(No Model.) 4 Sheets—Sheet 1.

L. MILLER.

GRAIN BINDER.

No. 411,821. Patented Oct. 1, 1889.

FIG. 1.

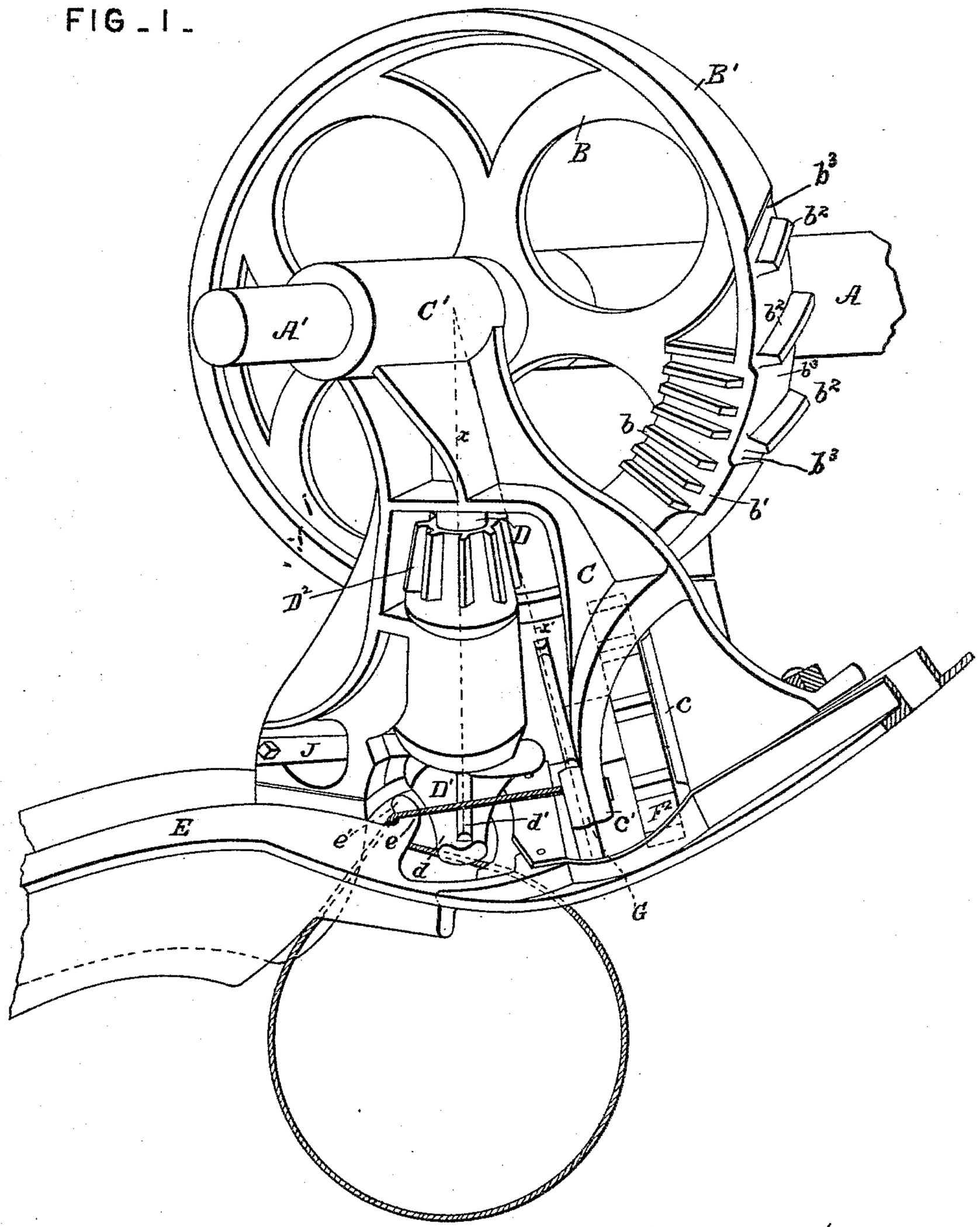

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FIG. 2.

