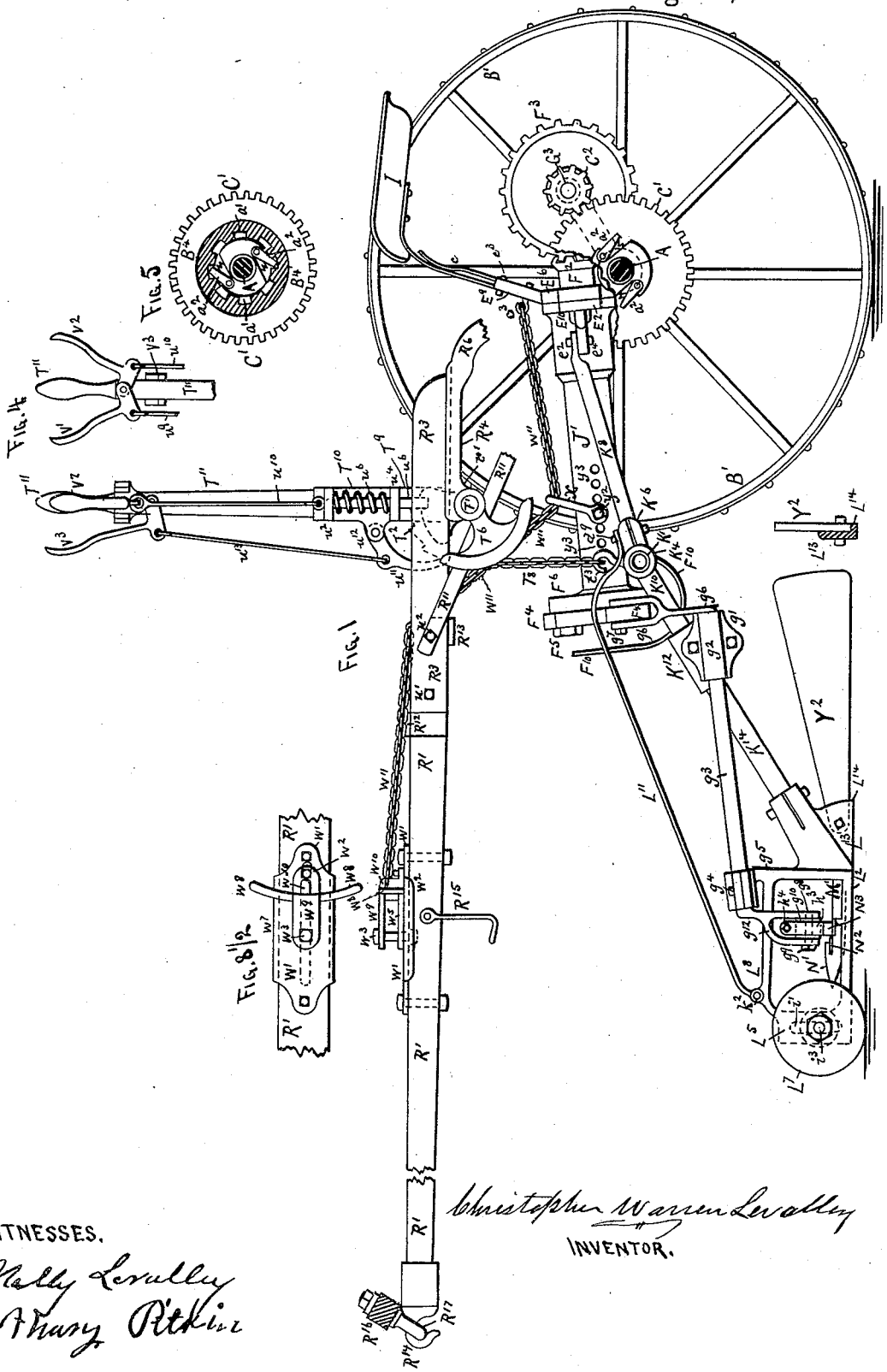
(No Model.) 4 Sheets—Sheet 1.

C. W. LEVALLEY.

MOWING MACHINE.

No. 263,291. Patented Aug. 22, 1882.



WITNESSES.

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(No Model.) 4 Sheets—Sheet 2.

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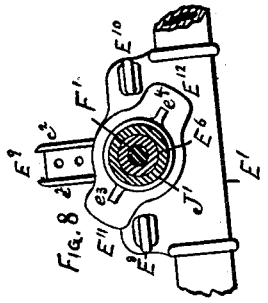

Fig. 8

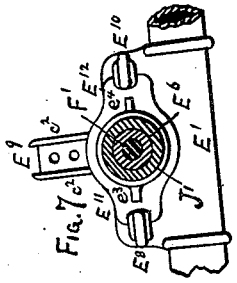

Fig. 7

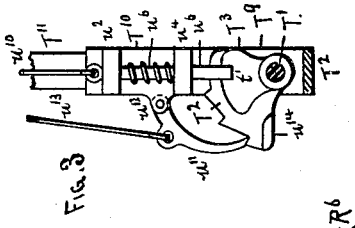

Fig. 3

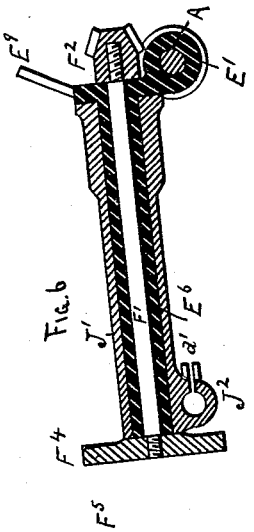

Fig. 6

Fig. 2

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MOWING MACHINE.

