No. 611,078. Patented Sept. 20, 1898.

H. E. PRIDMORE.

CORN HARVESTING MACHINE.

(Application filed May 24, 1895.)

(No Model.) 7 Sheets—Sheet 1.

Fig. 11.

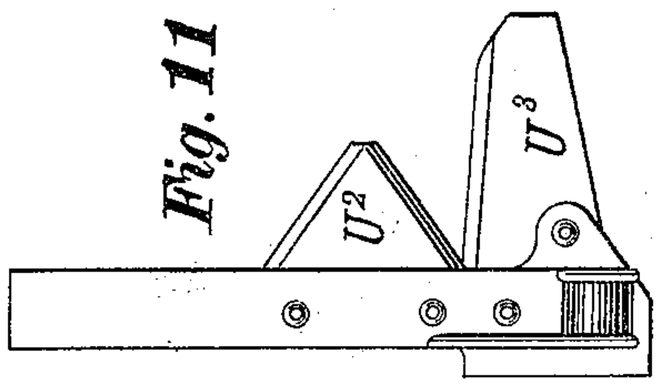

Fig. 1.

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Fig. 2.

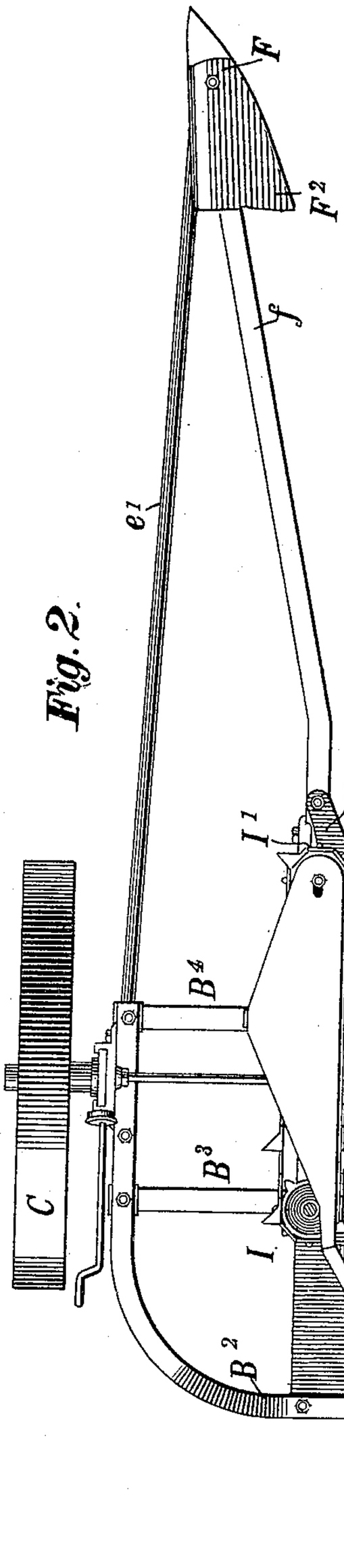
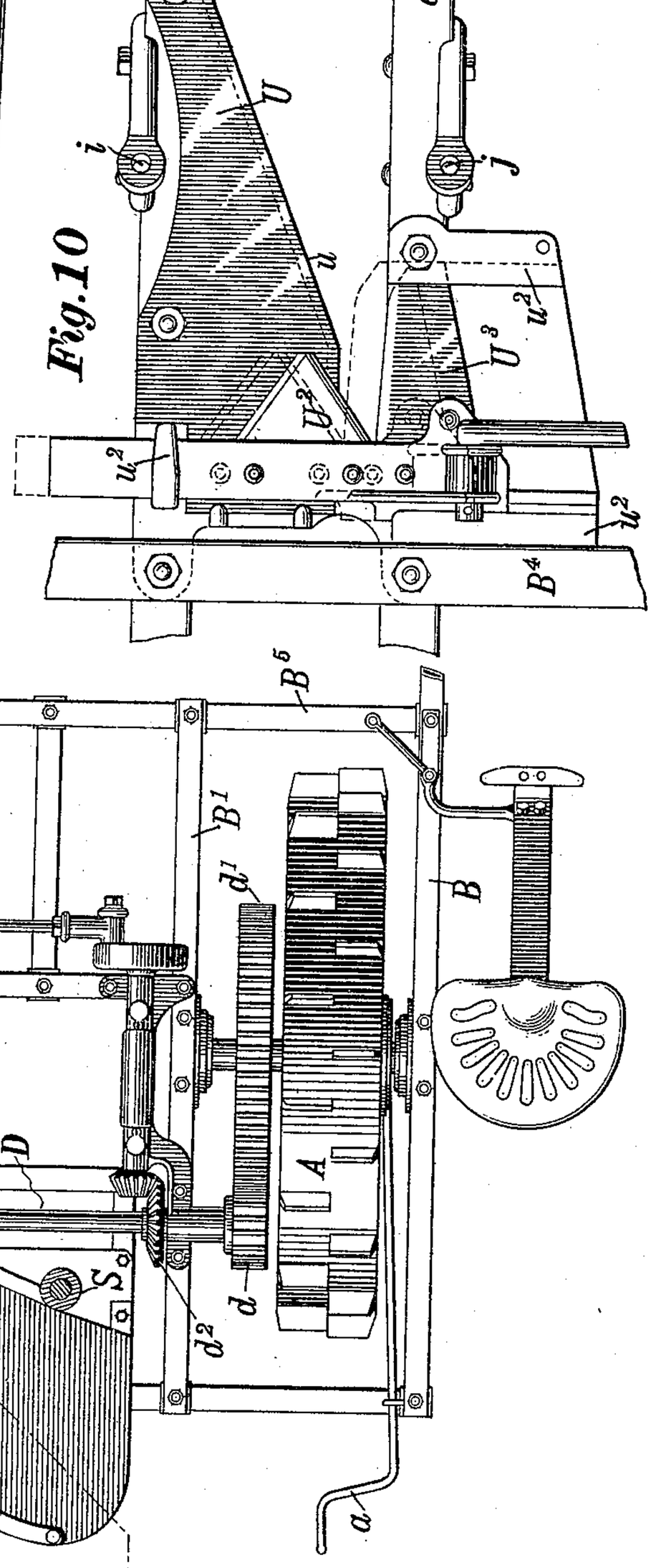


Fig. 10



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(No Model.) 7 Sheets—Sheet 3.