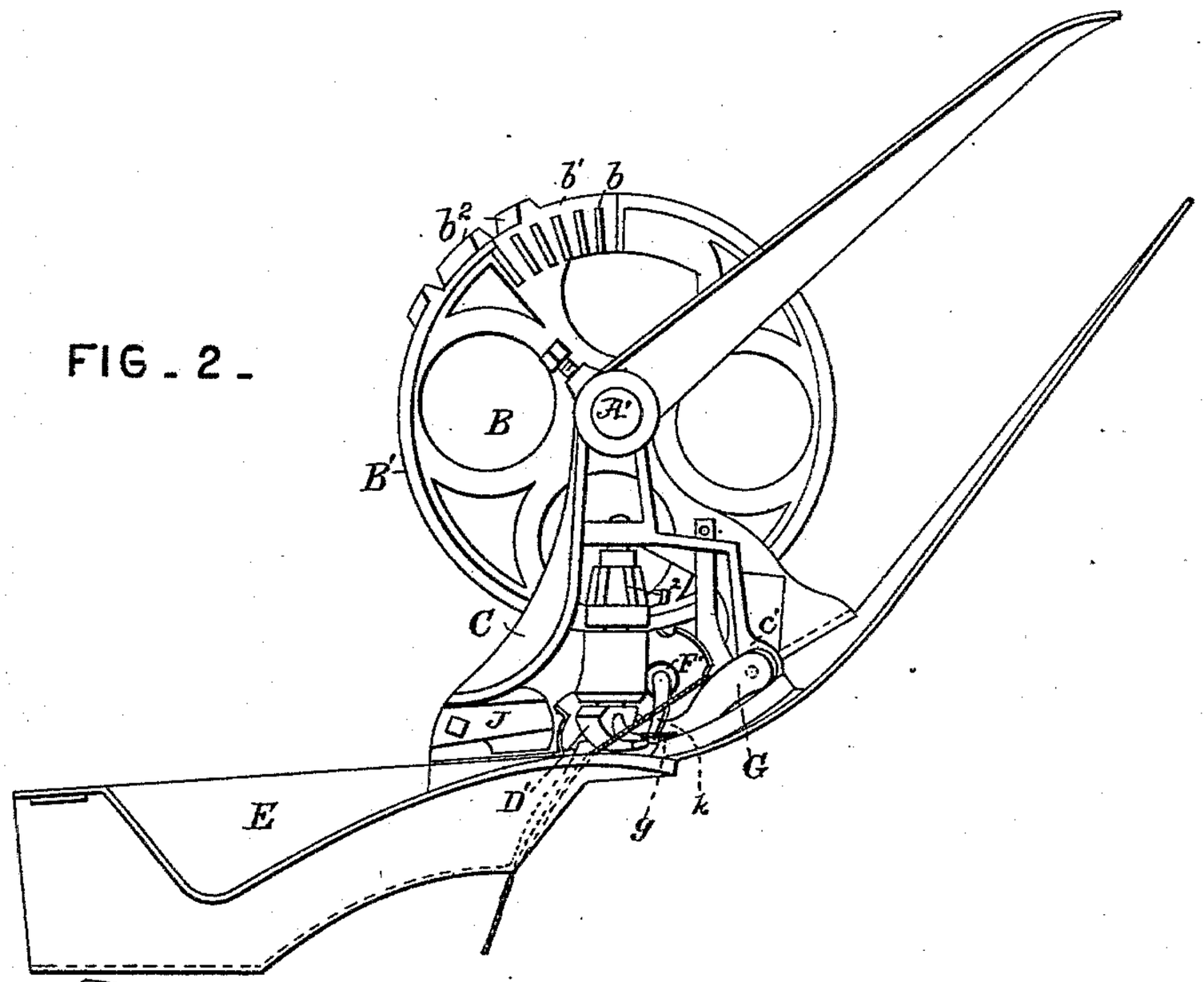