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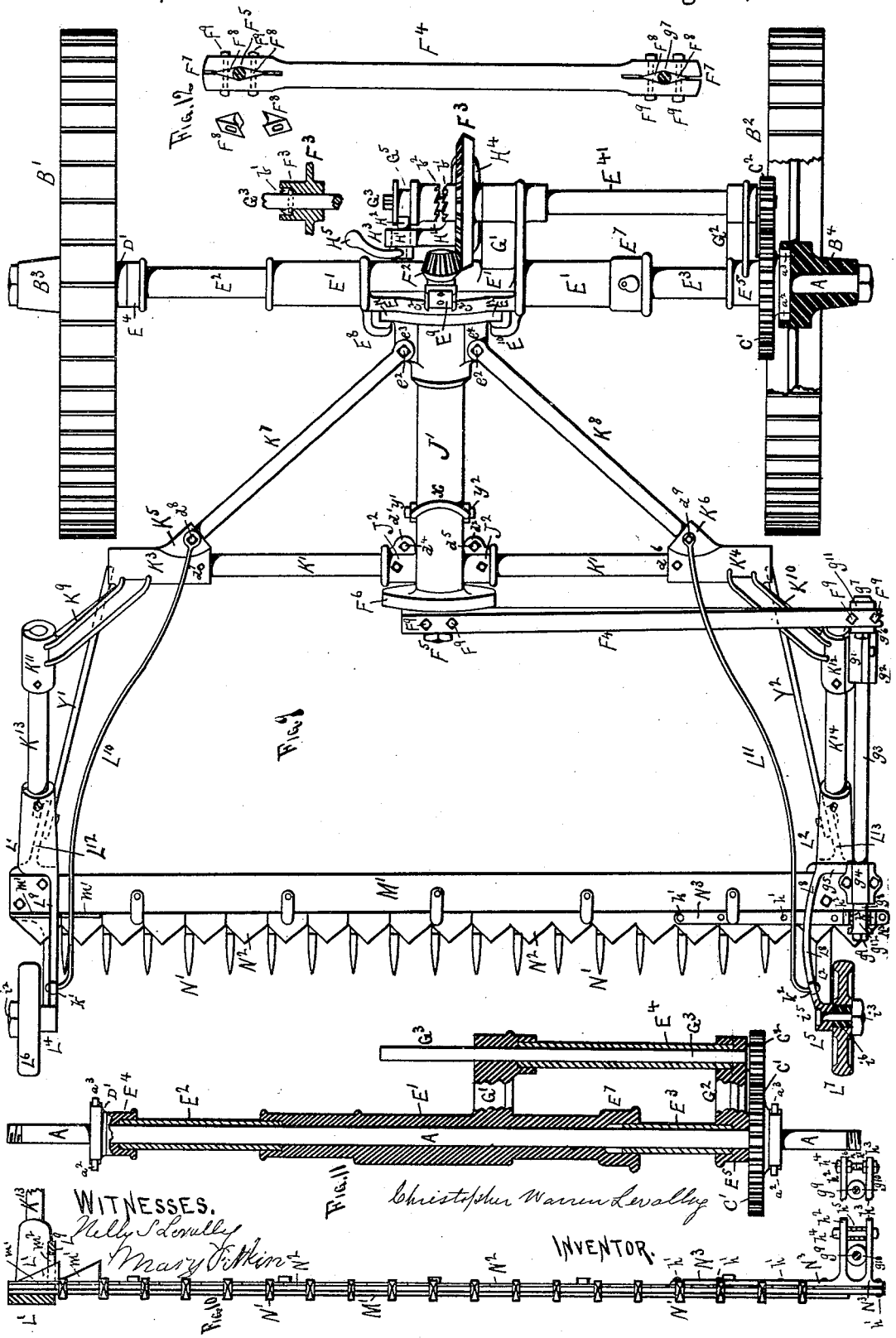

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(No Model.) 4 Sheets—Sheet 4.

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MOWING MACHINE.

