(No Model.) 3 Sheets—Sheet 1.

L. MILLER.

GRAIN BINDING HARVESTER.

No. 470,250. Patented Mar. 8, 1892.

Fig. 5

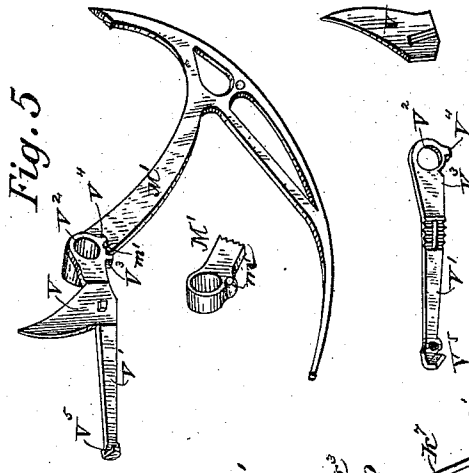

Fig. 1

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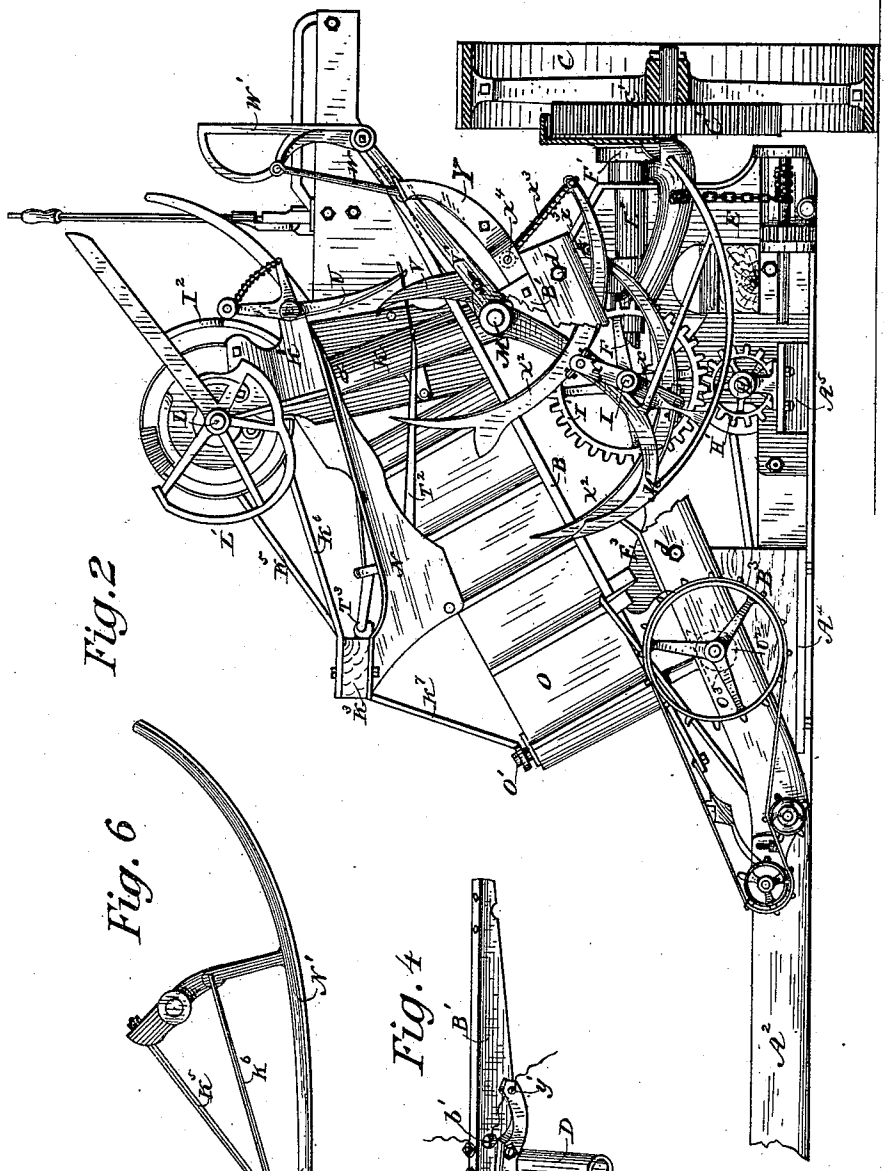