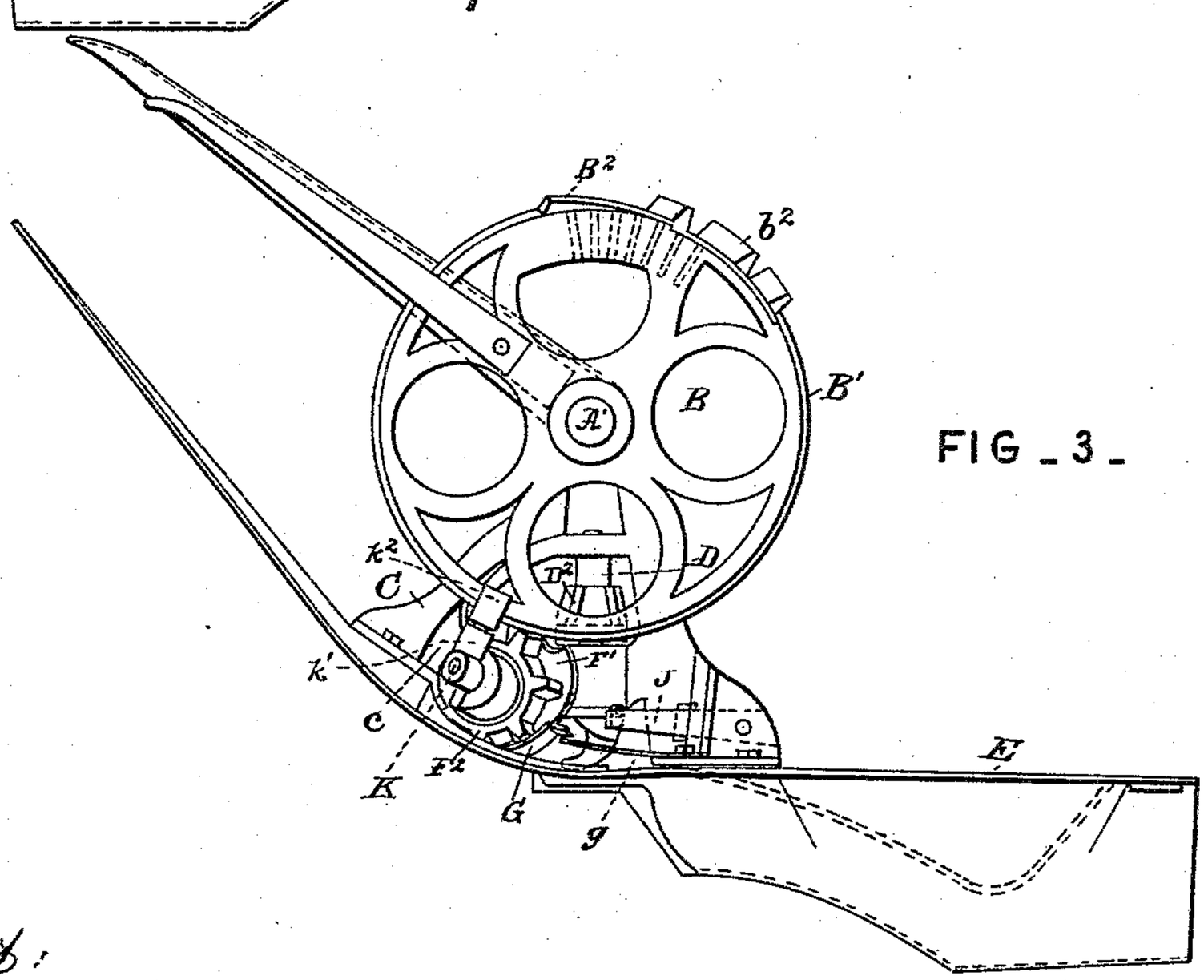