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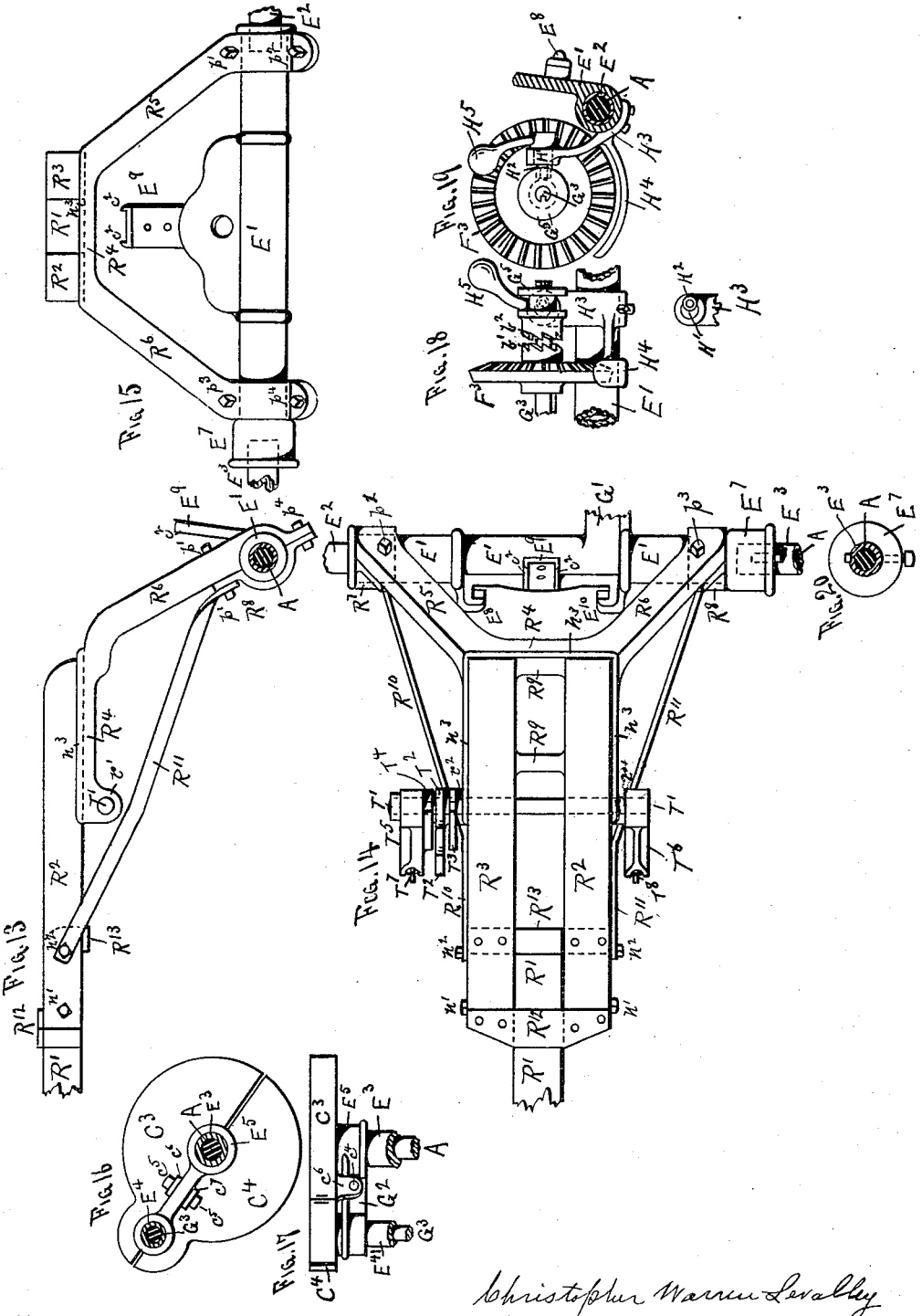

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Mary Pitkin

Christopher Warren Levalley
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UNITED STATES PATENT OFFICE.

CHRISTOPHER W. LEVALLEY, OF ST. PAUL, MINNESOTA.

MOWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 263,291, dated August 22, 1882.

Application filed January 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER W. LEVALLEY, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have made certain new and useful Improvements in Mowing-Machines, of which the following is a specification.

This invention relates to mowing-machines for grass or grain; and it consists in the arrangement, in connection with a centrally-pivoted cutter-bar frame, of a draft-chain, whereby a lifting force is exerted upon the cutter-bar and its attached parts at the same time that the machine is drawn ahead, as hereinafter shown.

The invention also consists in the construction and arrangement of the several parts of the machine, whereby they are strengthened and made adjustable to render the machine more easy of operation and without adding to its weight, as hereinafter shown. I attain these objects by the use of the mechanism illustrated by the accompanying drawings, in which—

Figure 1 is a side view, partially in section, of a mowing-machine having my improvements attached thereto. Fig. 2 is a front view of a portion of the axle-frame, tongue-frame, and driving-shaft, illustrating their construction. Fig. 3 is a detached side view of the "dogs" and "pawl" mechanism for elevating the cutter-bar. Fig. 4 is a rear view of the upper portion of the cutter-bar lifting-lever detached. Fig. 5 is a detached detail view, illustrating the construction of the axle, ratchet, and pawls. Fig. 6 is a detached sectional view of the axle-frame, main driving-shaft, and cutter-bar-frame sleeve, illustrating their construction. Fig. 7 is a front view of Figs. 8 and 6, showing the oscillating cutter-bar frame in its central position; and Fig. 8 is the same with the oscillating sleeve turned around for removal from the axle-frame. Fig. 8½ is a detached detail view of the draft-plate. Fig. 9 is a plan view, partially in section, and with the tongue and tongue-frame removed. Fig. 10 is a front view of the cutter-bar detached. Fig. 11 is a sectional view of the axle-frame detached. Fig. 12 is a view of the pitman detached. Fig. 13 is a side view, Fig. 14 is a plan view, and Fig. 15 is a rear view, of the tongue-frame detached. Fig. 16 is a side view, and Fig. 17 is a plan view, of the gearing "housing" or cover. Fig. 18 is a rear view, and Fig. 19 is a front view, enlarged and detached, of a portion of the driving-gear and clutch. Fig. 20 is a detached sectional view through the axle-frame and axle, illustrating the manner of securing the parts together.

A is the axle, and B′ B² the carrying-wheels, (having the usual ribs upon their rims to prevent slipping,) journaled upon the ends. The hubs B³ B⁴ are formed with hollow cavities within their inner faces and with square-sided teeth a' in the rims of said cavities, in which dogs a^2 a^3 upon the gear C′ upon one side, and in a sleeve, D′, upon the other side, are adapted to fit. The gear C′ and sleeve D′ are both attached to the axle A, and the dogs a^2 a^3 are set so that they engage with the ratchet-teeth a', when the wheels B′ B² are revolved forward, and slip over them when the wheels are revolved backward. Hence when the machine is drawn forward the wheels will be automatically connected to the axle and revolve it with them, but will not affect the axle when backing. By arranging the dogs and ratchets upon both ends of the axle the latter will be revolved as well when the machine is turning corners or short curves as when running straight ahead. It will be readily seen, therefore, that the gear C′, being attached to the axle, will be revolved with it, the object of revolving the axle being to secure the necessary movement to the gear C′. By forming the ratchets a' square or alike on both sides the dogs a^2 a^3 will act equally well upon both sides. Hence the drive-wheels may be made interchangeable and prevent the necessity for right and left hand wheels.