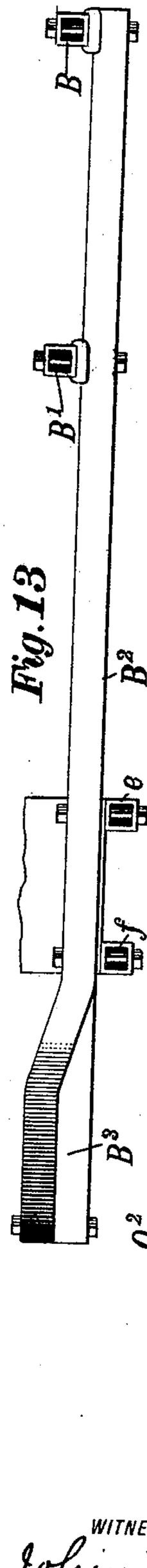

Fig. 13

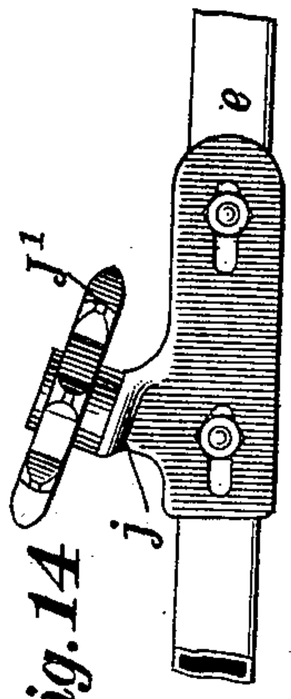

Fig. 14

Fig. 3

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Fig. 12

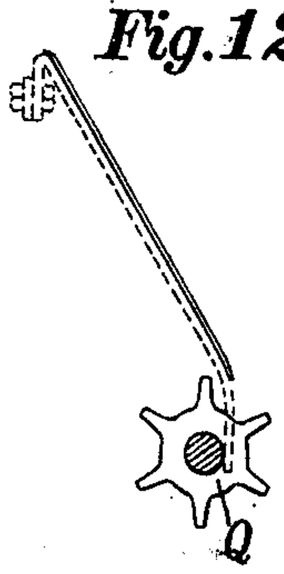

Fig. 4

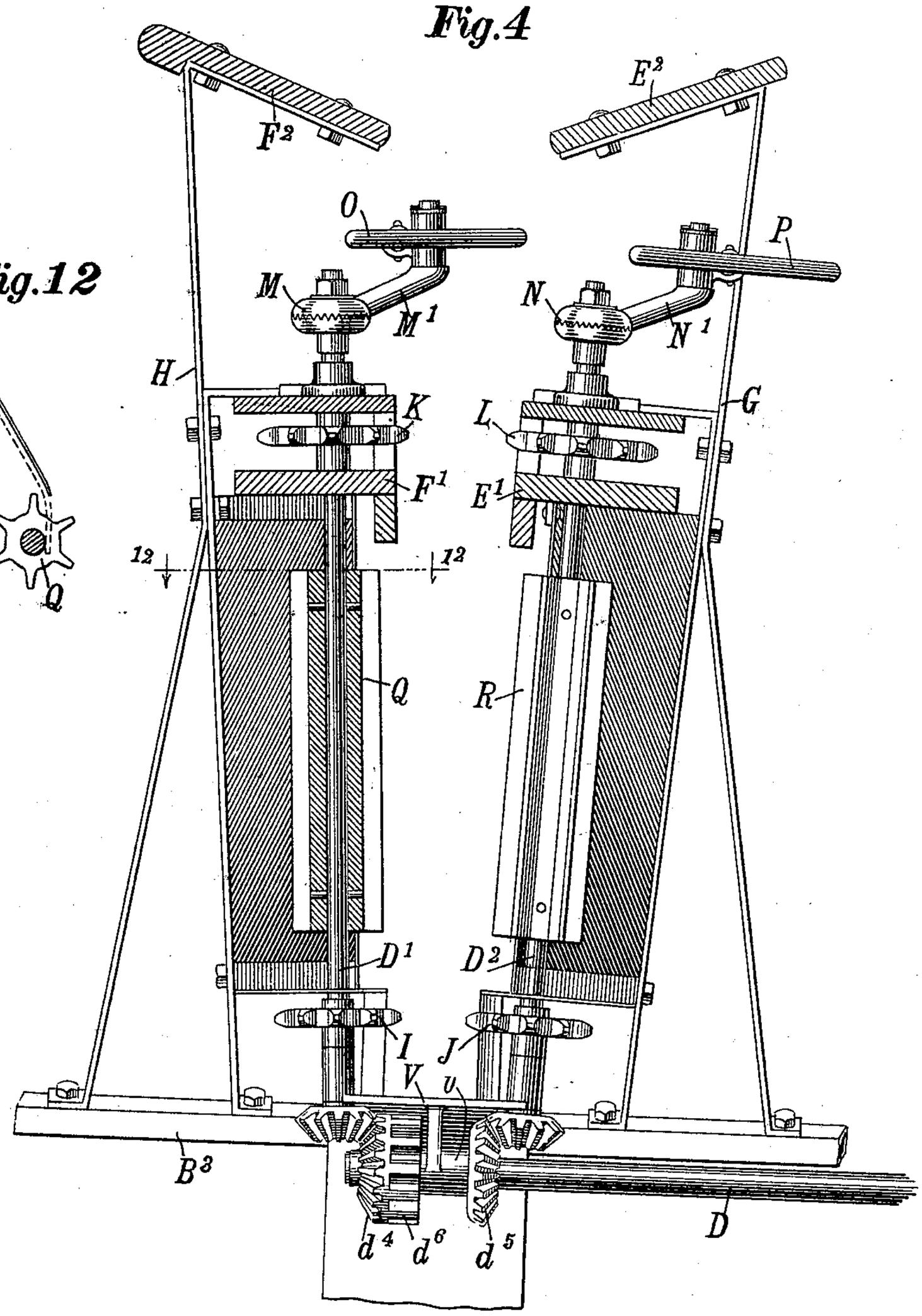

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Fig. 5

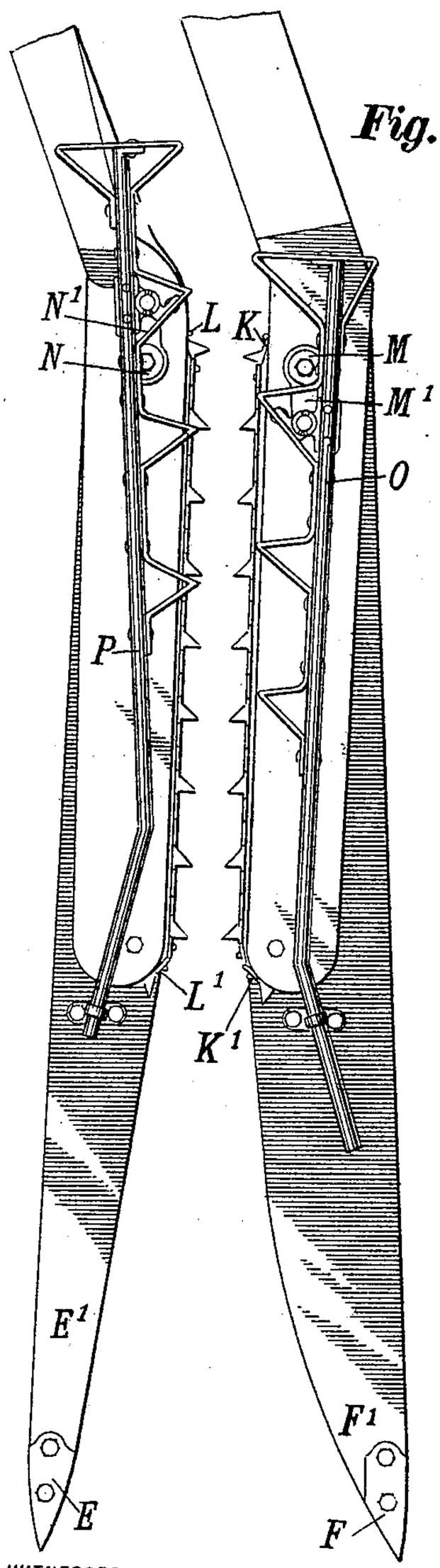

