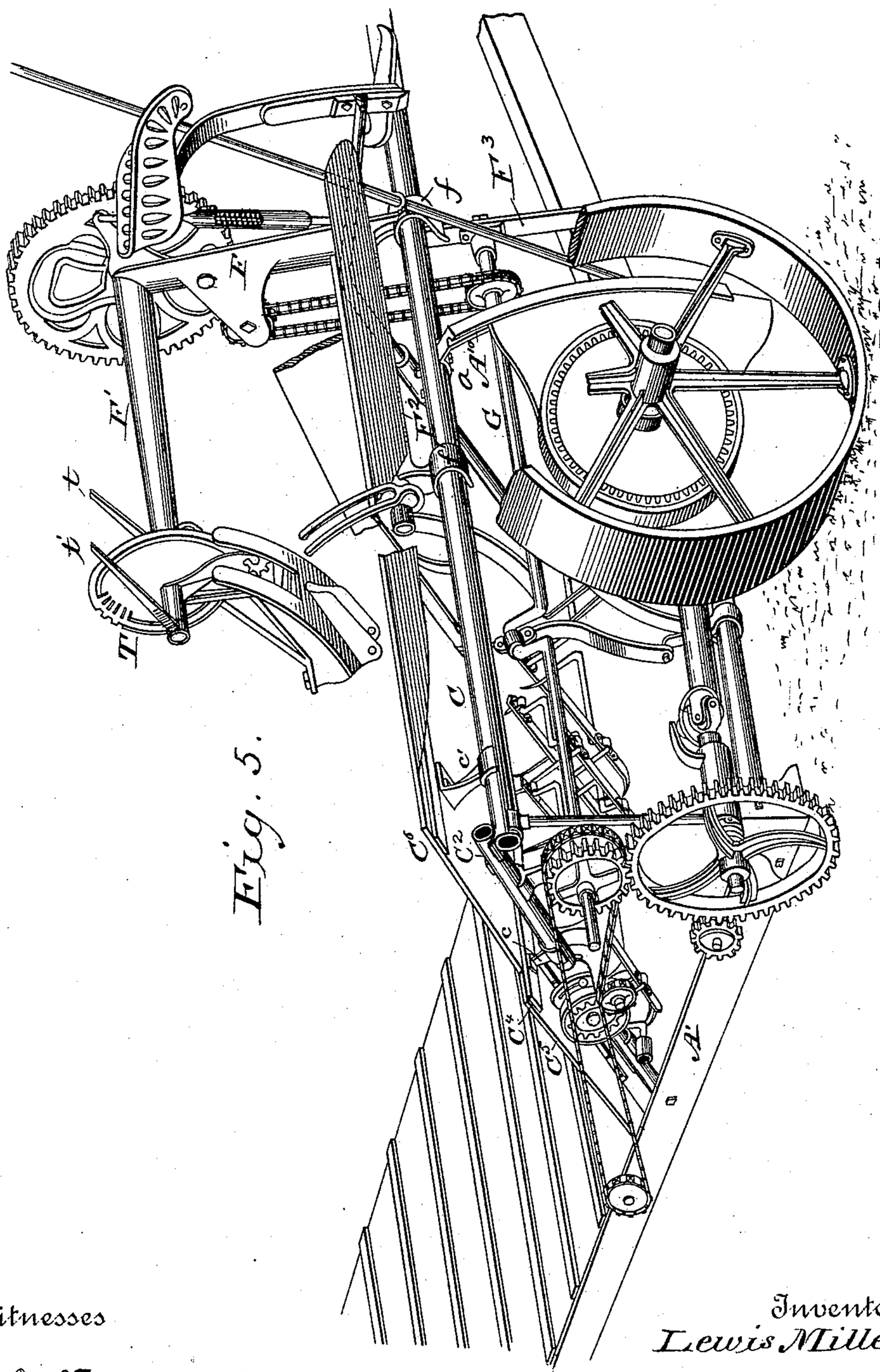

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 480,113, dated August 2, 1892.

