

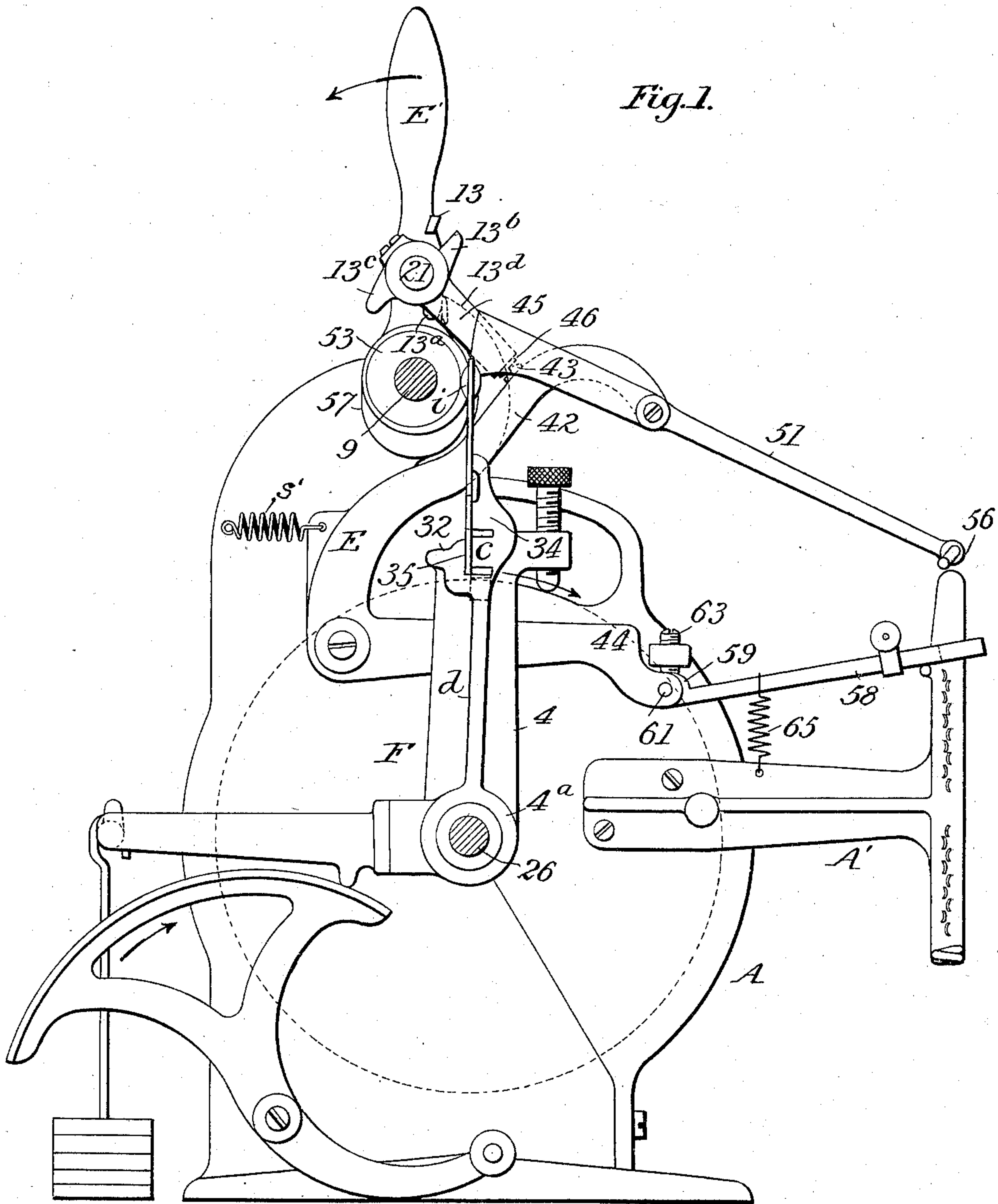
(No Model.)

3 Sheets—Sheet 1.

S. W. WARDWELL, Jr.
APPARATUS FOR WINDING COPS.

No. 567,871.

Patented Sept. 15, 1896.



Witnesses
J. H. Fairgrieve
G. P. Khamer

Inventor
Simon W. Wardwell Jr.
by Foster Freeman
Attorneys

(No Model.)