Fig. 6

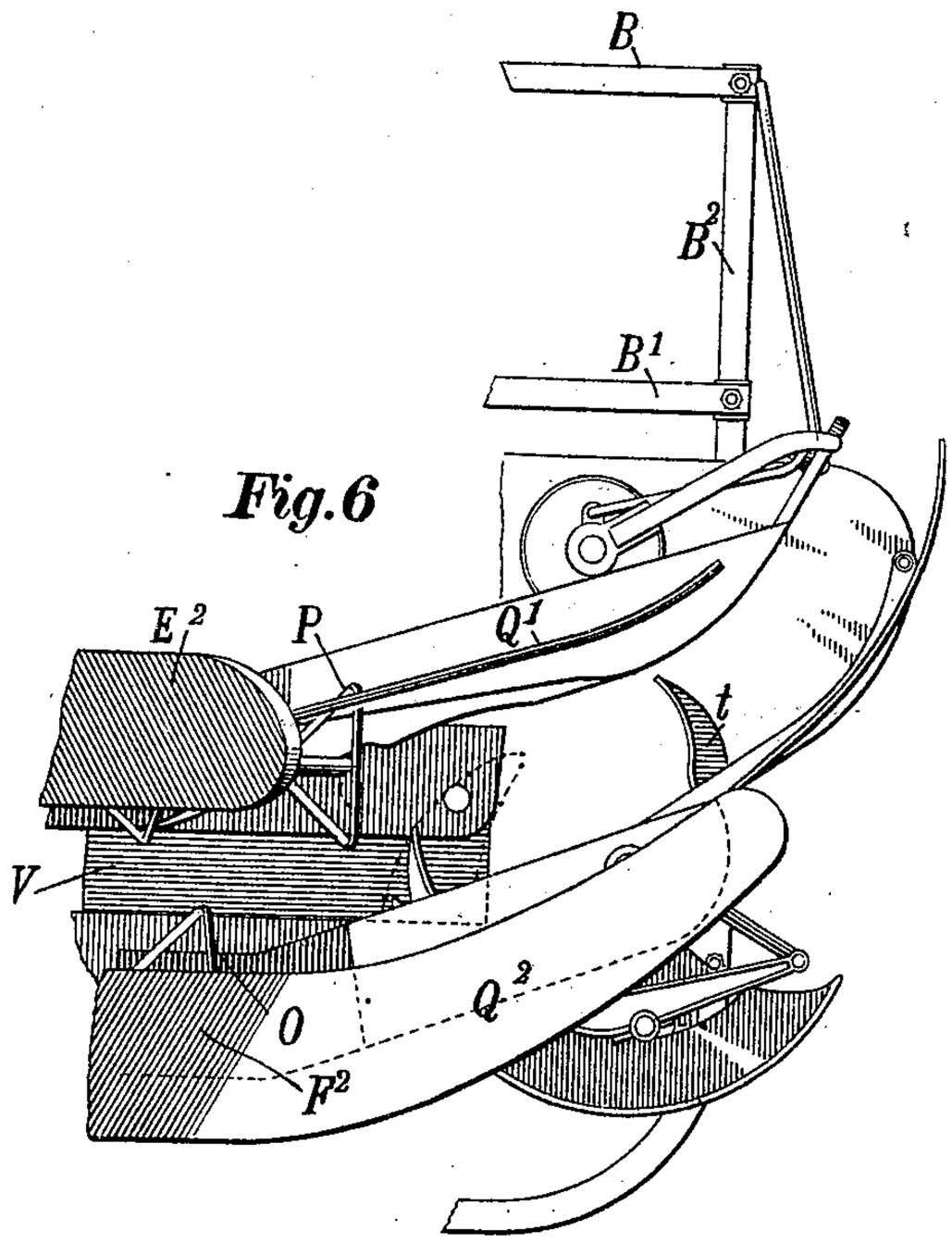

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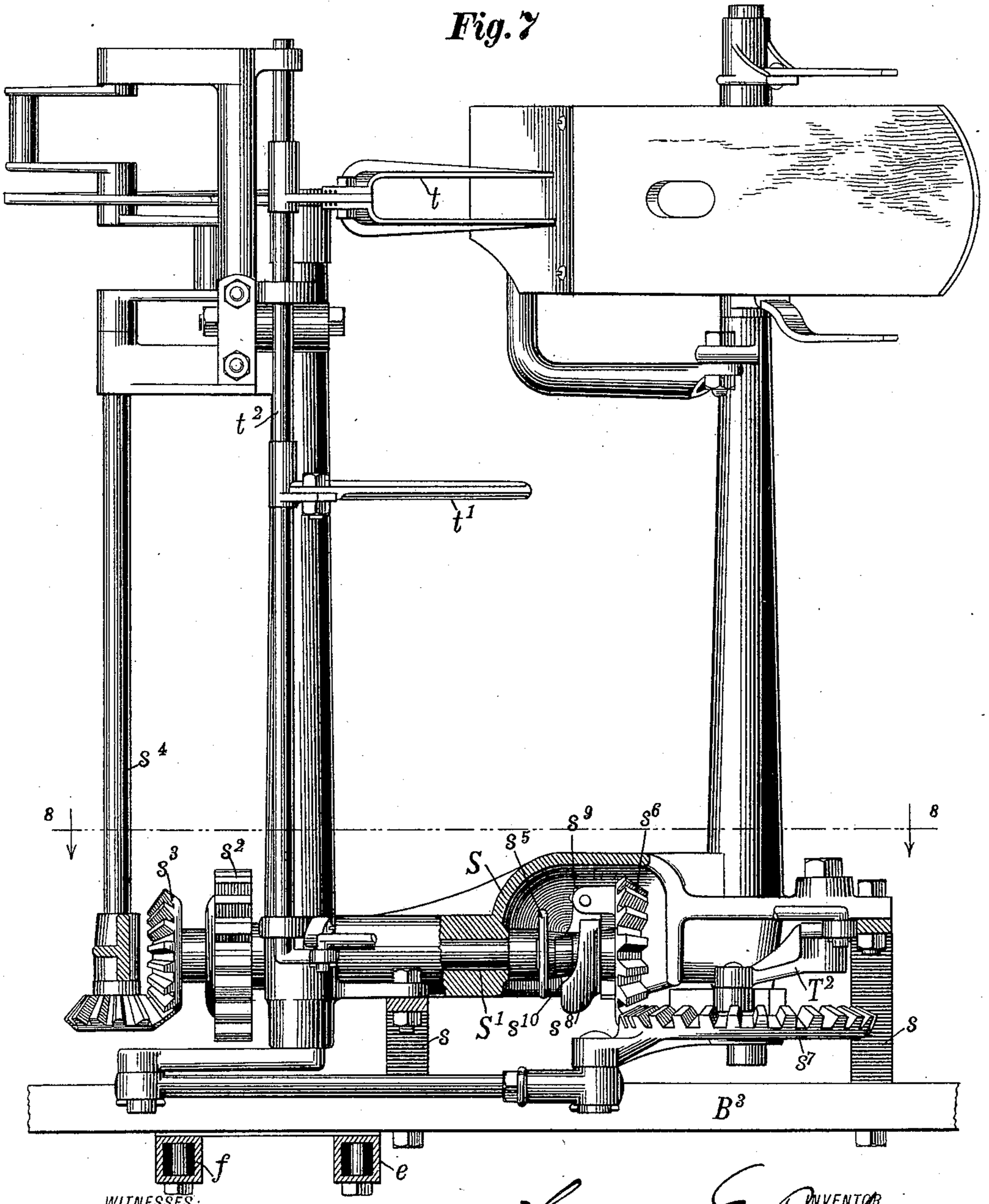
Fig. 7



WITNESSES:

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No. 611,078. Patented Sept. 20, 1898.

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CORN HARVESTING MACHINE.

(Application filed May 24, 1895.)