Original application filed April 30, 1886, Serial No. 200,754. Divided and this application filed April 2, 1889. Serial No. 305,753.
(No model.) Patented in England December 22, 1888, No. 18,739.

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 invented certain new and useful Improvements in Grain-Binding Harvesters, (for which I have received Letters Patent in Great Britain, No. 18,739, dated December 22, 1888,) of which the following is a specification.

My invention, while applicable to grain-binders generally, relates more especially to what is known as the "low-down" grain-binder. Its object is so to reorganize the present grain-binding harvester as to secure a strong, simple, compact, and effective light-weight machine, which ends I attain by the novel organization of instrumentalities hereinafter described.

The subject-matter claimed is hereinafter specifically designated in the claims at the close of this specification.

The accompanying drawings represent so much of a low-down grain-binding harvester embodying all my present improvements as is necessary to illustrate the subject-matter herein claimed.

Except as hereinafter indicated the views are all perspectives.

Figure 1 represents the machine as seen from the front and grain side showing its general organization; Fig. 2, a view from the front and grain side showing the wind-board, binding-table, fender, float, and tying mechanism; Fig. 3, a view from the rear and grain side showing the binding-table, float, pickers, packers, cut-off, compressor, and cognate parts; Fig. 4, a detail view of the cut-off, binding-arm, and compressor. Fig. 5 is a view from the rear and stubble side of the machine with a portion of the driving-wheel broken away, showing the framework, gearing, and binding mechanism.

The subject-matter of this application relates mainly to the wind-board, the float, the binder-table, and cut-off, and other parts of the mechanism combined therewith. It is therefore deemed unnecessary to describe in detail the other parts of the binder, they being fully set forth in other divisions of this specification, respectively serially numbered and filed as follows, viz: 200,754, filed April 30, 1886; 304,945, filed March 27, 1889; 305,754, 305,755, and 305,756, respectively filed April 2, 1889.

The main or platform frame is shown as composed of parallel front and rear transverse frame bars or sills A A′ and longitudinal frame bars or tubes connected therewith at their points of intersection by corner-pieces, such as A^5. Upright standards on these corner-pieces support a longitudinal binder-frame bar or tube C, connected through suitable brackets with transverse inclined front and rear bars or tubes C′ C^2, connected at their lower ends with the corresponding transverse sills of the platform-frame, which latter frame, the uprights, and the bars C C′, &c., constitute a strong rigid frame which I call a "combined main and binder frame."

The longitudinal binder-frame bar above mentioned and the bar C′ extend beyond their point of intersection, their projecting ends being connected by an angular brace, the outer end of which supports a driver's seat and foot-board.

An inner divider L is secured to the front sill and to the lower end of a guide-board or fender L′, extending inward and upward along the forward edge of the elevating-table and secured to and supported by an angle iron or strap $l^{\times}$, secured to the bar C′ or to a fixed portion of the inclined elevating-table.

A longitudinal bar C^4, secured to the front and rear inclined transverse binder-frame tubes C′ C^2 about midway between the platform-carrier and outside longitudinal frame-tube C by suitable brackets or standards *c* or otherwise, supports the upper part of the fixed or lower portion C^5 of the inclined elevating-table, (see Fig. 5,) the lower side thereof being supported upon transverse sills A A′ in any suitable manner in position to receive the grain properly from the platform-carrier. The longitudinal supporting-bar C^4 extends above or beyond the upper edge of the fixed part C^5 of the table, or it may be rabbeted, as shown in Fig. 1, to form a projecting ledge, on which the lower edge of the upper or longitudinally-adjustable portion C^6 of the inclined elevating-table rests and slides. The

upper edge of this portion C^6 of the binder-table rests upon and is secured to suitable flanges on the brackets *f f'*, or on the lower arm F^2 of the binder-gear standard in such manner as to be adjustable longitudinally with said standard. It may be further supported at its rear end by one or more pendent feet *c'*, adapted to rest and slide on the bar C, Fig. 5. By this construction and arrangement the upper portion of the inclined elevating-table, through slots in which the needle and packers move, is adapted to move with said parts as they are moved backward and forward and is thereby held in proper working relation thereto. I thus secure a horizontally and intermediately divided sectional or two-part binder-table, the lower section being fixed close to the platform apron or carrier, while the upper one is adjustable or movable with its co-operating mechanism.