Encircling the central part of the axle A is a tubular frame, E′, in the ends of which tubes E² E³, also encircling the axle A, are secured by keys and set-screws, as shown in Fig. 20, the outer ends of the tubes being secured in a like manner in small sleeves E⁴ E⁵, encircling the axle A just inside of and butting against the sleeve D′ and the gear C′, respectively, as shown, the nuts or keys for holding the wheels B′ B² upon the axles thus binding the whole axle-frame, axle, and drive-wheels in position, as well as holding the wheels B′ B² in position.

By this arrangement the entire axle is covered and no revolving part left exposed to catch and wind up the grass or grain or endanger the life of the operator. The central tubular frame, E′, tubes E^2 E^3, and sleeves E^4 E^5 may be cast in one piece, if desired, or constructed, as shown, of several parts. When constructed as shown the frame E′ and sleeves E^4 E^5 will usually be made of cast-iron and the tubes E^2 E^3 of wrought-iron. An enlarged portion, E^7, on the end of the tubular frame E′ forms an oil-cavity, whereby the central portion of the axle may be lubricated.

Branching outward from the tubular frame E′ is a hollow stem, E^6, through the center of which a shaft, F′, passes, the hollow being above the main frame E′, to permit a bevel-pinion, F^2, to be attached to the outer end of the shaft F′, as shown in Fig. 6.

G′ G^2 are brackets or arms projecting upward and backward from the central frame, E′, and sleeve E^5, through both of which a shaft, G^3, is journaled. Upon one end of this shaft G^3 is secured a pinion, C^2, adapted to engage with the gear C′, and upon the other end is a bevel-gear, F^3, adapted to engage with the bevel-pinion F^2, so that the revolution of the axle A will be communicated to the shaft F′.

Encircling the shaft G^3, between the arms G′ and G^2, and with its ends firmly secured therein in a similar manner to the tubes E^2 E^3 in the axle-frame E′, (see Fig. 20,) is a tube, E^{41}, to serve as a protector to the shaft G^3, and also to stiffen the gear-frame.

The bevel-gear F^3 is loose upon the shaft G^3, and is provided with a hub having ratchet or clutch teeth b' upon one side, adapted to engage with similar teeth, b^2, upon the adjacent side of a grooved collar, G^5, having a feather fitting into a groove in the shaft G^3, whereby the collar G^5 is free to be moved along the shaft and revolved with it, and a "clutch" formed for connecting and disconnecting the shaft G^3 from the gear F^3.

H′ is a short shaft, carrying a friction-roller, H^2, (see Figs. 18 and 19,) mounted upon a pin eccentrically projecting from the end of said shaft, so that when the latter is oscillated the friction-roller will describe the segment of a circle. Hence when the friction-roller is placed in its position within the groove in the collar G^5 and the shaft H′ oscillated the collar will be moved back and forth along the shaft G^3 and throw the clutch b' b^2 in and out of gear. The shaft H′ is mounted in a hanger or bracket, H^3, attached to the tubular frame E′, and said hanger is also provided with a projecting curved plate, H^4, extending beneath the lower portion of the gear F^3, to protect it from the straw and dust from below. The guard H^4 and hanger H^3 are thus formed in one piece. A short weighted arm, H^5, upon the end of the shaft H′ enables the latter to be easily oscillated back and forth, the weight being heavy enough to hold the clutch in whichever position it may be left.

Projecting upward and backward from the center of the tubular frame E′ above the stem E^6 is a plate, E^9, to which the springs c' for supporting the seat I are secured, this arrangement thus bringing the weight of the driver behind the axle to assist the balancing of the cutter-bar frame, the seat being adjustable to vary the weight. Small ribs c^2 will be formed upon the side of the seat-bracket to support the springs c' and prevent side-play.

Surrounding the stem E^6, and adapted to oscillate thereon, is a skein or sleeve, J′, across the lower front side of which a tubular hanger, J^2, is constructed, the two parts J′ J^2 being cast in one piece. The hanger J^2 has a tube, K′, passing through it, and is formed with a split through one side and with small lugs d' d^2 upon opposite sides of the split, through which small bolts d^4 d^5 are placed and screwed up to draw the sides of the hanger together and "pinch" and firmly hold the tube K′ in the hanger. Bolts will also be placed through the branches J^2 and tube K′, to more firmly secure them together. Upon the outer ends of the tube K′, just forward of the wheels B′ B^2, are tubular pieces K^3 K^4, also formed with splits through one side, so that bolts d^6 d^7 pass through the sides of the tubular pieces and tube K′ will hold them firmly together. Branching from the rear sides of the tubular pieces K^3 K^4, at an angle, are shorter tubular arms K^5 K^6, in which bracing arms or tubes K^7 K^8 are secured by splits through their sides and bolts d^8 d^9 passing down through them in the same manner as in the tubular pieces J^2 K^3 K^4, the splits for the angular portions K^5 K^6 being continuations of the splits in the tubular pieces K^3 K^4. The braces K^7 K^8 pass backward and inward, and are connected by bolts e' e^2 to ears e^3 e^4 upon the sides of the rear end of the skein J′. Connected by webs K^9 K^{10} to the front sides of the tubular end pieces, K^3 K^4, at right angles to them and tending forward and downward at an angle, are two other tubular pieces, K^{11} K^{12}, in which short tubes K^{13} K^{14} are secured by the splits and bolts, in the same manner as the tube K′ in the pieces K^3 K^4. Upon the lower ends of the tubes K^{13} K^{14} the shoes L′ L^2, connected to each other by the cutter-bar M′, are secured, as shown. The skein J′ J^2, tube K′, corner-frames K^3 K^4 K^9 K^{10} K^{11} K^{12}, braces K^7 K^8, tubes K^{13} K^{14}, shoes L′ L^2, and cutter-bar M′ thus form a stiff, strong frame, free to be oscillated upon the stem E^6, to permit the cutter-bar to be raised at either end in running over uneven ground, or oscillated upon the axle A when the whole cutter-bar is to be elevated.