(No Model.) 7 Sheets—Sheet 7.

Fig. 8

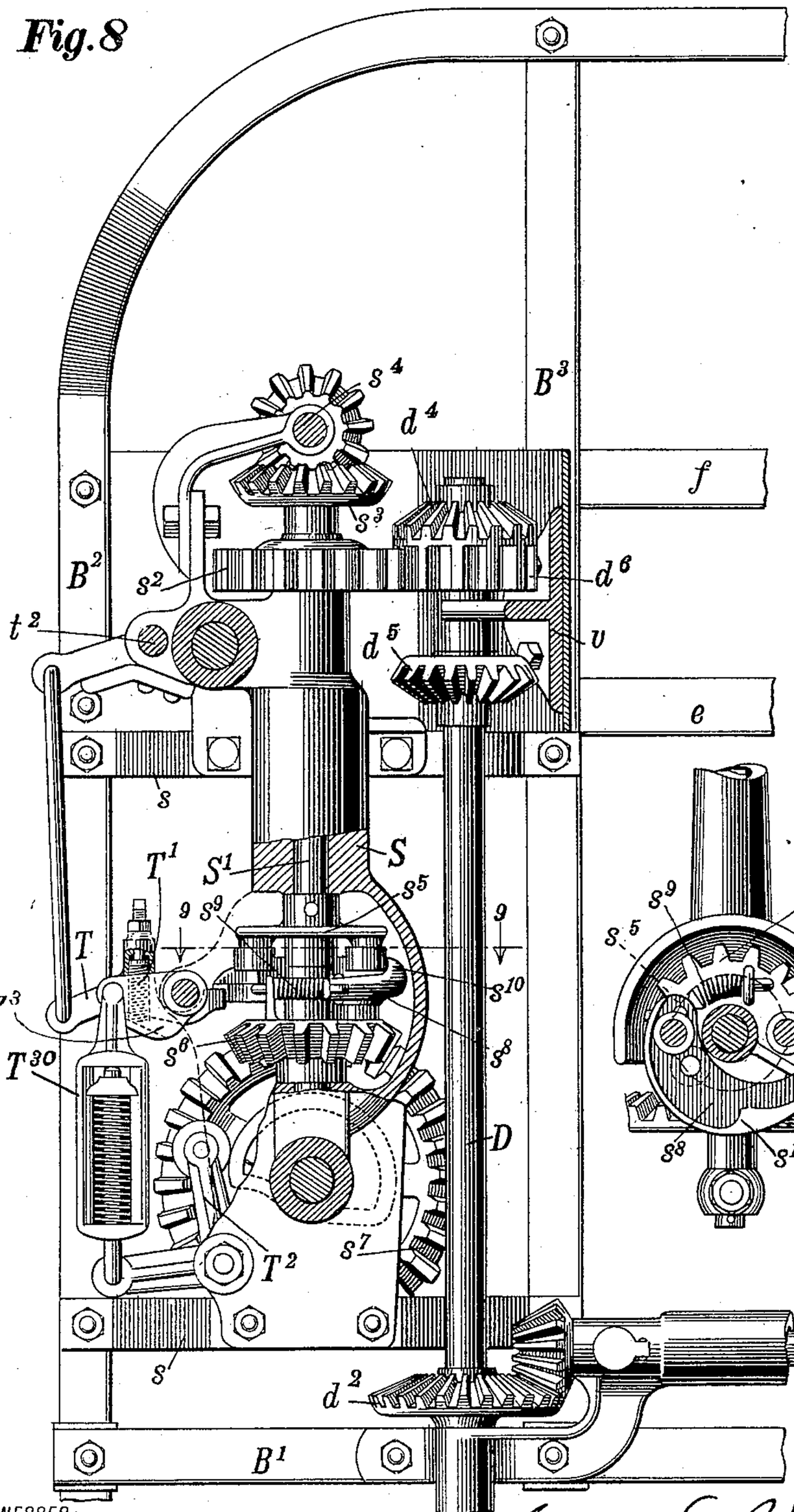
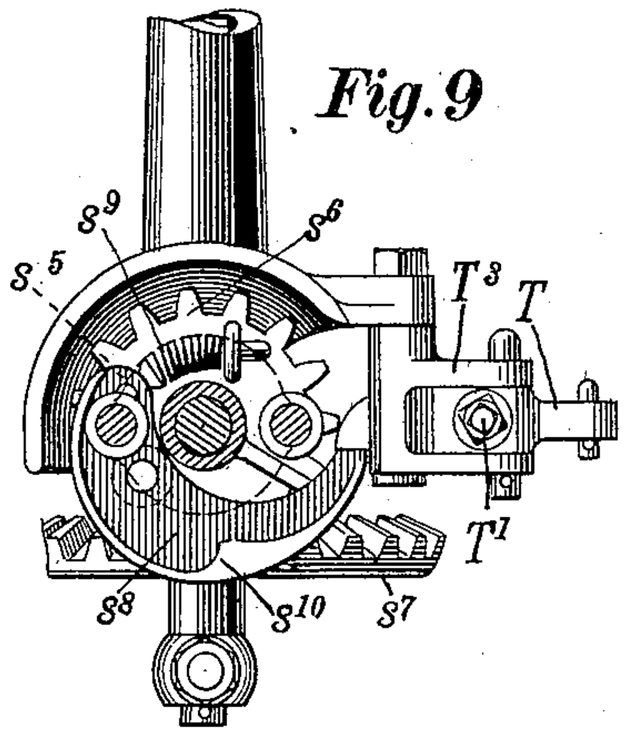


Fig. 9



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UNITED STATES PATENT OFFICE.

HENRY E. PRIDMORE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE McCORMICK HARVESTING MACHINE COMPANY.

CORN-HARVESTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 611,078, dated September 20, 1898.

Application filed May 24, 1895. Serial No. 550,484. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. PRIDMORE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Machine for Cutting and Binding Corn, of which the following is a specification.

My invention relates to improvements in the mechanism of corn-binders of the type shown in the patent to Albert S. Peck, No. 466,512, issued January 5, 1892, and has to do with the gathering and straightening of the corn, the cutting of it, the carrying it in an upright position to the binder, and the binding and discharging of it. The position of the binder upon the machine, the method of giving it motion, the compressing and clutching devices are also my improvements, while the form and construction of the framework of the machine, the method of gearing, and the means of actuating the devices used to carry the corn onward to the binder are also improvements to which my invention relates.

There are also other improvements, such as the cutting device, the construction of the guiding-prongs, and the continuation of them to form a guide for the stalks while in the binder. In the specification these improvements will be described and pointed out in detail, while some minor improvements that are found in the machine will be described.

Figure 1 is an elevation of the machine from the main-wheel side, the tongue being broken off just beyond the tilting lever. Fig. 2 is a plan view of the machine, showing the method of framing and of transmitting the power from the driving-wheel to the operating parts, and the top of the machine is removed to more clearly show the construction. Fig. 3 is an elevation in section from the main-wheel side on the line 3 3 of Fig. 2. Fig. 4 is a section in elevation on the line 4 4 of Fig. 1, looking from the rear to the front of the machine. Fig. 5 is a plan view looking onto the forwarding devices from the line 5 5 of Fig. 1, the top parts of the machine being removed. Fig. 6 is also a plan view looking down upon the parts at the rear of the machine from the line 6 6 in Fig. 1. Fig. 7 is an elevation of the binding attachment with the horizontal part of the framework and the compressing connections partly broken away to more clearly show the clutching devices, while Fig. 8 is a plan view, partly in section, on the line 8 8 of Fig. 7, of the main shaft, showing its connection to the horizontal shaft of the binder-frame, together with the clutching, compressing, and other devices. Fig. 9 is a sectional view on line 9 9 of Fig. 8 of the clutching mechanism. Fig. 10 is a plan view of the cutting mechanism, showing the stationary knife and the reciprocating knife, the reciprocating knife being shown in dotted lines in another position. Fig. 11 is a view of the reciprocating knife removed from the machine. Fig. 12 is a top view on the line 12 12 of Fig. 4, showing the moving devices that are on the upright shafts. Fig. 13 is a view of the framework of the machine from the rear, and Fig. 14 is a view of the stud and sprocket-wheel for the lower end of the lower chains.