FIG. 3.



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GRAIN BINDER.

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FIG. 9.

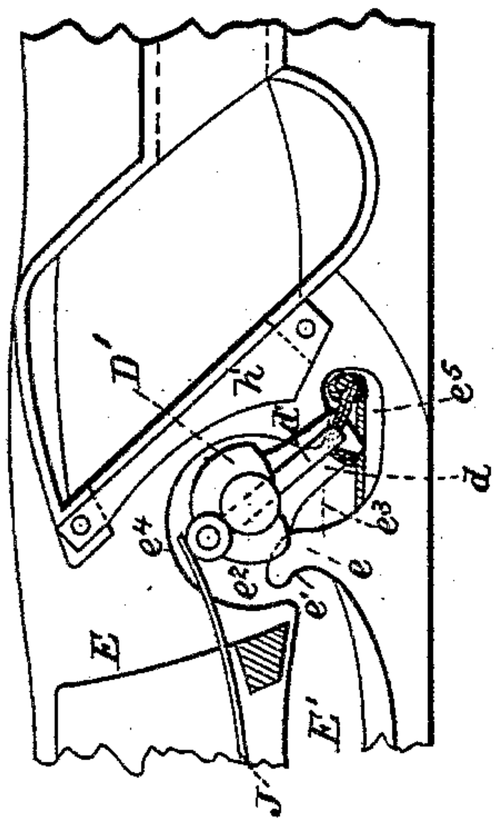


FIG. 5.