Cast upon the side of the tubular piece K^{12} is the base g' of a journal-box, having a cap, g^2, in which one end of a rock-shaft, g^3, is mounted, the opposite end being similarly mounted in a box, g^4, upon a standard, g^5, rising from the shoe L^2. This rock-shaft is set on a line parallel to the stem E^6, and is provided upon its upper end with a crank-arm,

g^6, having a crank-pin, g^7, upon which the lower end of a connecting rod or pitman, F^4, is journaled. The upper end of this pitman is connected by a crank-pin, F^5, to a crank-plate, F^6, screwed upon the lower end of the shaft F′. By this arrangement the revolution of the shaft F′, through the gears F^2 F^3 C^2 C′, as before described, will be communicated to the shaft g^3 and oscillate it, the throw of the crank-plate of course being shorter than the throw of the crank-arm g^6. The pitman F^4 is formed with its ends split or sawed asunder at F^7 in Fig. 12, and these split portions cut out in elongated diamond shapes, in which wedge-shaped blocks F^8 are adapted to fit, with their broad ends toward each other, and made concave, to embrace the sides of the crank-pins g^7 and F^5. Bolts F^9 pass down through the ends of the pitman, and also through the wedges F^8, the latter being provided with slots, through which the bolts pass, so that a small degree of end-play will be permitted to them. By this arrangement the screwing of the bolts F^9 together will draw the split parts toward each other and cause the wedges to be forced inward, and thus take up any wear that may occur and keep the parts tight and prevent rattling.

It frequently occurs that the throw of the sickle requires adjustment to cause the knives to pass through the fingers N′ the proper distance, especially in first "setting up" the machine, and by means of the adjustability of the wedge-shaped blocks F^8 endwise I am enabled to alter the throw of the sickle to any required extent to adapt the cutting-knives in the proper manner to the fingers N′.

Attached to the face of the central tubular frame, E′, are two hook-shaped lugs, E^8 E^{10}, adapted to inclasp two lips, E^{11} E^{12}, upon the sides of the rear part of the skein J′. By this means the skein is held in position upon the stem E^6, but is free to oscillate upon it, the lips E^{11} E^{12} being wide enough to allow for all the necessary oscillation in operating the machine without passing beyond the hooks E^8 E^{10}; but when it is desired to remove the skein J′ from the stem E^6 the former is turned around until the lips E^{11} E^{12} pass beyond the lugs E^8 E^{10}, as shown in Fig. 8, when the skein may be drawn off from the stem, (the crank-plate F^6 and pitman F^4 having of course been first removed from the shaft F′.) By this means all the end and side thrust is borne by the lugs or hooks E^8 E^{10} and lips E^{11} E^{12}, and no strain endwise permitted upon the crank-plate F^6 or pinion F^2, while at the same time a very secure, yet easily connected or disconnected, joint is formed between the sleeve and stem. Another advantage of this arrangement is that when the machine is backed up, which very frequently occurs in turning corners, the weight of the cutter-bar and its frame is borne by the lugs E^8 E^{10}, and not by the screw-thread by which the crank-plate F^6 is secured to the shaft F′, as it would if the lugs were not used. These lugs E^8 E^{10} also prevent the side thrust or twisting strain of the frame when turning corners from coming upon the stem E^6 and shaft F′.

Upon the lower end of the shaft g^3 a crank-arm, g^8, similar to the arm g^6, is formed and projects downward, and is provided with a stud, g^9, upon which a roller, g^{10}, is mounted. (See Fig. 10.)

g^{11} is an auxiliary arm or brace branching from the crank-arm g^6 and running upward and backward, and ends alongside of the end of the pitman F^4 opposite to the end of the crank-arm g^6, so that the pivot g^7 will pass through all three parts, the brace g^{11} thus serving as a support to the pivot and preventing the rapid motion of the pitman from bending or breaking the pivot, and at the same time strengthening the crank-arm. A similar brace, g^{12}, is attached to the lower crank-arm, g^8, to support the pin g^9.

N′ are the fingers of the cutter-bar, attached to the under side of the cutter-bar M′, and having the sickle N^2 lying in notches across them, and with its back edge against the face of the cutter-bar, as shown.

N^3 is a metal bar resting across the rear upper sides of the knives, upon the end next the shoe L^2, and secured thereon by rivets or bolts h', passing down through said bar, the sickle-knives, and the sickle-back, whereby they are all firmly secured together.

Projecting upward from near the outer end of the bar N^3 are two prongs or standards, h^2 h^3, between which the friction-roller g^{10} upon the crank-arm g^8 is adapted to rest, so that when the rock-shaft g^3 is oscillated the vibration of the crank-arm g^8 will move the sickle back and forth, the friction-roller causing it to act with less noise and friction.

Through the upper ends of the prongs h^2 h^3, at a sufficient distance above the friction-roller to prevent interference with it, is a bolt, h^4, having a small tube, h^5, (or other means for keeping the prongs apart,) encircling it. By this means the prongs are held by the bolt to prevent their being "spread" by the vibratory motion, so that they can be made much lighter than if no such support existed.

The "weak points" of the bar N^3 are where the prongs h^2 h^3 branch from it, and to strengthen the bar without adding to its weight I extend the sickle-back as far as the outer end of the plate N^3 and place the outer prong, h^3, far enough inward to enable me to place one of the rivets h' through the plate and "sickle-back" outside the prongs. By this means the whole plate is supported by the sickle-back, especially the outer end, where its weakest part exists, and all danger of breakage removed.