Similar letters will refer to similar parts throughout the several views.

The machine is of the single-row kind and is drawn by the team walking beside the corn. A main driving-wheel A supports the machine on one side and is adjustable in the frame to vary the height of cut by means of the crank *a* in the usual way that is well known in the McCormick self-binding harvesters. The wheel C carries the side of the machine toward the corn and is also adjustable to change the height of cut in a well-known way. Upon the frame in which these wheels are positioned the machine is erected. This frame, which must be very stiff to withstand torsional strains, strong to carry the heavy binder and load of corn, and firmly jointed to prevent its getting out of line, is formed as follows, viz: Longitudinal sills B B′ are placed on each side of the main wheel, to which in the rear is bolted the rear cross-sill B^2, that extends across the rear of the machine and is bent at the inner rear corner and extends forwardly to form the longitudinal sill at the grain side. Cross-sills B^3 and B^4 are extended from the inner sill B′ about the main wheel transversely across to the longitudinal sill on the grain side. A transverse sill B^5 connects the longitudinal sills B and B′ in front of the main wheel, but extends only to the prong-sill on the outer side of the row, which will

be hereinafter described. It is to be noted that the rear sill B^2 is bent up into a higher plane, as shown in Fig. 13, at the inner rear corner, so that the cross-sills B^3 and B^4 pass beneath it at their inner ends. The sill B is extended forward of the main frame and serves as a fulcrum for the attachment of the tilting lever *b*, positioned on the tongue *b'*, that is connected to the machine at the front outer corner of the frame. A main shaft D, with a spur-pinion *d*, is located on this frame, and its pinion meshes with the spur-wheel *d'*, which receives its motion from the forward advance of the main wheel A. This shaft is carried across the machine, as shown in Fig. 8, and the bevel-wheel d^2, that drives the crank-shaft d^3, which reciprocates the knife, and the bevel-wheels d^4 and d^5, which give motion to the upright shafts D' and D^2, are mounted upon it. The spur-wheel d^6 is also on this main shaft and meshes with a spur-wheel on the horizontal shaft of the binder, thus giving motion to the mechanisms of the binder.

Projecting forwardly from the rear sill and attached to the cross-sills of the machine are the sills of the guiding-prongs. I letter the prong upon the side of the machine away from the corn E and upon the side toward the standing corn F. These prongs pass upon either side of the row to lift the down and fallen stalks, and they serve to support gathering devices that assist in lifting and straightening the stalks, so that they may be formed into a bundle. The stalks are frequently of considerable weight, and it is necessary to build these prongs in a substantial way. Therefore the lower sills of the prongs are extended to the rear sill of the framework across the cross-sills and projected forwardly such a distance as will give the angle of the guiding-ways that are located above them such a pitch as will allow the corn to be carried rearwardly. The sill of the guiding-prong E is lettered *e*, while that of the guiding-prong F is lettered *f*. The prong E is braced from its point to the frame of the machine by the brace *e'*, while the cross-sill B^5 of the machine is attached to the sill *e* so far forward as to support it. By reference to Fig. 2 of the drawings it will be seen that the prong F is formed differently from the prong E in that it has more of an inclination, while its upwardly-inclined board F' and its supplementary board F^2 are wider and have a more pronounced curve at their receiving ends.

In machines of this type the tendency of the team is to keep away from the corn-row, and therefore the prong next to the team can be kept straighter than the one on the other side of the row. It is also a fact that if an inclined stalk is to be lifted the prong must get beneath it near the roots or it will be thrown forward parallel with the advance of the machine, and thus be run over. I have therefore kept the inner prong more nearly straight and the outward one curved, a construction that is not my invention. I have, however, made its guiding-board overlap it, thus straightening the stalk by the board as quickly as possible, while the prong is nearer the root of the stalk. It should be borne in mind that great care is required to prevent the stalks from falling forward when struck by the prongs and that the least frictional resistance possible must be permitted. I therefore set the sill back under the prong, as stated above. In this connection I will also explain that the guiding-boards upon the prongs are subject to hard usage, the stalks wearing into them and forming notches which push the stalks forward rather than allow them to slide upwardly along the prong. I have remedied this by forming the forward end of the supplemental guiding-boards of sheet metal, suitably curving the edges and overlapping the boards with this sheet extension, as shown in Figs. 1 and 3. It is in the combination of the board with the sheet metal that my improvement at this point relates. As the thickness of the board would have to be so great if continued to the point in order that there be strength as to make an abrupt guide, while if the sheet metal were continued through to the rear it would not be so stiff and would be more liable to rattle. The guiding-boards upon the prongs E and F are supported at the rear by the upright standards G and H. These standards are erected on the cross-sill of the frame and are formed by extending an upright post to the height of the guiding-board and then bending it horizontally to furnish a support for that board throughout its width. A brace to this standard is then erected and continued above the standard and inclined inwardly toward the passage-way with an inclination sufficient for the ears upon the stalks to slide easily along the board that is attached to this inclined standard and into the passage-way, if perchance they should be caught upon these boards during the forward advance of the machine. The guiding-board F' and supplemental guiding-board F^2 are upon the other side of the row and extend from the points of the prong F rearwardly and upwardly. The guiding-board F' is continued rearwardly beyond the upright standard H and attached to a connection on one post of the binder-frame, while the guiding-board E' is continued rearwardly and attached to a connection from the post of the binder on the other side of the passage-way. The upright shafts D' and D^2, that receive motion from the main shaft D, as clearly shown in Fig. 4, are supported at their upper ends in journals attached to the main portions of the upright standards G and H. These shafts carry at their lower ends sprocket-wheels I and J and near their upper ends K and L, while on their extremities are keyed the rosettes M and N. The sprocket-wheels I and J are of such size and the speed transmitted to them is such that the chains mounted on them and extending forwardly

to the sprocket-wheels I′ and J′, which are mounted on studs *i* and *j*, will give the chains a speed about the same as that of the advance of the machine. The studs *i* and *j* are adjustable along the sills of the prongs to take up any slackness in the chains, as shown in Fig. 14. The upper sprockets K and L are of such size as to carry longer chains, which are supported on the guiding-boards E′ and F′, around sprocket-wheels K′ and L′, which turn on studs that are adjustably mounted upon the guiding-boards E′ and F′. The chains mounted upon these sprockets carry feed-teeth that aggressively act to carry the corn rearwardly. The rosettes M and N upon the upper ends of the shafts are put there to position crank-arms M′ and N′, that are held upon them by nuts on the ends of the shaft. By these rosettes these crank-arms can have their throw adjusted one to the other so that their stroke will alternate, as desired. Upon these crank-arms are rakes O and P, that are given a rotating motion at their upper end, and sliding through guides at their lower ends thus enter the corn in the passage-way and force it onward and toward the binder. As one retreats the other advances, and any long heavy stalks that hang upon the gathering-prongs are carriedly backwardly toward the binder. Attention is called to the form of these rakes O and P, to the extent of their stroke in relation to the parts of the binder, and to their widened extremities. These features will be referred to later, and the positions that these rakes occupy and the work that they perform will be pointed out while giving a description of the other parts with which they coact.