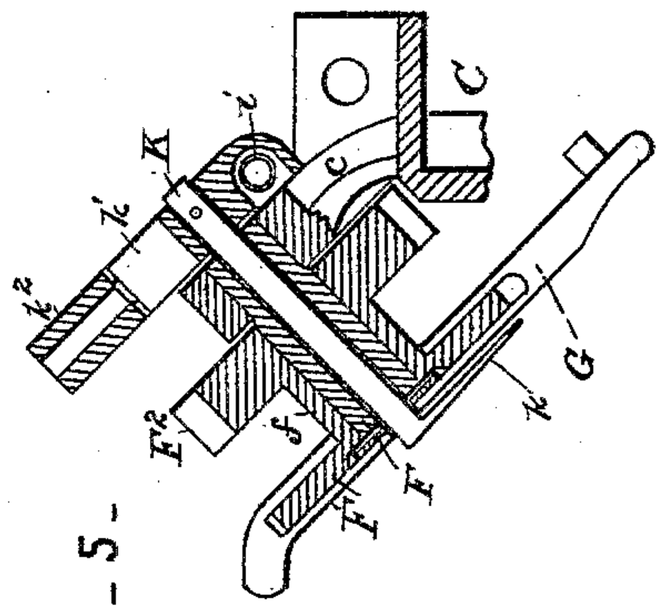


FIG. 4.

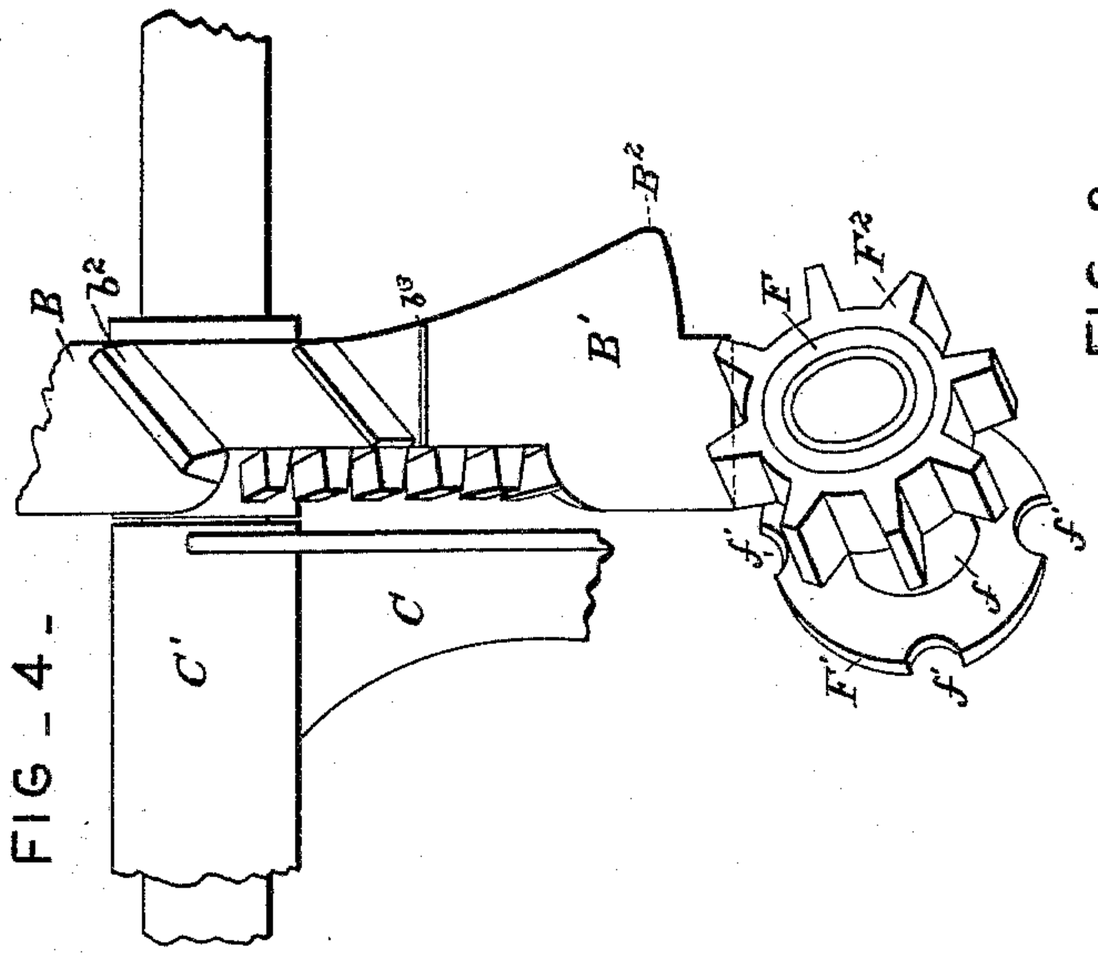
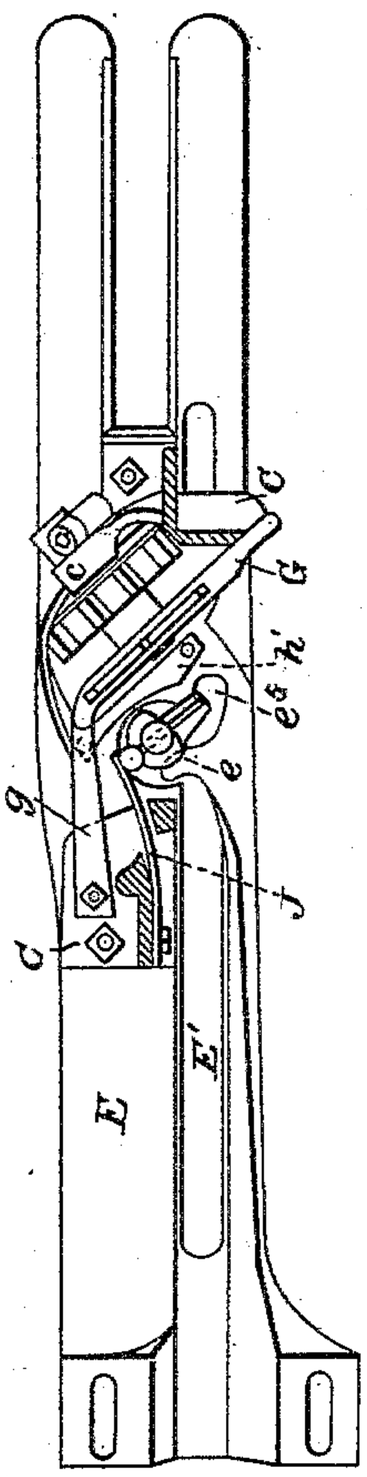