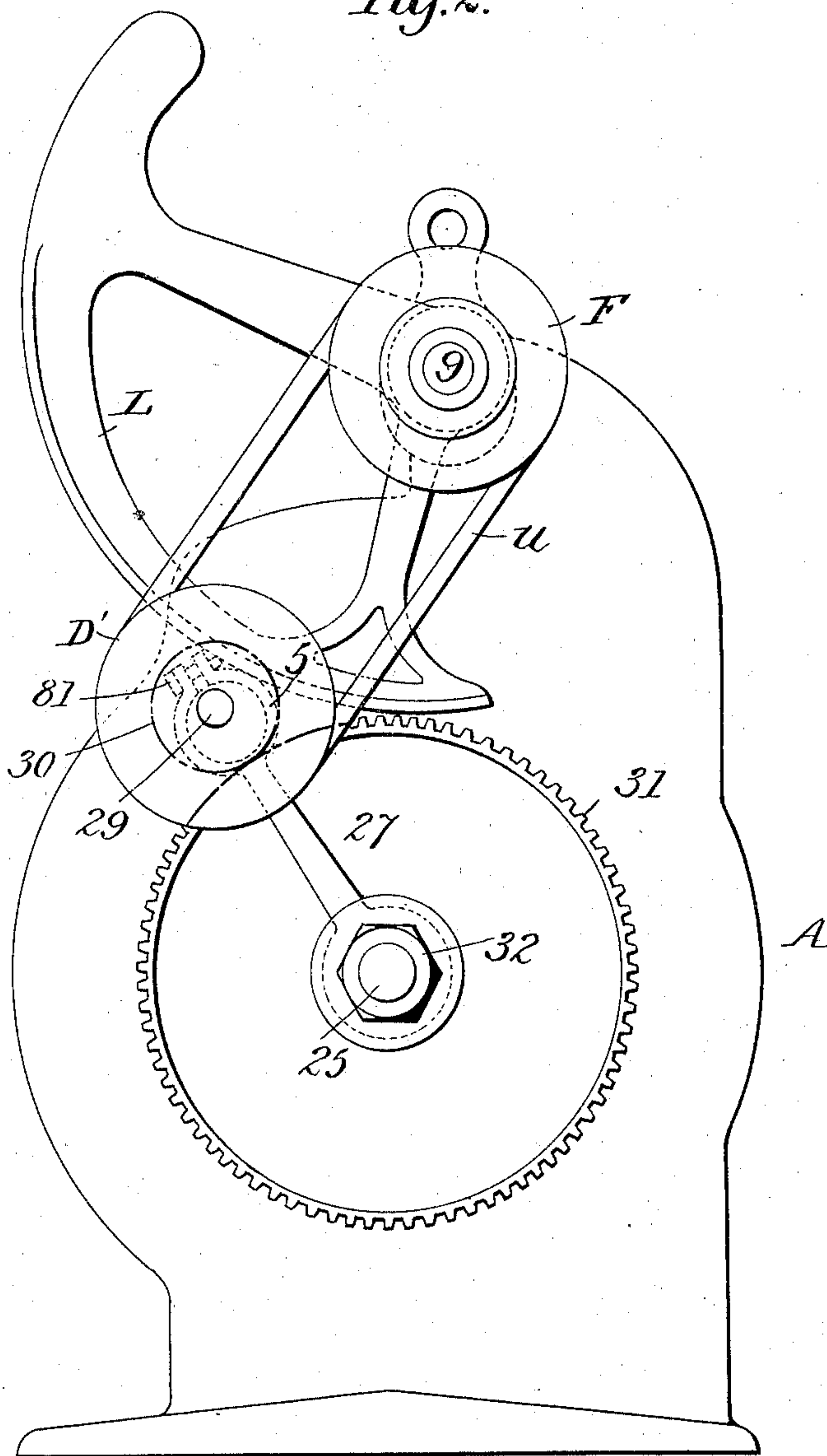
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Fig. 2.