The upright shafts D′ and D², as has been explained, are located one upon each side of the corn passage-way and are given motion from the main driving-shaft of the machine. They have a forward inclination about perpendicular the pitch of the guiding-boards E′ and F′, which pitch is governed by the slant against which the corn can be carried up the prongs, and they have an upward inclination away from the row to widen the passage-way for the bulky part of the stalk and ear. Another object of this inclination away from the row is that the forwarding devices above cannot do their most available work if they are not speeded faster than those below. They therefore require larger sprockets to carry them. The chains below cannot vary much in their rapidity of travel from the forward rate of travel of the machine, as they are so near the stiff butts that they cannot deflect them, while if the chains above only go at same rate as the machine they would do little good as lifters and forwarders. Heretofore in machines of this type it has been found necessary to separate these upright shafts, using supplemental sprockets to carry the forwarding devices in the stalk passage-way in order to allow the broken stalks of corn and the trash to work back between them and pass through the machine and also that different-sized sprockets could be used to give the proper speed to the forwarding devices. It is easily seen that any stalks that are not caught by the upper gathering devices and lifted to the height of the needle will not be gathered in the bundle. In fields of corn that are badly lodged and the stalks broken the forward advance of the machine and those stalks that are caught in the upper forwarding devices will sometimes carry this trash into the machine and pass it through to the rear. Generally, however, this trash will soon fill the machine. For corn of this description I have mounted upon these upright shafts feeding-rolls or beaters Q and R. They are shown in the drawings, Figs. 4 and 12, as being corrugated. I have, however, experimenting in the field, found that other forms of beaters will work satisfactorily, such as square and hexagonal. I therefore do not wish to limit myself to any precise form for these rolls. The trash which works back against them is carried between them and discharged through the machine.

The binding attachment that receives the corn in an upright position from the corn passage-way formed by the projecting prongs and bites off from this stream bundles which it binds and then discharges them is positioned on the machine similarly to the binder shown in the Peck machine. It is, however, inclined rearwardly from a vertical plane, which inclination allows the horizontal member of the U-frame to be brought more nearly to the main shaft D of the machine and the spur-wheel d^6 thereon to mesh with and give motion to the operative parts of the binder. Were the upper part of the binder brought forward into the same vertical plane as the lower part the receptacle for the accumulation of the corn while the bundle is being bound and the needle has cut off the passage-way would be decreased in size and would not hold the amount of corn that might accumulate were the crop heavy. This pitch of the binder also gives the support deck or platform upon which the butts rest a downward inclination rearwardly, so that the butts tend to slide from the machine with greater ease, and the tops will also slightly incline in that direction, thus making the separation of the bundle and its discharge after binding more easy than though the binder were vertical. The guide-boards above are connected with the binder upon either side of the row, as in the Peck machine, thus supporting the corn from the time it is gathered in by the prongs until it is discharged in the form of a bound bundle.

The main or U frame S of the binder is attached to the main frame of the machine by being bolted upon raised brackets *s*. The machine is thus easily dismantled for shipping, and the binding attachment can quickly be put in place after shipment. The horizontal part of the U-frame S furnishes a bearing for the horizontal main binder-shaft S′. This shaft carries the spur-pinion s^2, that meshes

with the spur-pinion d^6 on the main shaft. A bevel-wheel s^3 gives motion to a bevel-wheel on the packer-shaft s^4. This shaft is thus given a continuous movement, the packers during the binding operation working in the space in the stream of corn that has been opened by the needle.

In order that the other parts of the binder may have an intermittent movement dependent upon the amount of corn that has been put upon the binder, a clutch s^5 in the common form of a double driver with rollers mounted on its arms is keyed to the shaft S'. A bevel-wheel s^6 is loosely placed on the shaft beside the clutch, the clutch and wheel being so located upon the shaft that the bevel-wheel will mesh with a bevel-wheel s^7 on the knotter driving-shaft. A trip-dog s^8 is pivoted on the bevel-wheel s^6, and by means of its spring s^9 it is forced into the path of the rollers on the double driver, which in their rotation strike the projection s^{10} on the trip-dog. It is thus seen that any motion transmitted by the spur-gears to the main horizontal shaft of the binder will be transmitted to the bevel-wheel on the vertical or knotter shaft and that the parts of the binder will be continuously in motion. This, however, is not desirable, as the binder would operate so rapidly that sufficient stalks to form a bundle would not be accumulated. A trip-stop T is therefore pivoted so that when held in its normal position it will be positioned in the path of the rotation of the trip-dog s^8, which will strike against it, thus forcing the trip-dog to be thrown outwardly on its pivot against the trip-dog spring S^9 and the roller on the clutch that engaged with the projection of the trip-dog to pass by the projection, thus unclutching the mechanism beyond.

At certain intervals when sufficient corn has accumulated it becomes necessary to move the trip-stop into the path of the trip-dog, which is accomplished by placing the trip-fingers t in the path of the stream of corn. A supplemental trip-finger t' is placed in the stream below the regular fingers, so that should the machine fill up with broken stalks and trash that would not be sufficient to move the trip-fingers pressure upon this supplemental trip would rotate the shaft t^2, upon which both the trip-fingers and this supplemental trip are placed, and by means of the crank on the trip-shaft and a connecting-rod from this crank to one arm of the trip-stop T pressure upon these fingers will throw the trip-stop out of the path of the trip-dog and allow the parts to become clutched. A trip-stop spring T' presses against the trip-stop and tends to keep the trip-fingers forward and the trip-stop in the path of the trip-dog. The pressure of the incoming corn then upon the trip-finger must overcome the strength of this spring.

As thus far described, the machine would be clutched and unclutched. The trip-fingers have, however, another function—that of compression—and they must also have a capacity to get out of the way when the bundle is being discharged, and means must be provided to forcibly bring them into position after the bundle has been discharged. These objects I accomplish by pivoting to the frame of the binder a compressor-lever T^2, one arm of which carries a roller that is located in the path of a cam-track on the bevel-wheel s^7. To the other end of this lever a spring-link pitman of the usual form is connected and through connections that will be hereinafter explained is attached to the trip-shaft t^2. It is thus seen that any pressure on the trip-fingers when sufficient to clutch the machine will be thrown upon the spring-link pitman and compressor-lever T, which will with a spring force hold the fingers forward against the corn as long as the roller is traveling upon the cam-track on the bevel-wheel. This track, however, is cut away upon one side, and the rotation of the bevel-wheel, with the pressure of the corn against the trip-fingers, will cause the compressor-lever to drop in this depression, thus opening the fingers for the outward passage of the bundle.

I have discovered that the stiff hard stalks of corn cannot be indented by a compressor as can the softer straws of grain and that a strong compression will frequently clog the machine. I have therefore introduced between the trip-fingers and the compressor-lever a means by which the trip-dog is more easily actuated to throw the clutching devices into engagement, and because of the same construction the trip-fingers will have an increased leverage on the compressor-spring over and above what they would have did the spring-link containing the compressor-spring connect directly the compressor-lever with the shaft on which the trip-fingers are mounted. To accomplish this result, I pivot the trip-stop T in a pivoted arm T^3, which has its bearing on a stud positioned on the main frame S of the binder. The trip-stop is pivoted in this pivoted arm and held into a position to be in line with the path of the trip-dog by means of the trip-stop spring T', as referred to before.