The binder-gear standard or frame consists of an upright tubular portion or standard F, having tubular arms or sleeves $F' F^2$, projecting rearwardly and transversely therefrom, giving it the usual U form, with one of the transverse arms constituting the base. U-shaped pendent brackets or clasps on the lower arm F^2 clamp and slide upon the longitudinal binder-frame tube C to render the binder-gear standard adjustable backward and forward thereon. This bar C, it will be observed, projects in advance of its supporting-socket *a* in the standard A^{10}, and the front bracket of the binder-gear standard slides upon this extended portion. The lower sleeve F^2 of the binder-gear standard or frame is provided with suitable bearings for the needle-shaft and the upper sleeve with bearings for the knotter-actuating shaft, or vice versa, one being above and the other below the binder-table and the path of the grain.

The upper end of the upright part of a pendent bent arm or angular bar F^3 is secured to the binder-gear standard or the front bracket thereof. The front part of the lower horizontally-bent portion f^2 of said arm F^3 slides in a groove in the front corner-piece, while its rear end carries a pendent loop or bracket embracing and sliding on the inner longitudinal frame-tube. This bent arm thus serves to uphold and brace the binder-gear standard and connected parts, either while working or while partaking of their adjustments, and also carries the pivots of the packer-links.

The packer-shaft G, which also constitutes the first or main driving-shaft of the binder mechanism, is shown in Fig. 1 as supported at its forward end in a bearing in the upright part of the bent arm F^3. Collars on this shaft in front and rear of this arm, while leaving the shaft free to turn, cause it to move backward and forward with the arm as the binder-gear standard is adjusted.

Packers of a well-known oscillating kind work up through slots in the upper part of the elevating-table. Pickers m^6 in like manner work up through slots in the lower portion of the binding-table. The binding and compressing mechanisms are similar to those shown in the other divisions of this application hereinbefore referred to.

The fender or guide-board L' has secured to it near its lower or outer end and upper edge a bracket having a suitable bearing $n^\times$ for a longitudinal rock-shaft N, Figs. 2 and 3, provided with a series of curved elastic fingers *n*, which constitute a float and overlie the inclined table and serve to hold the grain down thereon with a yielding pressure. The forward end of this shaft N has a crank-arm $N^\times$ fast upon it, having a series of perforations at different distances from the shaft, through any one of which it may have connected with it a rod connecting it with the crank-arm N' on the forward end of the needle-shaft.

The connecting-rod is shown in Fig. 1 as divided into two parts $n^2 n^3$, the adjacent ends of which are pivoted to a crank-arm N^2, formed on the forward end of a rock-shaft O, Fig. 1, carrying cut-off fingers *o' o'*, which as the crank N' is vibrated to raise the needle are thrown upward through a slot or opening in the table from the inclined position shown in Fig. 3 to the upright position shown in Fig. 4, in which they serve to guard the needle and protect it from the grain in a manner that will be readily understood. The same movement of the needle crank-arm which raises the cut-off *o'* also serves through the pitman n^2 to rock the yielding float-fingers *n* upward, and thereby to provide more space underneath them for the accumulation of the grain, while its upward flow or movement is stopped by the cut-off. When the arm N' is vibrated to depress the needle, the cut-off *o'* will be depressed out of the path of the grain, and simultaneously therewith the float-fingers *n* will be lowered and caused to depress upon and thereby to insure the proper and steady upward movement of the grain. By adjusting the rod n^2 in or out upon the arm $N^\times$ the throw of the float-fingers *n* can be regulated at will, and the throw of the cut-off fingers *o'* may be similarly regulated by the adjusting-rod n^2 upon the crank-arm N^2, provision for such adjustment being made as indicated. If preferred, however, the cut-off fingers *o'* may be connected by a link or rod n^4 with a pendent ear n^5 on the lower side of the needle near its shaft, as shown in Fig. 4, so as to be operated from the needle itself. In this case the rod n^2 can extend to and connect directly with the arm N' and need not be divided.