Fig. 2

Fig. 6

Fig. 4

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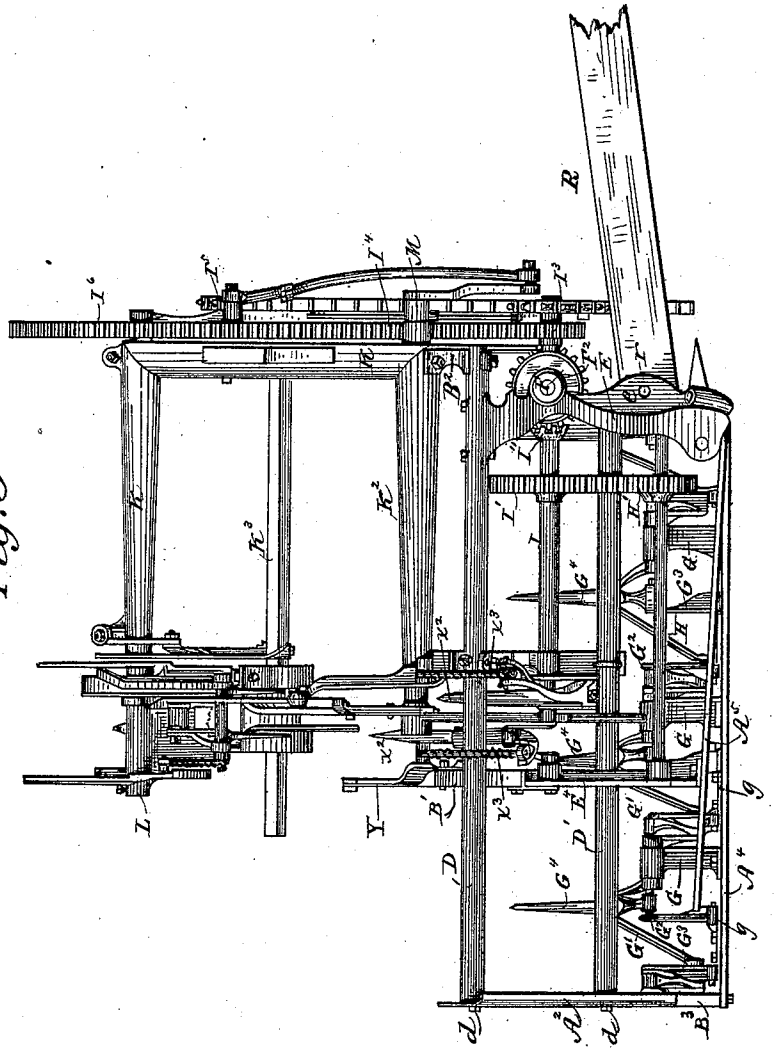
GRAIN BINDING HARVESTER.

No. 470,250. Patented Mar. 8, 1892.

Fig. 3



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UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

GRAIN-BINDING HARVESTER.

SPECIFICATION forming part of Letters Patent No. 470,250, dated March 8, 1892.

Application filed November 24, 1884. Serial No. 148,753. (No model.)

To all whom it may concern:

Be it known that I, LEWIS MILLER, of Akron, county of Summit, and State of Ohio, have invented a new and useful Improvement in Grain-Binding Harvesters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to that class of grain-binding harvesters wherein the grain is bound upon an inclined elevating-table interposed between the platform-carrier and the path of the driving-wheel, and more particularly to means for driving the picker-shaft and reel from the packer-shaft without obstruction from the hinged tongue connections; to the arrangement of the upper and lower compressors in connection with the inclined binder-table, needle, and needle and knotter shafts; to the means for tripping or stopping and starting the binder mechanism and controlling the size of the bundles; to the manner of combining the bundle-ejector with the compressor-arm, and to a novel construction and arrangement of arm or bracket for supporting the overhanging side of the binder-table and the packer-links and for guiding the twine to the needle, all as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front elevation of so much of a harvesting-machine as is necessary to show my improvements; Fig. 2, a rear elevation of the same; Fig. 3, a side elevation of the driving-wheel, tongue, and so much of the framing as is necessary to show the means for effecting the adjustment of the frame upon the driving-wheel; Fig. 4, a perspective view in detail of the bracket for supporting the overhung end of the binder-table; Fig. 5, a perspective view of the needle and compressor in detail and in combination with each other, and Fig. 6 a detail view of the presser-arms and brace-rods secured to the longitudinal bar overhanging the foot of the binder-table.