In the construction shown in the drawings one end of the spring-link is extended to form the pivot of the trip-stop on the pivoted arm. It will thus be seen that the spring-link T^{30}, connecting the compressor-lever T^2 with the pivoted arm T^3, in which is pivoted the trip-stop T and which is connected with the shaft upon which the trip-fingers t are mounted, forms a connection which keeps the trip-fingers into the path of the stream of corn and closes this path, so that the stalks will not escape. Pressure brought upon the trip-fingers will first overcome the strength of the trip-stop spring T', and then the binder mechanism will be started into operation. The trip-fingers, then acting as compressors, will have an increased leverage over the spring in the spring-link because of the leverage exercised

upon it through the trip-stop T and pivoted arm T^3, which have now become a rigid element. A strong spring can by this means be put into the compressor-link, so as to always insure that the trip-stop spring T′ shall be first actuated and still when the bundle is being compressed shall not exert such force upon the compressor as will clog the machine. It is to be remembered that the spring in the spring-link must be of a strength enough greater than the trip-stop spring to insure the giving away of the trip-stop spring in the spring-link, otherwise the spring-link would yield and the binder fill with corn so full that it could not hope to form a bundle and discharge it. The immediate action of the binder when a bundle has been accumulated is necessary in corn-binding machines.

In the practical operation of corn cutting and binding machines in the field, especially of the type which cuts the corn and binds it vertically, it has been found necessary to begin raising the corn at some distance ahead of the machine and to confine it by means of gathering-prongs, which prongs guide and lift the tops of the stalks and confine them at the bottom until they are severed by a knife or knives that are located in the stalk passage-way formed by these prongs. Corn is usually grown in rows and frequently in hills that contain five or six large stalks. These must be severed within a short advance of the machine, and it has been one of the problems in the building of a successful corn-harvester to discover a corn-knife that shall satisfactorily sever the corn in all the varying conditions of the field. A rigid knife alone, while it might cut the stiff standing stalks, would fill with trash and weeds and light corn would have so little resistance in the stalk as to be pushed forward and slide beneath the machine, while a rotating or a reciprocating knife alone will have so much work thrown upon it as to be clogged. I have therefore combined a stationary knife and a reciprocating knife, but have formed them differently and combined them in a new way to meet the varying conditions. I position a stationary knife U in the corn passage-way and bolt it to the lower sill of the guiding-prong F, as that side of the machines of the type shown in these drawings has a tendency to hug more closely to the row than the other. This knife I extend diagonally across the passage-way to the rear until its diagonal cutting edge *u* approaches the reciprocating knife in the rear, and then I leave an opening between the knife U and the sill of the other prong of sufficient width to allow trash and weeds to pass by the knife into the path of the reciprocating knife. The reciprocating knife U^2 is held in guiding-ways u^2 on the sills of the prongs, and by means of the pitman and crank (shown in Fig. 2) is reciprocated across the opening left between the stationary knife U and the sill of the prong F.

As so far explained the parts would sever the corn under many conditions, but not all, as when the stalks are lodged in the field and especially when they are leaning forward in the direction of the advance of the machine they will be gathered between the prongs, but not lifted, and the machine will slide along the stalk, it being nearly horizontal with the ground, and the ear projecting from the stalk will be caught between the stationary knife U and the sill of the guiding-prong F. The ear being very hard, it will wedge between these parts and the machine will soon clog. In such corn it has been found necessary heretofore to take off the stationary knife or else to so reduce its size as to allow the ears to slide back to the reciprocating knife. When the size of the stationary knife is reduced, of course its cutting capacity is also lessened and more work is thrown upon the reciprocator. The draft is thus increased, and in very heavy corn the work for the reciprocator becomes so great that it cannot do it. It is readily seen that even in the same field corn may be extremely heavy and standing and then again lodged, so that as much work should be done with the stationary knife as possible. Still when entering the lodged corn the ears will clog in the knife so badly as to cause much trouble. I have remedied this difficulty by attaching to the reciprocating knife a long section U^3, that projects ahead of the regular cutting-section of the knife. It is positioned similarly to the blank section with which cutting-knives have been heretofore fitted. I have, however, sharpened one edge of the knife. It is fastened upon the reciprocating knife-back and held down to its work by the guiding-ways u^2. It projects forward to such an extent as to strike the ears of corn that may lodge between the stationary knife and the sill of the prong F, but does not in its reciprocation make a complete crossing of the slot left between the stationary knife and the sill of the prong F. It does, however, go far enough to strike any ears that may be lodged in the space, splitting many of them and forcing the others onto the stationary knife, so that the forward advance of the machine will carry these ears along the edge of the stationary knife and into the slot to be again struck by the long section, and, finally, if not severed the ear will slide back into the passage-way and be cut off by the combined action of the short and long section against the prong or the stationary knife. It should be explained that these ears are frequently very hard and that they will lodge upon the stationary knife, but if struck from the other side and pushed farther on to the stationary knife that the stalks will force them along the cutting edge, where otherwise they would lodge. The long section is not intended to make a stroke across the open slot in the rear to sever any trash or weeds, as this will be done by the short

section with a saving of some power. Besides the combined action of the long and short section is necessary to do the cutting.

Behind the knife is an upwardly-inclined flooring V, upon which the butts of the stalks slide rearwardly when being carried back by the chains upon the gathering-prongs. This flooring is parallel, or practically so, with the planes of the path of the forwarding-chains above. It extends rearwardly, being fastened to the cross-sill of the main frame of the machine, and then outwardly and rearwardly to the rear sill of the machine; but as it extends from the sill of one guiding-prong to that of the other it protects the parts of the machine from the wearing and rough contact with the butts of the severed stalks. I form it of a plate of sheet-steel, and it serves at its upper angle for the bearing of the box *v* of the main shaft D. This shaft, as has been before explained, carries near this bearing the bevel-wheels that give motion to the upright shafts and the spur-wheel that gives motion to the binder. The box *v*, being carried farther to the rear, as shown in Fig. 3, forms a continuation of the specially-inclined floor, along which the butts slide until they have reached the deck of the binder.

In Fig. 6 I have shown a view on line 6 6 of Fig. 1 to more clearly point out the relation between the stroke of the needle and packers of the binder and that of the adjusters or supplemental forwarding-rakes O and P. In order to prevent the stalks from getting behind the rakes at their delivery end, the guiding-rod Q′ is fastened to the supplemental guiding-board F^2 on one side of the path of the passage-way and the widened end of the rack P never advances from beneath it, while on the other side the continuation Q^2 of the supplemental guiding-board E^2 in a plane practically parallel with that of the binder-deck, as shown in Figs. 1 and 3, holds the corn from getting behind the widened end of the rake O. It will be noticed that the extended end Q^2 is slightly downward and curved outwardly, thus guiding the corn in its discharge to the side of the machine.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a corn-harvesting machine, projecting prongs extending in front of the machine and slanting rearwardly and upwardly from their points, upright shafts, one upon each side of the row, which carry devices at the lower extremity to move the corn onward, and at their upper ends other forwarding devices to lift and straighten the corn, cranks mounted upon the upper ends of these shafts, with means for adjusting the cranks angularly on the shafts, and rakes mounted upon the cranks and reciprocated by them.

2. In a corn-harvesting machine, forwardly-projecting prongs, one on each side of the row, which prongs form a passage-way for the stalks, stalk-forwarding rakes located on either side of said passage-way and operated to project into said way, move rearward, and withdraw therefrom, and means for adjusting the throw of the rakes so as to regulate with respect to each other the time when said rakes are projected into and withdrawn from the passage-way.