The shaft O may be supported in any suitable manner from the binder-gear standard or movable part C^6 of the binder-table, so as to be adjustable therewith. The fender or grain-guide L' also has a rearwardly-projecting longitudinal bracket P, Fig. 2, rigidly secured to it near its upper end, said bar overhanging the inclined elevating-table and the

grain moving upward thereon, and to this arm or bar P the inner ends of two parallel bars or links p p' are pivoted. Said bars p p' extend outward toward the platform-carrier and have their outer ends pivoted to a longitudinal bar P'. At a point at or near midway the bars P and P' is a longitudinal supporting-arm P^2, upon which the links p p' rest, which bar P^2 is connected at its rear end to and upheld from the outer end of the breast-plate binder-head or knotter-shield Q or its support Q', as shown in Fig. 2. The longitudinal bar P' nearest the platform projects in rear of its supporting link or bar p' and has a sleeve R, square or polygonal in form, corresponding to the form of the bar P' in cross-section, mounted on and adapted to be adjusted longitudinally upon its projecting end, and to be held at any desired adjustment by a set-screw or other suitable device. This sleeve is provided on its outer side with a socket R', in which is secured a rod or bar R^2, which projects horizontally and transversely over the rear side of the platform-carrier, Fig. 7. The rod or bar R' is perforated to receive or has otherwise secured to it the upper ends of the arms of a pendent U-shaped loop of wire or light rod r, which, in connection with the rod R^2, serves as a frame on which is stretched a canvas S, forming a light but effective wind-guard, protecting the grain and preventing its being blown off from the platform-carrier. The sleeve R permits the adjustment back and forth of this guard for giving it the proper relation to the grain on the platform, and by having one of the links p p' pivoted at p^2 to the supporting-arm P^2, which moves with the binder-gear standard and mechanism, it will be seen that when the latter are adjusted to proper position to apply the band at or near the center of the length of the straw the wind-guard will be moved through the action of its parallel links in the same direction, but double the distance that the binder-gear standard and mechanism are moved, for the purpose explained, thereby moving the wind-guard to accommodate the full length of the straw to be operated upon. The wind-board support overhangs or overlies the float, and the grain of course passes up under it on its way to the binder. The wind-board is readily adjustable on this support, which, it will be observed, is entirely above as well as some distance laterally from it, entirely out of the way of entanglement with the grain, either on the platform or binder-table.

The wind-board, it will be seen, is directly connected with its supporting-bars or pivoted links and is adjustable bodily to and fro at this point of connection—that is to say, when the binder-head or breast-plate is adjusted backward and forward to suit varying lengths of the grain the wind-board, besides the movement due to simply rocking horizontally on its pivots, is moved bodily to and fro.

The usual cam gear-wheel T is shown on the knotter-actuating shaft, near its rear end, as provided with an arm t, which assists in the discharge of the bundles. A second arm t is secured to the rear end of the knotter-actuating shaft, arranged in the same place with the arm t and rotating with the shaft. It is made longer than the arm t and is arranged in close proximity to the path in which the needle and cut-off work and the end is adapted to enter the space between said cut-off and needle, and, while the cut-off is still holding back the incoming grain, removes the bundle in connection with the arm t, and thus completes the separation between the bundle and the loose grain. The compressor I is mounted on a rock-shaft constituting a part of the trip mechanism and cooperates with the discharge-arms by getting out of the way at the proper moment to allow the grain to pass over them.

The operating of the mechanism will readily be comprehended from the foregoing description.