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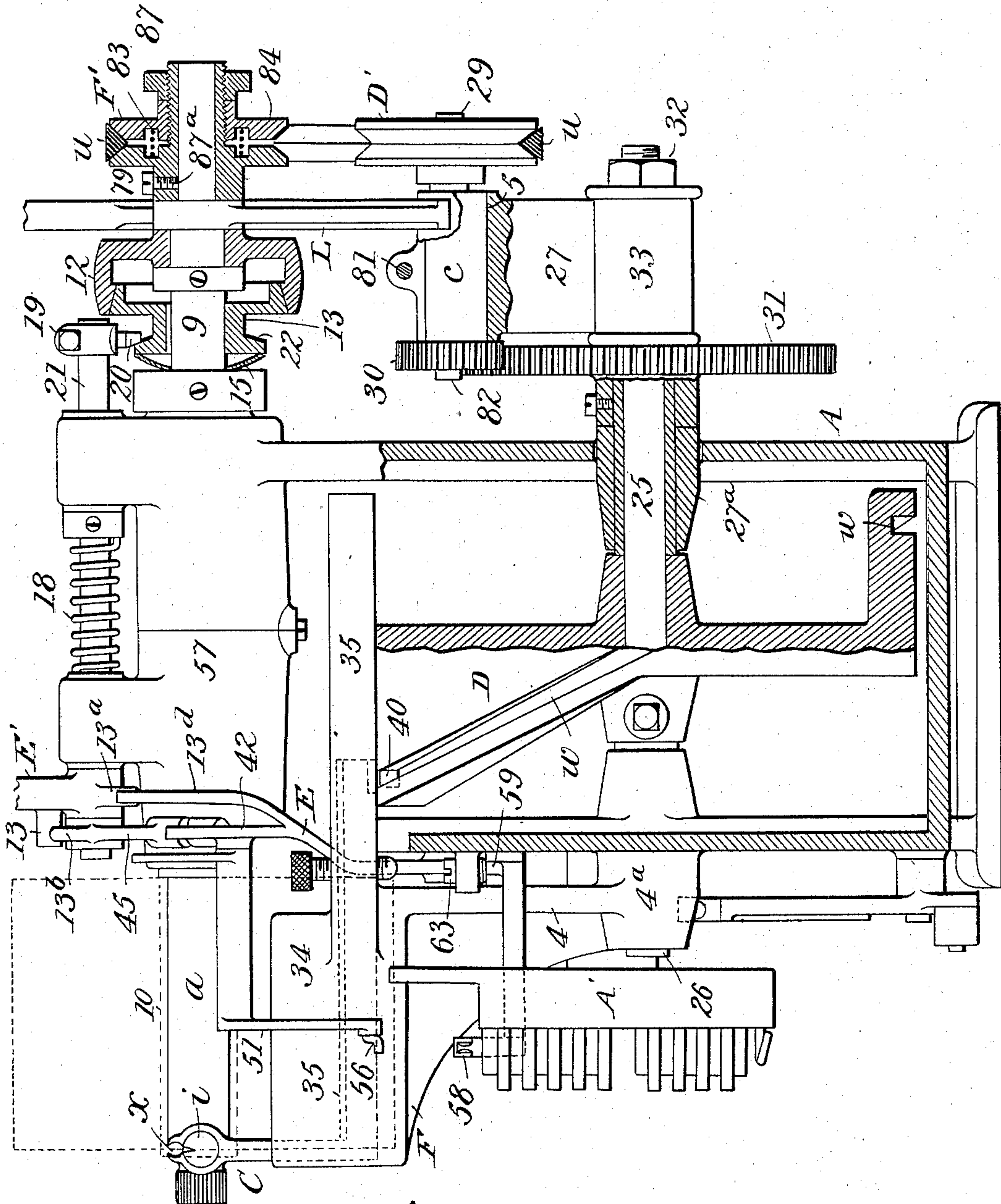
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Fig. 3.

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UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, JR., OF BOSTON, MASSACHUSETTS, ASSIGNOR TO
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APPARATUS FOR WINDING COPS.

SPECIFICATION forming part of Letters Patent No. 567,871, dated September 15, 1896.

Application filed December 8, 1894. Serial No. 531,242. (No model.)

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, Jr., a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Winding Cops, of which the following is a specification.