FIG. 8.



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(No Model.)

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GRAIN BINDER.

No. 411,821. Patented Oct. 1, 1889.

FIG_6_

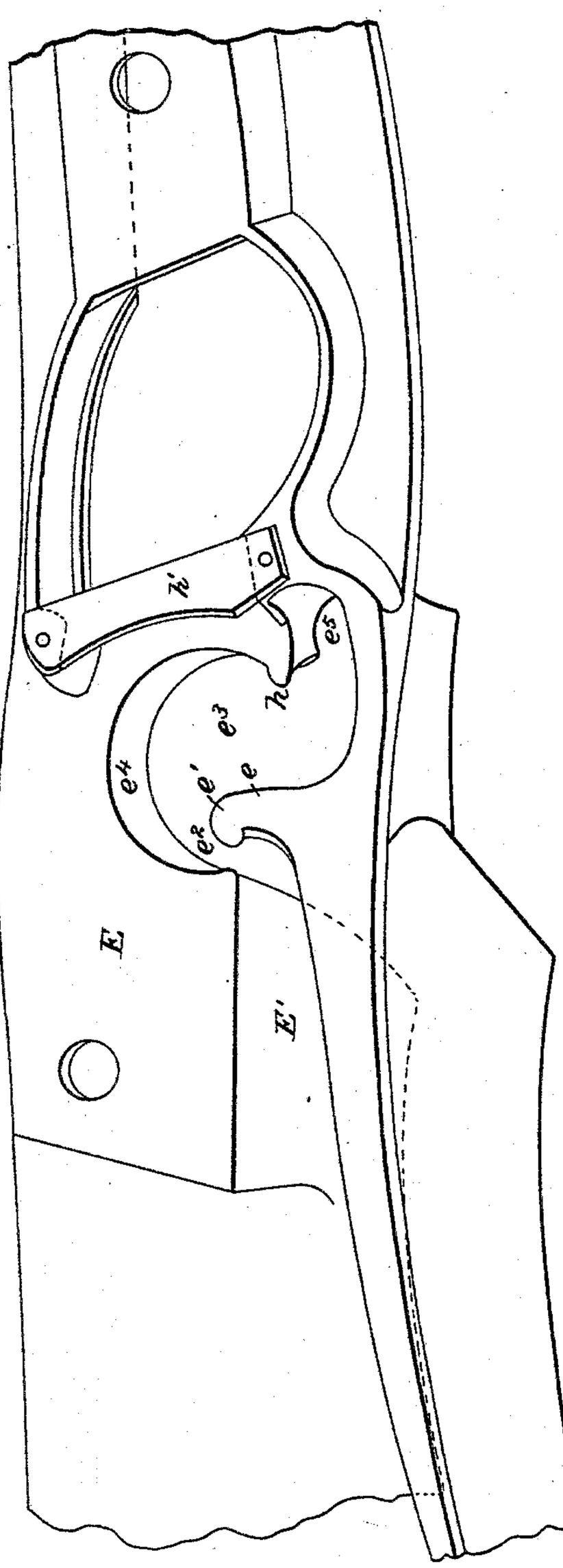
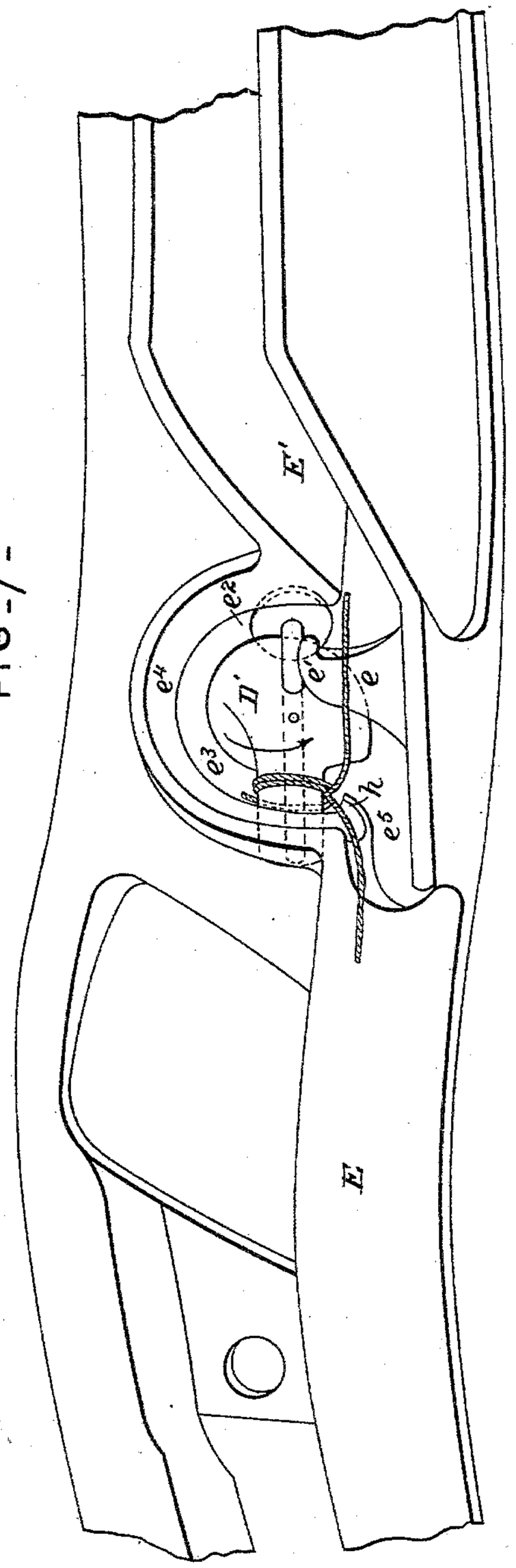


FIG_7_



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UNITED STATES PATENT OFFICE.

LEWIS MILLER, OF AKRON, OHIO.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 411,821, dated October 1, 1889.

Application filed August 16, 1888. Serial No. 282,917. (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-Binders, 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 the construction of the knotter-actuating gear-wheel and to the arrangement in connection therewith of the pinion actuating the cord-holding disk, whereby said wheel is made to hold said disk stationary in the intervals of intermittent rotary movements without the aid of the ordinary projecting flange or rib and by the engagement of the faces of adjacent teeth of the pinion with the outer face or periphery of said wheel.