The machine represented in the drawings is of that class in which the grain is bound on an inclined elevating-table located at the inner side of the platform-carrier and receiving the grain directly therefrom.

The platform A and main binder-table B are supported upon a forward sill A′, which may be the finger-bar, and extends entirely across the front of the machine from the grain to the stubble side thereof, and a rear sill A^2, made, preferably, of metal and bent upward at its inner end to serve as the rear transverse sill of the inclined binder-frame. The binder-table is, furthermore, formed of longitudinal bars D D′, secured at their rear ends by bolts *d d* to the upturned portion of the rear sill A^2. The upper bar D is supported at its forward end by a chair E, made of cast-iron and provided with a sleeve E′, which forms a bearing for the binder-gear secondary shaft F, and the lower tubular bar D′ is supported at its forward end by a similar chair E^2, provided with a bearing for the forward end of a picker-shaft G^2, arranged beneath and at the foot of the inclined binder-table and supported in bearings at its inner end formed in the upturned end of the rear sill A^2.

The forward end of the binder-table is supported immediately upon a transverse bar B^2 of cast-iron, formed into the required shape to provide bearings for attachment to the forward ends of the longitudinal bars D D′, and the rear end of the binder-table is supported upon chairs E^3, secured to the upturned end of the rear sill A^2, by which means the binder-table is held a sufficient distance above the sills to provide room for the arrangement and movement of the binder shafts and mechanism operating from beneath the table.

B′ is an intermediate transverse bar lying in a plane parallel with and corresponding to the supports A^2 and B^2. Said part B′ rests upon the tubular frame-bars D D′ and serves as an additional support for the inclined binder-table. A filling-piece B^3, of wood or cast metal, secured to the under side of said rear sill near its elbow, will provide means for supporting the rear end of the longitudinal metal plate A^4, which extends beneath the foot of the inclined binder-table and is secured at its forward end to the sill A′. The plate A^4 serves as a support for the brackets G, which form the bearings between the crank-arms G′ of the picker-shaft G^2 and also as a support for the bearing-blocks *g g*, to which the lower ends of said links G^3 are pivoted, the upper ends of said links being connected in a well-known manner to the heel ends of the pickers G^4. A longitudinal metal

plate A^5 is secured at its forward end to the forward sill A′ and forms a brace for the foot of a bracket E^4, suspended from the intermediate transverse bar B′ of the binder-frame, said plate A^5 extending beyond said bracket a sufficient distance to form a support for the spool-box. The bracket E^4 is formed with arms for the support of the rear ends of the cutter-actuating shaft H and the shaft I, the latter forming the main binder-gear shaft and serving to drive the shaft H by spur-gears H′ I′, secured, respectively, to said shafts.

Motion is imparted to the various operative parts of the machine from the main drive-wheel in the present instance through the medium of a spur-gear or rim C′, fast on the drive-wheel C and meshing with a pinion F′ on the counter-shaft F, supported in bearings in the chair E, as above described, and provided with a bevel wheel or pinion F^2, engaging and driving a bevel-wheel I″ on the main binder-gear shaft I, from which motion is communicated to the various operating parts of the machine to the binding and packing mechanisms in a manner and under an arrangement similar to that described in Letters Patent No. 276,448, granted to me April 24, 1883, the shaft I being also the crank-shaft to which the elliptically-moving packers operating from beneath the slotted binding-table B are attached.