My invention relates to that class of cop-winding machines, such, for instance, as illustrated in my Letters Patent Nos. 480,157 and 506,959, in which there is a rotating cop-holder, a reciprocating guide, and means for varying the relative movements thereof; and my invention consists in the details of construction of such machines, fully set forth hereinafter, and illustrated in the accompanying drawings, in which—

Figure 1 is an end view of a winding-machine embodying my improvements, Fig. 2 showing an elevation of devices at the opposite end; Fig. 3, a front elevation in part section.

The frame A is suitably constructed to support the operating parts, including a spindle *a* and means for rotating it, a thread-guide C, having an eye *x*, and means for reciprocating the said guide, and appliances for varying the relative action of the guide and spindle, so that at the end of each reciprocation the guide will occupy a different position as regards the holder or cop, that is, it will be opposite a point on the periphery of the cop back of or in advance of the point to which the guide was opposite at the previous reciprocation.

As shown, the spindle *a* is the end of the driving-shaft 9, but any other suitable form of support for a holder (solid or tubular) may be used. As shown, the spindle projects from the side frame to receive a tubular holder 10.

The shaft 9 for rotating the holder is driven by a driving-pulley 12, receiving a driving-belt, turning loosely on the shaft 9, and having an inner beveled face to engage the outer beveled face of a clutch-pulley 13, turning with but sliding on the shaft 9, the pulley 13 being pressed into engagement by a spring 15 and carried out of engagement by the downward pressure of a beveled projection 20 upon an arm 19, extending from a rock-shaft 21,

when the said projection 20 is brought against the beveled face of a collar 22 on the pulley. A spring 18 tends to turn the shaft to throw downward the arm 19 and carry the pulleys out of engagement. A suitable detent is employed for maintaining the shaft 21 in position to keep the projection 20 out of contact with the collar 22. Thus the shaft 21 carries at one end an arm 45, Figs. 1 and 3, with a cross-shoulder 46, that engages a cross-shoulder 43 upon the arm 42 of a lever E, actuated in one direction by a spring *s'*, thereby preventing the rocking of the shaft 21 under the action of the spring 18 so long as the shoulders 43 46 are engaged, when the pulley 12 will drive the shaft.

As the guide in this class of machines must be reciprocated very rapidly, it has been found that unless the guide is very light in weight the momentum from the rapid movement will tend to carry it out of position and interfere with that nice and regular operation which is necessary in order that the thread as it is brought to each end of the cop may be laid across one of the preceding threads with a sharp bend and carried back at one side of said preceding thread. Therefore the guide C moves on a carrier-frame F, the guide being of very thin light metal and sliding upon the frame, which is of heavier material and which is pivoted or otherwise supported so that it can be carried outward as the cop increases in size, it being necessary to the formation of a cop of the character desired to maintain that portion of the guide which has the guiding-eye in close contact with the cop throughout the entire series or operations of building up the cop. Thus the guide, in which is the guide-opening *x*, consists of a thin blade of metal with an opening receiving a porcelain or other vitreous stud *i*, in which is a notch, while the frame F, Figs. 1 and 3, consists of an arm 4, with a hub 4^a swinging on a stud 26 at one side of the main frame, a horizontal rib 34, having two parallel slots, receiving the arms of a guiding-bracket 35, secured to the guide C. From the lower arm of the bracket 35 a stud 40 extends into the groove *w* of a cam-wheel D, secured to a shaft 25, extending through the hollow bearing or sleeve 27^a of the frame and