The forward ends of the shoes L′ L^2 are provided with upright standards L^4 L^5, having slots i' cut through them, in which bolts i^2 i^3 are inserted. In the inner faces of the standards L^4 L^5, upon either side of the slots i', shoulders are formed to receive the square

heads i^5 of the bolts i^2 i^3, to prevent their turning.

L^6 L^7 are the "grass-wheels," journaled upon large collars i^6 upon the bolts i^2 i^3, so that a large bearing-surface may be obtained for the wheels.

The shoe L^2 is provided with a brace, L^8, connecting the standard L^5 with the rock-shaft standard g^5, to stiffen and strengthen them, while the shoe L′ is provided with a similar but smaller brace, L^9, connecting its standard L^4 with the tubular portion of the shoe, in which the lower end of the tube K^{13} is secured. Small lugs k' k^2 are formed upon these braces L^8 L^9, in which the ends of rods L^{10} L^{11} are secured, and, passing backward and inward in curved lines, are connected to the bolts d^8 d^9 of the branches K^5 K^6 of the corner-frames of the cutter-bar frame, the rod L^{11} being curved upward over the pitman F^4, so as not to be struck by it. These rods are intended to serve as guides to turn the grass or grain inward as it is cut and prevent its falling upon or coming in contact with the pitman or rock-shaft or side frames, and to pass it between the carrying-wheels B′ B^2.

Small lips L^{12} L^{13} are formed upon the rear lower sides of the shoes L′ L^2, on which two inwardly and backwardly trending track-clearers, Y′ Y^2, are pivoted, and are left free to play upward as far as the cutter-bar frames will allow, but are prevented from falling downward below the line of the cutter-bar by small lips L^{14} L^{14}, projecting beneath them, as shown in small detached rear view of one of the track-clearers in the lower part of Fig. 1. By this means, when the cutter-bar is elevated the track-clearers will be elevated with it, but are free to play upward when running over uneven ground. The grass or grain is thus guided inward as it falls backward over the sickle and cutter-bar, and formed into windrows between the driving-wheels, so that neither the team nor the wheels pass upon the cut grass.

Upon the end of the sickle next the shoe L′, and opposite to the rock-shaft g^3, are a number of inclined teeth, m', with their inner sides perpendicular, adapted to pass back and forth with the sickle through a slot, m^2, in the brace L^9 of the shoe L′. By this means the perpendicular front edges of these teeth m' catch the grass or grain as it falls and draw it inward away from the shoe L′ at the inner stroke of the sickle, but pass beneath it without affecting it at the backward or outward stroke, by reason of the inclined rear edges of the teeth, thereby preventing the grass clogging the shoe and permitting it to be carried inward between the wheels. The vibrating crank-arm g^6 and prongs h^2 h^3 perform the same office for their end of the machine. The grass-wheels, by being moved up or down in the slots i in the standards L^4 L^5, adjust the cutter-bar higher or lower for a low or high cut.

In Figs. 16 and 17 is shown a "housing" or cover for the gears C′ C^2, consisting of two semicircular hoods, C^3 C^4, adapted to fit over the upper and lower halves of the pinion and gear and the arm G^2, and with their edges joining each other and secured by a bolt, c^5, passing through lugs c^6 c^7 on the hoods C^3 C^4, and also through the arm G^2. By this means the gears are protected from dust and dirt, and all danger of accident prevented, and, by simply removing one bolt, c^5, the whole hood may be removed.

R′ is the tongue, attached at its rear end, by bolts n' n^2, to two hounds, R^2 R^3, upon either side. These hounds are bolted to a frame consisting of a top plate, R^4, having cross-bars R^9 and two downwardly and backwardly branching legs, R^5 R^6. The lower ends of these legs are formed to encircle the rear half of the outer ends of the axle-frame E′, and provided with caps R^7 R^8, inclasping the axle-frame on its forward half, and the two parts of each leg secured together by bolts p' p^2 p^3 p^4. By this arrangement the tongue-frame is connected to the axle-frame E′ loosely, so that the tongue is free to oscillate around it when the tongue is raised or lowered, or when the cutter-bar frame is elevated or depressed, and can be easily removed. A plate, R^{12}, is attached to the "hounds" R^2 R^3, across their front ends, and the tongue, and a similar plate, R^{13}, is attached to the under side of the hounds beneath the rear end of the tongue, to assist the bolts n' n^2 and prevent the whole strain coming upon them. Small ribs n^3 will be formed upon the edges of the frame R^4, around the rear and outer parts of the hounds R^2 R^3, to support them and prevent side-play. Wrought-iron braces R^{10} R^{11} will be connected to the tongue R′ by the bolt n^2, and to the lower end of the tongue-frame by the bolts p' p^3, to stiffen and support the tongue-frame.

Projecting down from the forward end of the top plate, R^4, upon either side, are ears or lugs r' r^2, through which a shaft, T′, is journaled. The ear r^2 is carried downward and outward and upward again, and is formed into a segmental ratchet-toothed disk, T^2, through which the shaft T′ also passes, as shown in Figs. 2, 3, and 14.

Between the disk T^2 and ear r^2 upon the shaft T′ is another segmental disk, T^3, keyed or otherwise secured to the shaft and provided with a notch, t', in its upper part; and outside the disk T^2 is another segmental disk, T^4, precisely like the disk T^3, except that it is loose upon the shaft T′ and is cast in one piece with or otherwise firmly attached to a segmental grooved cam, T^5; also loose upon the shaft T′, but prevented from coming off from it by a pin or collar or other suitable device. Upon the opposite end of the shaft T′ is another grooved segmental cam, T^6, fast upon the shaft.

T^7 T^8 are chains attached to the cams T^5 T^6 by pins or other suitable means, and, running downward, are connected to hooks t^2 t^3 upon collars K^{15} K^{16}, encircling the tube K′.