The binder-gear standard K is securely bolted to the forward transverse bar B′ and is provided with longitudinal tubular arms K′ K^2, arranged, respectively, above and below the binder-table to support the knotter-actuating shaft L and needle-shaft M. A longitudinal bar K^3 is supported in a horizontal position above the foot of the binder-table by a strut K^4, bolted to the transverse bar B′ and to the binder-gear standard by angular brace-rods K^5 K^6, bolted to lugs projecting from the overhung arm K′, supporting the knotter-actuating shaft. The bar K^3 serves to support a breast-plate N and arms N′, which overhang the binder-table and serve to hold the grain down upon the table. The bar K^3 also supports the lower end of the butter O by means of a hanger K^7, in which the upper end of the butter-roller O′ is journaled. The lower end of said butter-roller is geared to the picker-shaft by beveled wheels O^2 O^3 and is operated thereby. The bar K^3 furthermore serves to support the inner end of the reel-shaft P and the gearing for actuating said shaft, which consists of beveled gear-wheels P′ P^2 and a sprocket-wheel P^3, secured to the shaft of the beveled wheel P^2 and driven by a belt Q. The belt Q passes around a sprocket-wheel I^2 on the forward end of the main binder-gear shaft I, by which it is driven, thence over an idler sprocket-pinion Q′ and beneath the sprocket-wheel G^5 on the forward end of the picker-shaft, then over the sprocket-wheel P^3 for operating the reel, as above described, and back to the driving sprocket-wheel I^2. The idler sprocket-pinion Q′ is supported upon a bracket adjustably secured to the transverse bar B^2 of the binder-frame and serves to carry the belt Q upward a sufficient distance to pass the hinged brace connection between the tongue and the frame of the machine. The rear end of the tongue R is fitted in a socket between lugs *e e* in the cast-iron chair E and is pivotally connected thereto by a bolt *r*, and an iron link R′, jointed to staple on the tongue, extends diagonally across and is jointed to a lug *e′* on the chair E^2, arranged approximately in line with the pivotal bolt *r*, by which means the height of the finger-bar may be adjusted without affecting the working position of the tongue. It will be readily seen that the belt Q will be so arranged as to operate both the reel and picker shafts in their positions relative to each other, above described, without obstruction from either the hinged connections of the frame or of the pitman and crank for actuating the cutter-bar, and, furthermore, that the idler sprocket-wheel may be adjusted to take up the slack of the belt Q when required.

The tripping mechanism employed in connection with my present improvements for controlling and operating said mechanism is of the type used upon the Appleby machine, and consists generally in a train of gear-wheels I^3 I^4 I^5 I^6, connecting the packer and knotter-actuating shafts. The gear-wheel I^3 is loosely journaled upon the end of the main binder-gear shaft I and is adapted to be engaged or be locked therewith by means of a dog *i′*, pivoted to the forward face of the said gear-wheel I^3 and adapted, when not rocked in toward shaft I by means hereinafter described, to engage a spur i^2 on a cross-head rigidly secured to the shaft I directly in front of the gear I^3 for causing the latter to be rotated with the shaft I in a manner well known. When coupled to and rotated with the shaft I, the gear I^3 serves, through intermediate gears I^4 I^5, to drive a gear I^6, fast on the knotter-actuating shaft L, and thence through suitable crank-wrist, crank, and connecting-rod the vibrating needle-shaft M. A bell-crank-shaped arm or bar T is supported at its lower end to slide vertically in a guide-bracket *t* in such manner that the said lower end of the bar will form a stop or abutment *t′* to intercept the dog *i′* of the clutch mechanism when the bar T is thrust downward and will be withdrawn from contact with said dog *i′* when the bar T is in its raised position. The arm T′ projects from the bar T and rests upon a cam *m* upon the forward end of the needle-shaft M, by which means the stop *t′* on the bar T is raised out of the path of the dog *i′* until the needle-shaft is returned to its former position of rest and the operative movement of the binder mechanism is completed. The bar T is ordinarily actuated by a rod or arm T^2, connected to a rock-shaft T^3, supported in bearings upon the bar K^3 of the binder-frame. The bar T^2 is arranged to lie