I am aware that a wind-board heretofore has been pivoted so as to rock horizontally and radially on a supporting-bracket fixed on a longitudinal supporting-bar constituting a part of the main frame and overhanging the grain-passage at the inner end of the platform, the wind-board-supporting arm being connected with a rigid arm constituting a part of the binder-frame and capable of sliding longitudinally on the bar supporting the wind-board bracket by a link pivoted at one end to this rigid arm and at an intermediate point to the wind-board-supporting arm. In this case, however, the bracket fixed on the longitudinal frame-bar constituted the sole support of the wind-board, which derived no support from the breast-plate. While, therefore, I do not broadly claim a wind-board adjustable with the binder-gear standard or breast-plate, I am, so far as I am aware, the first to mount the wind-board upon supports connected directly with the breast-plate, so as to be adjustable bodily to and fro therewith, whereby I am enabled to dispense with the bracket and supporting-bar hereinbefore mentioned, not only simplifying the mechanism and leaving the rear end of the grain-passage unobstructed, but also to provide room for other mechanism—such, for instance, as the float herein shown, which otherwise could not be employed. I am also enabled by my organization to arrange the wind-board supports in front of the breast-plate, and thus secure a compact, convenient, and light connection of the parts.

Having thus fully described the construction, organization, and operation of my improved low-down grain-binding harvester, what I claim herein as new and of my invention, is—

1. The combination, substantially as hereinbefore set forth, of a fender or guide-board, a bar secured thereto, parallel links pivoted thereon and extending toward the grain-plat-

form, a cross-bar pivoted on the opposite ends of these links, a wind-board supported on this bar, an adjustable breast-plate, binder-head, or knotter-shield, and an intermediate bar supported on the binder-head and pivoted to one of the links, whereby the adjustment of the binder-head imparts a greater range of adjustment to the wind-board.

2. The combination, substantially as hereinbefore set forth, of a platform-carrier, an inclined slotted elevating binder-table, pickers or gatherers working therethrough, a breast-plate, a wind-board, and flexible supporting connections interposed between the breast-plate and wind-board and overhanging the pickers and elevator.

3. The combination, substantially as hereinbefore set forth, of the fender or guide-board, the rearwardly-projecting rock-shaft mounted therein, and the elastic floating fingers carried thereby, under which the grain passes on its way to the binder.

4. The combination, substantially as hereinbefore set forth, of an intermediately horizontally divided sectional elevating binder-table, a rock-shaft overhanging the fixed section, and elastic floating fingers carried thereby, overlying both sections of the table.

5. The combination, substantially as hereinbefore set forth, of the fender, the rock-shaft of the float, turning in bearings therein, the crank-arm actuating the binder-shaft, and the connecting-rod uniting them.

6. The combination, substantially as hereinbefore set forth, of the binder-arm crank, the rock-shaft of the float, the divided connecting-rod uniting them, the intermediate crank-arm therein, and the rock-shaft carrying the cut-off fingers actuated by said crank-arm.

7. The combination, substantially as hereinbefore set forth, of the binder-frame, the slotted lower fixed portion or section of the horizontally intermediately divided binder-table, its upper movable portion, the rock-shaft journaled therein, and the cut-off fingers carried by said shaft, over which fingers the grain passes.

8. The combination, substantially as hereinbefore set forth, of a binder-frame, a binder-gear standard adjustable therein, a slotted horizontally-divided sectional binder-table, the upper portion of which is adjustable with the binder-gear standard, a rock-shaft journaled in said upper portion, cut-off fingers on said shaft, a vibrating binder arm or needle, and a link directly connecting the binder-arm and cut-off to vibrate them in unison.

9. The combination, substantially as hereinbefore set forth, of a carrier-platform, a slotted divided binder-table, pickers gathering and elevating the grain, elastic floating fingers pressing upon the grain in its upward passage, cut-off fingers temporarily arresting the flow of the grain, packers consolidating the grain while thus arrested, and a binder-arm encircling the bundle with band material at the proper moment.

In testimony whereof I have hereunto subscribed my name.

LEWIS MILLER.

Witnesses:
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