T^9 is an arm encircling the shaft T′ between

the disks T^2 T^4, and projecting upward and provided with a socket, T^{10}, in which a wooden hand-lever, T^{11}, is secured. Upon either side of the socket T^{10} are four lugs, u' u^2 u^3 u^4, through which bolts u^5 u^6 pass, and are provided with coiled springs to hold them down in place. The lower ends of these bolts u^5 u^6 are adapted to fit into the notches t' in the disks T^3 T^4, while their upper ends are connected by rods u^9 u^{10} to hand-levers V' V^2, pivoted upon either side of the hand-lever T^{11}, as shown in Figs. 1 and 4. By this means either or both of the bolts u^5 u^6 may be withdrawn from contact with the disks T^3 T^4 by pressing inward upon the levers V' V^2.

u^{11} is a dog or pawl pivoted, at u^{12}, upon the front of the socket T^{10}, and adapted to engage with the ratchet-teeth of the disk T^2, and is connected by a rod, u^{13}, to a third hand-lever, V^3, pivoted to the same handle, T^{11}. By this arrangement, if the hand-lever V^2 be pressed inward and the hand-lever V' permitted to remain outward, the bolt u^6 will be withdrawn from contact with the disk T^3, while the bolt u^4 will still be connected to the disk T^4, so that if the handle T^{11} be drawn backward the disk T^2 will not be affected, while the disk T^4 will be turned around the shaft T' by the bolt u^5, and being loose upon the shaft T' and attached to the cam T^5, the chain T^7 will raise that end of the cutter-bar and leave the other end unaffected, and then, if the hand-lever V' be drawn inward and hand-lever V^2 left undisturbed, the chain-cam T^6 will be turned and the other end of the cutter-bar elevated. If, however, both ends of the cutter-bar are to be raised at once, both the hand-levers V' V^2 are left unmoved with the bolts u^5 u^6 both in contact with both their respective disks and the handle T^{11} pulled backward, when both chain-cams will be revolved, the dog u^{11} at all times catching upon the ratchets of the disk T^2 and holding the lever T^{11} wherever it may be left until released by pressing the hand-lever V^3 inward.

Projecting from either side of the front edges of the ratchet-disk T^2 are stops w^{14}, against which the disks T^3 T^4 strike at their lowest forward position, to prevent them going too far, and T^{12} is a coiled spring encircling the shaft T' between the ears r' r^2, and secured to said shaft at one end and to the plate R^4 at the other, to serve as a "holdback" to the lever and its attachments, to prevent the jarring and shaking of the machine affecting them.

Attached to the upper side of the tongue R', forward of the hounds R^2 R^3, is a plate, W', having a slot throughout nearly its entire length, in which bolts W^2 W^3 are inserted, with square lower heads resting beneath shoulders along the lower edges of the slot, so that while free to play back and forth in the slot they cannot be lifted out of it.

W^5 is another plate, resting upon top of the plate W', and through which the bolts W^2 W^3 pass, so that said plate is free to play back and forth upon the plate W' as far as the slot will permit to take up the slack of the chain when the cutter-bar rises over an elevation. Rising from the plate W^5 is a lug having wings W^7 W^8 upon either side, and with a forwardly-projecting top part, W^9, through whose forward end the bolt W^3 passes. Through this frame, between the plates W^5 and W^9, the "double-tree" or evener is placed, the bolt W^3 serving as a king-bolt thereto, and the wings W^7 W^8 acting as stops to prevent the evener from being thrown backward too far and to prevent the horses backing up against the sickle.

Upon the rear of the wings, in the center, is an eye, W^{10}, in which a chain, W^{11}, is hooked and passes backward down over the end of the tongue between the hounds to a bail, X, upon the skein J', and beneath which it passes, and thence back to a hook formed on the end of one of the bolts c^3, which secures the seat-springs c' to the seat-bracket E^9, to which one of its links is hooked. By this means the "draft" comes wholly upon the chain W^{11}, and by passing it beneath the bail X before it passes to the hook c^3 a lifting force is exerted upon the cutter-bar frame at the same time with the forward movement, which greatly assists the operation of the machine and prevents the cutter-bar plunging into every little declivity, or rising and falling too suddenly in running over uneven ground.

The bail X is attached to the skein J' by cap-screws y' y^2, tapped into the skein, and by providing a number of screw-holes, y^3, upon each side the bail may be adjusted to adapt the draft-chain to the weight of the machine or the work being done or the nature of the ground operated upon.

The draft-chain may be shortened or lengthened by hooking its links forward or backward upon the hook c^3, to adjust the chain.

Upon the front end of the tongue R' is a hook, R^{14}, across which the neck-yoke R^{16} is laid, and held thereon by a loop, R^{17}, passing under the hook R^{14}. The neck-yoke, and also the evener, will be long enough to cause the horses to travel one between the windrows formed by the track-clearers and the other in the edge of the uncut grass or grain, and both in front of the grass-wheels L^6 L^7 and drive-wheels B' B^2.

F^{10} is a guard or shield to protect the under side of the crank-plate and pitman from the grass and dust or dirt.

R^{15} is a hook pivoted to the tongue R' and hanging down therefrom, and adapted to be caught under the rear edge of the cutter-bar M' when the latter is lifted up, to hold the frame when not in use, or, when moving from place to place, to prevent the strain coming constantly upon the lifting mechanism.

In place of the tube h^5, encircling the bolt h^4, to keep the prongs h^2 h^3 from "spreading," the bolt may be supplied with nuts h^6 h^7 inside the prongs, by which they may be prevented from spreading, or may be drawn nearer to-

gether in event of the wear of the friction-roller or prongs. These nuts h^6 h^7 answer the same purpose as the tube h^5, with the additional advantage of possessing adjustability.