over the grain upon the binder-table and be lifted by the accumulation of said grain beneath it, and as the bar T is connected to the rock-shaft T^3 it serves to trip or release the binder mechanism automatically when a sufficient quantity of grain has been packed beneath the arm T^2 to form a bundle. A foot-lever T^4, pivoted to an extension of the gear-standard or to the foot-board B of the machine within convenient reach of the driver from his seat, is connected by a link t^2 with the end of the arm T′, by which means the bar T may be lifted at any desired time to set the binding mechanism in motion, or the bar T may be held up and the binder mechanism thereby kept in continuous operation. The end of the link t^2 is either looped or slotted to permit the arm T′ to be lifted independently of the foot-lever by the instrumentalities operated upon by the grain on the binder-table, above described. An overhung upper compressor U is pivoted to a bracket K^8, depending from the sleeve K′ of the knotter-actuating shaft, and is operated upon by a cam-plate L′, secured to and revolving with the said knotter-actuating shaft to give the final pressure to the bundle as it is being bound in a well-known manner. A supplemental compressor or abutment-plate V is adjustably secured upon an arm V′, loosely journaled upon the end of the needle-shaft M, and the hub or rim V^2 of said arm is formed with lugs V^3 V^4, which engage with a lug m', projecting from the hub of the needle M′, which serves to lift the arm V′ and compressor V when the needle is depressed beneath the table and the grain is being elevated thereon by the packers and to allow the compressor V to drop beneath the table while the bundle is being bound and ejected. The abutment V acts in conjunction with the compressor U to prevent the grain from being packed up beneath and past the upper or overhung compressor U by the packers while the needle is depressed. When the needle is raised, it serves as a cut-off to the packing action of the grain, and the service of the abutment is no longer required during the remainder of the operation of binding the bundle. The abutment-plate V is serrated upon one of its sides or edges to fit or engage with corresponding serrations upon the arm V′, and is adjustably secured thereon in any well-known or preferred manner. By adjusting the abutment-plate V upon the arm either toward or away from the needle-shaft the space within which the grain is compressed is either contracted or expanded to the required degree to form bundles of any desired size. Either the plate or the arm may be slotted, or both may be formed with slots arranged transversely to each other to admit of the adjustment of the plate to regulate its distance from the center of the needle-shaft. The vibrating end of the arm V′ is pivoted to one end of a link W, the other end of which is similarly connected to an ejector-arm W′, by which means the ejector-arm, which is pivoted to the outer end of the binder-table, is swung up to a vertical position to effect the discharge of the bundle from the machine simultaneously with the return of the needle to its depressed or normal position. A laterally-projecting lip or lug V^5 is formed upon the end of the arm V beyond its pivotal connection with the link W, which projection serves to limit the movement of the link W and stiffen the joint between the link and the ejector-arm when said arm shall have reached the end of its required movement.

The main binder-gear shaft I is provided at its rear end with crank-arms x x, to which the packers x^2 x^2 are connected and operated in a well-known manner. The heel ends of the packer-arms are suspended by links x^3 x^3 from a pin x^4, secured to a bracket Y, bolted firmly to the intermediate transverse bar B′. The bracket Y projects outwardly and forms a support for the projecting end of the binder-table and extends at its opposite end across the tubular bar D and is formed with an eye y', through which the thread passes from the spool-box, and is guided to an eye b' in the bar B′, arranged directly beneath the needle-shaft, from whence it passes through the channels and the eye of needle to the cord-holder.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, with the main frame, of the inclined binder-frame arranged between the grain-platform and the driving-wheel, the tongue, the hinged diagonal brace connecting the tongue and frame, the packer-shaft, the picker-shaft, the reel-actuating shaft, the sprocket-wheels secured to said shafts, an adjustable idler sprocket-wheel arranged between and above the picker and packer shafts, and the driving-belt arranged to pass over and around said sprocket-wheels to clear the hinged tongue connections, substantially as described.

2. The combination, with the inclined binder-table interposed between the platform-carrier and the path of the driving-wheel, of the needle arranged to vibrate from beneath said table, an adjustable compressor on a compressor-arm journaled on the needle-shaft and actuated therefrom, and the overhung compressor actuated from the knotter-shaft and operating in connection with said lower compressor, substantially as described.

3. The combination, with the needle-shaft, of the arm V′, journaled to vibrate upon said shaft, a compressor-finger adjustably secured to said arm for regulating the size of the bundle, the sliding angular bar provided with the spur for holding and releasing the binder mechanism, and the pendent overhung arm or lever connected with and operating said mechanism, substantially as described.

4. The combination, with the needle-shaft, of the compressor-arm journaled to be actuated by and vibrating upon said shaft, a

link pivoted to the end of the arm, the ejector-arm, also pivotally connected to the link and actuated by the compressor-arm, and means, substantially as described, for limiting the throw of said ejector-arm, substantially as described.

5. The combination, with the main frame, of the longitudinal bars, an intermediate transverse bar B′, and the bracket Y, which forms a support for the binder-table and for the suspension-links of the elliptically-moving packers, the said bracket being provided with a heel-extension formed with a twine-guide, substantially as and for the purpose described.

In testimony whereof I hereunto set my hand this 19th day of November, A. D. 1884.

LEWIS MILLER.

Witnesses:
O. L. SADLER,
CHAS. W. CRANKSHAW.