It further relates to the construction of the knotter breast-plate, whereby it is provided with two spurs or fingers projecting within the cord-slot—one in front of the knotter, relative to the movement of the grain, for holding the cord and yielding it at the proper time to the knotter, and the other in rear of the knotter and serving to insure the proper holding and placing of the ends of the band within or between the jaws of the knotter—and to certain details of construction and arrangement of parts, all as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of so much of a grain-binding mechanism as is necessary to show my improvements, looking from the rear discharging side, and showing the knotter breast-plate, actuating-shaft sleeve, and point of the knotter. Fig. 2 is a rear elevation, and Fig. 3 a front elevation, of the knotter mechanism, breast-plate, and bundle-discharge arms. Fig. 4 is a stubble-side elevation, showing the relation of the cord-holder disk and its actuating-pinion to the knotter-actuating wheel, which also actuates said disk and pinion with an intermittent rotary movement and holds them in the intervals of said movements. Fig. 5 shows the cord-holder disk and its actuating-pinion and support in section, with the through shaft and lever for operating the knife. Fig. 6 is a perspective view of the knotter breast-plate looking from the rear and above. Fig. 7 is a similar view looking from beneath and showing the knotter in the act of grasping the ends of the band; and Figs. 8 and 9 are plan views of the breast-plate, showing the knotter-stand and shaft in section—one with with the cord-holding devices and the other with said devices removed.

A indicates a portion of the sleeve of the binder mechanism stand or frame in which the knotter-actuating shaft A′ has its bearings; B, the knotter-actuating wheel fast on said shaft; C, the knotter stand or frame, in which the knotter-shaft D has its bearings and which is suspended from the shaft A′ through a sleeve C′ on its upper end, and E the knotter shield or breast-plate secured to suitable foot-flanges formed on the stand C in a well-known manner. The stand or frame C is in the form of a casting, provided on its upper end with the sleeve C′, and having pendent arms provided with suitable projecting arms or lugs, in which the knotter-shaft, the shaft of the cord-holder disk, and the pivot of the cord-holder shoe have their bearings.

The knotter (indicated at D′) when at rest stands with its jaws *d* and *d′* pointing rearwardly and outwardly, as indicated in Figs. 1, 8, and 9, and the shaft of the cord-holder disk and the pivot of the cord-holder shoe are arranged in planes substantially at right angles to said jaws to bring the cord-holding devices into a plane parallel, or nearly so, with and outside of said jaws in such manner that the cord, in being carried to and from the cord-holder by the needle, will be laid upon the knotter. The lugs or ears *c* and *c′*, in which the shaft of the cord-holder disk and the pivot of the cord-holder shoe are journaled, are set obliquely to the body C of the knotter-stand to accommodate the oblique arrangement of the cord-holder shaft and pivot.

F indicates the tubular stud-shaft of the cord-holder disk, secured in the lug or arm *c*, and F′ the notched cord-holder disk journaled on said shaft and formed in one with or fast on a sleeve *f*, to which the actuating-pinion F^2 is also rigidly secured. The shoe G is pivoted in the lug or arm *c′*, and is grooved or slotted to allow the lower side of

the disk F′ to rest and move within it in the usual manner, its free end being upheld to support the shoe in proper working relation to the disk by a spring *g*, which is secured to the breast-plate or to a foot-flange of the knotter-stand and frame, and bears against the lower face of said shoe at its free swinging end. The pinion F^2, under the arrangement described, is brought into the plane of knotter-actuating wheel B, with its upper face inclined and crossing the face or periphery of said wheel obliquely, and with the outer faces or edges of two of its teeth resting in contact with the periphery of the rim of said wheel, and which rim is made broad enough to rest upon two of said teeth, and so to act as a delay-surface for holding the pinion and disk in the intervals between their partial rotary movements.

The disk F′, under the arrangement of its support as described, is made not only to stand in a plane crossing the plane of the knotter-shield obliquely, but it also stands in a plane oblique to the plane of the knotter-shaft in such manner that a line drawn diametrically across the face of the disk to the center of the knotter-actuating shaft would intersect at the latter point the axial line of the knotter-shaft extended, as indicated by dotted lines *x* and *x′*, Fig. 1. The faces of the teeth of pinion F^2 and of the rim of the wheel B by this arrangement are brought into true working relation to each other and all cramping of the parts avoided.

The wheel B is provided on its forward face, at *b*, with a sufficient number of teeth to impart a single complete revolution to the knotter-shaft through the pinion D^2, fast on said shaft, and has the broad rim B′, the outer face of which forms the delay-surface referred to. The forward edge of this rim, at the point where it would overlie the teeth *b*, is cut away at *b′* to accommodate the knotter-pinion and permit its rotation, and just in front (relative to the direction of movement of the wheel B) of and in line with said cut-away portion the rim is slightly depressed at b^3 to permit the rotation of the pinion F^2, and at said depressed portion has the teeth b^2, which act at each revolution of the wheel B to impart a partial revolution to the pinion F^2 and cord-holder disk equal to the distance between the notches *f′* in the latter, which engage the cord and carry it into the shoe in a well-known manner.