The hub of the bevel-gear F^3 is hollowed out beneath the teeth b', as shown in Fig. 9, to provide room for a pin to be inserted through the shaft G^3 to hold the wheel and shaft in place.

The throw of the sickle will be sufficient to carry the knife-sections through two of the fingers N′ at each stroke, thus reducing the number of strokes one-half, and the power required to drive the knife is much less, because the stopping and starting again at each stroke occurs only one-half as often.

The cutter-bar M′ is made very thin and flat to enable it to slip under the cut grass more easily than it would if it were thicker or had an angle edge.

The fingers N′ are of any preferred style, but should be as thin as possible.

Having thus described my invention, what I claim as new is—

1. An axle carrying the drive-wheels, a tubular frame encircling said axle loosely midway between said drive-wheels, a hollow stem branching from the center of said tubular frame, and a skein or sleeve encircling said stem and carrying a cutter-bar frame, whereby said cutter-bar frame is free to oscillate upon said hollow stem to permit the sickle to follow the shape of the ground independently of the drive-wheels, in combination with a draft-chain centrally located between the drive-wheels, and means for connecting the motive power which propels the machine with the above-described oscillating skein, whereby a lifting force is exerted upon the cutter-bar frame at the same time that the machine is drawn forward, without interfering with its oscillatory motion, substantially as and for the purpose set forth.

2. An axle carrying the drive-wheels, a tubular frame encircling said axle loosely midway between said drive-wheels, a hollow stem branching from the center of said tubular frame, a skein or sleeve encircling said stem and carrying the cutter-bar frame, whereby said cutter-bar frame is free to oscillate upon said hollow stem to permit the sickle to follow the shape of the ground independently of the drive-wheels, and a tongue-frame attached loosely to said axle-frame, whereby the said axle-frame is free to oscillate independently of said tongue-frame while being drawn forward, in combination with a draft-chain attached to the axle-frame and adjustably coupled to the foregoing-described skein and oscillating frame, said draft-chain passing upward and forward, and being attached to the evener or other means for connecting the horses or other power to propel the machine, whereby a lifting force is exerted upon the cutter-bar frame at the same time that the machine is drawn forward, without interfering with the oscillatory motion of the cutter-bar frame around the said stem or the motion of the axle-frame around said axle, substantially as and for the purpose set forth.

3. An axle carrying the drive-wheels, a tubular frame encircling said axle loosely midway between said drive-wheels, a hollow stem branching from the center of said tubular frame, a skein or sleeve encircling said stem and carrying the cutter-bar frame, whereby said cutter-bar frame is free to oscillate upon said hollow stem to permit the sickle to follow the shape of the ground independently of the drive-wheels, and means, substantially as described, for connecting said drive-wheels in their motion with and disconnecting the same from the sickle-operating mechanism, in combination with a centrally-applied draft-chain and means for connecting the motive power which propels the machine with the foregoing-described skein and oscillating frame, whereby a lifting force is exerted upon the cutter-bar frame at the same time that the machine is drawn forward without interfering with its oscillatory motion or the sickle-vibrating mechanism, substantially as and for the purposes set forth.

4. The rock-shaft g^3, crank-arm g^8, auxiliary brace g^{12}, friction-roller g^9, and stud g^{10}, in combination with the sickle N^2, plate N^3, prongs h^2 h^3, and bolt h^4, substantially as set forth.

5. A cutter-bar, a frame for supporting said cutter-bar and adapted to be oscillated upon a central pivot back of said cutter-bar, and means for elevating either or both ends of said cutter-bar, in combination with a centrally-seated spring, T^{12}, by which said elevating mechanism is adjustably controlled, whereby the forward movement and jarring of the machine is prevented from displacing the adjusting devices, as set forth.

6. The combination of the tubular frame E′, stem E^6, sleeve J′, having the cutter-bar frame attached thereto, and means for elevating said cutter-bar frame, and a draft-chain, W^{11}, centrally located midway between the driving-wheels, said draft-chain being immediately connected to the axle-frame E′, substantially as and for the purpose specified.

7. The combination of the shaft T′, cams T^5 T^6, with means for operating them independently, and a spring, T^{12}, substantially as set forth.

8. The tongue-frame having the base R^4, to which the hounds R^2 R^3 are secured, and legs R^5 R^6, branching downwardly and loosely connected to the axle-frame E′, in combination with braces R^{10} R^{11}, connecting said hounds and tongue-frame with the lower rear portion of the legs R^5 R^6, whereby the hounds and tongue-frame are supported from both sides and are enabled to resist the stress of the draft-chain W^{11}, substantially as and for the purposes set forth.

9. The tongue-frame consisting of the base R^4, to which the hounds R^2 R^3 and tongue R′ are secured, and legs R^5 R^6, said legs branching

downwardly, and adapted to clasp half of the axle-frame E′, and secured on the opposite side by removable caps R^7 R^8, whereby the tongue-frame is adapted to freely oscillate about the axle-frame and to be easily attached and detached therefrom, substantially as set forth.

10. The axle-frame having a central stem branching therefrom, a skein encircling said stem and carrying the cutter-bar frame, and a draft-chain connected to said skein, in combination with the hounds R^2R^3, and a tongue-frame consisting of a base, R^4, and downwardly-branching legs R^5 R^6, with their lower ends attached loosely to said axle-frame to permit oscillation, said draft-chain passing upward and forward centrally, whereby the draft of the machine is opposite the center of the cutter-bar and axle, substantially as set forth.

11. A centrally-located draft-chain, in combination with the skein J′, which carries a cutter-bar frame, said skein having the adjustable bail X, for the purposes set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHRISTOPHER W. LEVALLEY.

Witnesses:
JAS. O'BRIEN,
R. M. KIEFER.