3. In a corn-harvesting machine, forwardly-projecting prongs on opposite sides of the row forming a passage-way for the stalks, upright shafts located on opposite sides of said passage-way, stalk-forwarding rakes operated by cranks on said shafts, and rosettes on the shafts whereby the angular adjustment of the crank on one shaft may be varied relatively to that of the crank on the other.

4. In a corn-harvesting machine, forwardly-projecting prongs on opposite sides of the row forming a passage-way for the corn, said prongs being continued toward the rear, traveling-chain butts-forwarding devices driven by sprockets on upright shafts journaled at their upper ends in the prongs on opposite sides of the passage-way, and traveling-chain tops-forwarding devices also on opposite sides of the passage-way and moving at a faster rate of speed than the butts-forwarding chains, the shafts having an outward inclination away from each other at their upper ends, whereby the tops-forwarding chains may be driven by larger sprockets on the shafts without the employment of idlers.

5. In a corn-harvesting machine that severs the corn and binds it while on end, the combination of gathering-prongs forming a passage-way for the stalks, forwarding devices carried by the prongs on either side of the passage-way, an upright binder located at the rear of the passage-way, said binder being inclined rearwardly from a vertical position, and a floor to the stalk passage-way in rear of the cutters that inclines upwardly toward the binder and downwardly therefrom, so as to afford room under the platform for the operative parts of the machine and to facilitate the discharge of the bound bundle; substantially as and for the purpose specified.

6. In combination to form a framework for a corn-harvesting machine, a rear sill extending across the full width of the machine, a cross-sill extending from the outer sill to the inner gathering-prong: girths, one on each side of the main wheel connecting the rear sill with the cross-sill; cross-sills extending from the inner main-wheel girth across to the grain-wheel sill, forwardly-projecting inclined sills extending from the rear sill across the cross-sill and in front of the machine, one upon each side of the row, all substantially as and for the purpose specified.

7. In combination in a corn-harvesting machine, with the main frame the main shaft extending transversely and the forwardly-extending prongs and the forwarding device mounted thereon, a binder located on the main frame in an upright position inclined toward the rear from the vertical, the main

shaft of the binder being practically parallel with the main drive-shaft and receiving motion therefrom, the space between the forwarding devices on the prongs and the back of the needle being sufficient to accommodate cut stalks while the binder is tying the bundle without increasing the depth of the frame or the distance the butts have to travel.

8. In a corn-harvesting machine that severs the corn and binds it while it is still on end, in combination with the gathering-prongs and the forwarding devices carried by them, a binder positioned on the machine at the rear of the gathering-prongs and in line with the stalk passage-way formed by them, which binder is inclined rearwardly from a vertical position whereby an enlarged space is provided for the accumulation of stalks behind the needle while the binder is tying a bundle without increasing the distance the butts have to be carried.

9. In combination in a corn-harvesting machine that receives the corn between gathering-prongs and conducts it rearwardly on ends to a binder where it is bound and discharged, forwarding devices located on the prongs to carry the corn onwardly to the binder, the prongs being connected with the binder on each side of the stalk passage-way and forming a continuous passage-way for the stalks from the time they are severed until bound, the binder being inclined rearwardly, whereby the receptacle for the accumulation of the cut stalks during binding that is formed between the forwarding devices and the back of the needle, is enlarged without increasing the depth of the frame or the distance the butts of the stalks have to be carried.

10. In combination in a corn-harvesting machine with the gathering-prongs, vibrating, reciprocating rakes located on the prongs, inclined shields or guides positioned on the prongs above these rakes, the rear end of the rake being widened, whereby in the vibration of the rake the rear end does not pass from beneath the overlying guide, substantially as and for the purpose specified.

11. In combination in a corn-harvesting machine with the gathering-prongs and the forwarding devices mounted thereon, a binder positioned on end at the rear of the forwarding devices, a shaft in the binder that is driven from the main shaft of the machine, which shaft carries a bevel-gear that drives the packer-shaft and another bevel-gear that drives the knotter and discharge shaft, a clutch mechanism positioned on this shaft, and connections extending from the clutch to a finger located on the corn passage-way, substantially as and for the purpose specified.

12. In combination in a self-binding machine, a main shaft that gives motion to the packer-shaft by means of gearing, and to the knotter and discharge shafts, also by means of gearing, a clutch mechanism located on this shaft, a trip-stop pivoted on the machine-frame and formed of two members, a finger located in the corn passage-way and connected to one member of the trip-stop, a link-and-lever connection from the other member of trip-stop to a cam whereby the pressure of the corn upon the finger that is located in the corn passage-way clutches the machine and further pressure acts upon the link-and-lever connection with an increased force, substantially as and for the purpose specified.

13. In combination in a self-binding machine, a main binder-shaft with beveled gearing thereon that gives motion to the packer and the knotter and discharging shafts, clutching mechanism, a trip-stop formed of two members and pivoted to the machine-frame in such a position that one of the members shall, when in normal position, be in the path of the trip-dog on the clutch; a spring between the members of the trip-stop, an elbow-lever pivoted on the machine, one arm of which is in the path of a cam positioned on a moving part of the binder, a spring-link connecting the other arm of the elbow-lever with the trip-stop, a link connecting the trip-stop at a point farther from its pivot than the connection of the spring-link, with a finger that is located in the path of the stream of corn, substantially as and for the purpose specified.

14. In combination in a self-binding machine with the corn passage-way, trip and compressor fingers located in this passage-way, connections from these trip and compressor fingers to a trip-stop pivoted upon the machine, the trip-stop being formed of two members; a spring interposed between the members of the trip-stop; a spring-link connected to that member of the trip-stop that releases the clutch-dog at a point between the pivot of said stop and connecting-link and with a loop-lever pivoted upon the machine, one arm of which is within the path of the cam, substantially as and for the purpose specified.

15. In combination in a corn-harvesting machine, a stationary knife located between the gathering-prongs and extending partly across the corn passage-way, a reciprocating knife at the rear of the stationary knife and moving across the space between the sill of the gathering-prong and the stationary knife, which reciprocating knife has a long section that extends forward of the main cutting portion of the knife.

16. In combination in a corn-harvesting machine to form the cutting apparatus, a stationary knife extending partly across the corn passage-way, a reciprocating knife moving across the passage-way that is left between the stationary knife and the sill of the machine; a long section upon the reciprocating knife that extends forward of the main cutting portion of the said knife, but which does not make a stroke entirely across the opening between the sill and the stationary knife.

17. In a corn-harvesting machine, forwardly-projecting prongs on opposite sides of

the row forming a passage-way for the stalks, a binder positioned at the rear of the prongs and to which the passage-way formed by the prongs is continued, the binder being inclined rearwardly from the vertical, whereby an enlarged space is provided for the accumulation of corn behind the needle when it closes the passage-way, and the discharge of the bound bundle from the binder is facilitated.

18. In combination to form a cutting apparatus in a corn-harvesting machine, in which gathering-prongs pass upon each side of the row and conduct the stalks to the knife, a stationary knife extending nearly across the stalk passage-way formed between the gathering-prongs, a reciprocating knife having a blade that moves across the open space between the stationary knife and the gathering-prong, a longer blade attached to the reciprocating knife that moves from the gathering-prong toward the stationary knife, but does not, in its stroke, pass entirely across the opening between the stationary knife and the gathering-prong, substantially as and for the purpose specified.

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