By the construction of wheel B and the arrangement of the pinion F^2 relatively thereto, as described, the diameter of the wheel B is contracted and the parts are brought into compact shape as compared with machines in which the wheel has a thin rim or peripheral flange formed upon it to project between the teeth of the cord-holder pinion or into the notches of the cord-holder disk for holding the latter in the intervals of its intermittent movement, and, further, the broad rim of the wheel B serves to cover the cord-holder pinion and prevent the straw from getting into it, and thereby interfering with its operation, as frequently happens in the ordinary construction referred to.

The knotter-shield or breast-plate E may be of the usual construction, differing only in certain details of construction which render it more certain in its action on the cord, as will appear.

E′ represents the cord-slot or the straight portion thereof in front of the knotter and through which the needle passes to carry the cord to the cord-holder. Just in front of the knotter a finger *e* projects from the rear across this slot and preferably slightly beyond the plane of the forward wall thereof, the slot extending in the arc of a circle around the point of the finger, as shown at e^2, and widening in rear thereof, as shown at a^3. The point of the finger *e* is crooked or curved forward slightly, as indicated at *e′*, to insure its retention of the cord laid upon it by the needle until such time as it is removed by the action of the knotter-jaws in sweeping over it, and which serves to carry the cord off the finger and around through the curved portion e^2 of the slot into the expanded portion e^3 thereof. The outer wall e^4 of the curved and expanded portion e^2 and e^3 of the slot is in an arc of a circle of less diameter than that described by the points of the knotter-jaws in the rotary movement of the latter, and serves to prevent the escape of the cord from said point, and said curved outer wall terminates in a finger *h*, which serves to check the onward movement of the cord sufficiently to insure its being passed between and caught by the jaws just in advance of the completion of the revolution of the knotter. The cord is upheld between the cord-holder and the knotter by a bar or bridge *h′*, crossing the knotter-shield obliquely just in rear of the knotter and slightly elevated above the plane of the body of the shield for upholding the portions of the cord extending from the cord-holder in proper position for the open jaws of the knotter to pass one above and the other below the cord for causing them when closed to grasp it, in a manner well understood. The finger *h* stops or prevents the movement of the cord long enough to insure its being passed between and grasped by the jaws, after which the cord is swept by the lip or finger *h* into the extension e^5 of the slot behind said finger, and being cut between the knotter and cord-holder the ends are held by said jaws until they are drawn through the loop on the jaws, when the ends are withdrawn and the bundle discharged in any usual manner.

J indicates a spring for closing the knotter-jaws; *k*, a knife for cutting the cord, secured to a shaft K, journaled in the hollow stud-shaft F, and provided on its rear end with an arm or lever *k′*, carrying a friction-roller k^2,

and which is acted on by a cam projection B^2 on the wheel B in each revolution of the latter for vibrating the knife.

i indicates a spring applied to the heel-extension of the lever *k'* for retracting it after it has been acted upon by the cam B^2.

Having now described my invention, I claim as new—

1. In a grain-binder, the combination of a cord-holder disk, a pinion rigid on the shaft of said disk, the knotter, and a wheel giving motion to said knotter and disk and having a broad flat periphery covering the outer ends of two adjoining teeth of the pinion and acting thereon as a delay-surface, and provided with a peripheral depression having teeth for giving an intermittent rotary movement to the pinion and cord-holder disk, substantially as described.

2. In a grain-binder, the combination, with the rotating knotter, of a slotted knotter breast-plate provided with two rigid spurs or fingers projecting into the cord-slot within the circle described by the knotter, one for upholding the cord in front of the knotter and over which the cord is carried by the revolution of the knotter, and the other in rear of the knotter for holding the cord leading to the holder until the latter is grasped by the knotter, which in its revolution then carries the cord past said finger, substantially as described.

3. The combination of the knotter, the cord-holder-actuating pinion, a driving-wheel common to both and having a broad flat periphery acting on the ends of two adjoining teeth of said pinion, the knotter-actuating shaft, the slotted knotter breast-plate, and an upright cord-holder disk rigid with said pinion, crossing obliquely the vertical plane of the slot in the breast-plate, and inclined to the axial line of the knotter-shaft in a plane intersecting said line in the knotter-actuating shaft, substantially as described.

In testimony whereof I have hereunto set my hand this 13th day of August, A. D. 1888.

LEWIS MILLER.

Witnesses:
O. L. SADLER,
F. B. HARGETT.