driven by devices hereinafter described from the shaft 9, so that the rotation of the shaft 25 and its cam reciprocates the guides during the rotation of the spindle and holder. As the spindle and its holder must be turned generally two or more times to each reciprocation of the guide, the shaft 9 is rotated more rapidly than the shaft 25, and this is effected through the medium of suitable intermediate gears. As shown, a grooved pulley F' upon the shaft 9 carries a belt *u*, passing to a grooved pulley D' upon a shaft 29, carried by an eccentric *c*, turning and secured in the split hub 5 of an arm or frame 27, swinging upon the projecting end of the shaft 25, its weight tending to depress the outer end of the said arm, so as to maintain the belt *u* taut to prevent any possible slipping. A detachable pinion 30 on the shaft 29 gears with a detachable toothed wheel 31 on the shaft 25, and it will be seen that by the use of interchangeable gears 30 31 of different diameters the spindle A may be caused to revolve any desired number of revolutions to each reciprocation of the guide, and an increase in the number of windings does not reduce the speed at which thread is wound. The hub 33 of the frame 27 is secured detachably to swing freely upon the end of the shaft 25 by a nut 32, so that the gear 31 can be readily renewed and replaced, and as a change of gears might necessitate carrying the axis of the gear 30 from or to that of the gear 31 the stud 82 of the gear 30 is placed eccentrically on the eccentric *c*, which, after loosening the screw 81, binding the split hub 5, may be turned to bring the stud to its desired position. As before stated, however, the spindle *a* must revolve not only a sufficient number of times to effect the desired number of winds at each rotation of the guide, but it must also have either a slightly less or slightly greater movement, so that a point on the cop which at the end of one reciprocation of the guide is opposite the eye of the latter shall at the end of the next reciprocation be a distance beyond or back of the eye of the guide equal to the distance between two adjacent bends following each other at the periphery of the cop, thus laying successive coils in different positions. In the construction shown the relative increment of movement of the cop spindle and guide is secured by making one of the pulleys F D' an expansion-pulley. As shown, the pulley F is an expansion-pulley consisting of two disks 79 84, each having one side beveled, with means for carrying the disks to and from each other, so as to increase or decrease the diameter of the channel in which the belt *u* (which is triangular in cross-section) lies. A spring 83 tends to separate the disks, while they may be brought together against the action of the spring, turning the disk 84 and securing it by means of a nut 87. To permit these parts to be readily applied to the shaft, the disk 79 has a hub fitting the shaft and secured to the same by a screw 87^a, and a thread

for the threaded hub of the disk 84, cut on this hub-wheel, also receives this nut 87.

By adjusting the disks to increase or decrease the working diameter of the pulley F' it is not only possible to secure the added or decreased movement necessary to cause the thread of one coil to be laid beyond that of the other, but it is also possible to secure that nice adjustment necessary to this end under variations of operations resulting from differences in the characters of the threads and from different conditions of the same thread from variations in the atmospheric conditions. To take up any slack of the belt and prevent vibration of the frame 27, an eccentric L, Figs. 2 and 3, is hung loosely on the shaft 9 and is weighted to bear on the frame 27, permitting the latter to swing outward, but preventing it from swinging inward.

In order to stop the machine by hand, the lever E', Fig. 1, is mounted loosely on the shaft 21 and is provided with two lugs 13 13^a, the arm 45 projecting from a hub secured to the shaft 21 and having two lugs 13^b 13^c, while a horn 13^d, extending from the arm 42 of the lever E, is in position to make contact with the projection 13^a.

When the handle E' is swung in the direction of the arrow, Fig. 1, the contact of the projection 13^a with the horn 13^d swings out the arm 42 of the lever E', disengages the shoulders 43 46 and the spring 18, Fig. 3, then turns the shaft 21, and arrests the machine. When the arm is swung in a reverse direction, the contact of the arms 13 13^b rocks the shaft 21 to put the machine in operation and swings the arm 45 so as to again engage the shoulders 43 46.

To arrest the motion of the machine if the thread should break, a stop-actuating device of suitable construction is used. As shown, the said stop-actuating device consists of a lever 51, pivoted to the lever E, its long arm 52 carrying the guide 56 and its short arm having a curved cam-face adapted to engage the periphery of a slightly-eccentric disk 53 on the shaft 9. The draft of the thread normally holds the lever in the position Fig. 1, but if the thread breaks the short arm of the stop-lever swings downward, is brought against the eccentric 53, and the latter forces out the lever 51, and with it the lever E, thus disengaging the shoulders 43 46, when the shaft 21 will be turned by the spring 18 and the clutch-wheel 22 will be drawn back, stopping the machine.

It is desirable in many instances to prevent knotted threads from being wound onto the cop, and a knot-catcher 58, Fig. 1, is therefore provided to operate in connection with the stop device to arrest the motion of the machine whenever a knot approaches the guide. The knot-catcher may be of any suitable character. As shown, it consists of a lever 58, pivoted to a pin 61 at the end of the arm 44 of the lever E and having at the opposite end a fork or notch through which the

thread passes toward the guide 56. At the pivoted end of the lever 58 is a cam 59, which bears against a set-screw 63, extending through a stud on the frame of the machine, and an adjustable spring 65 tends to hold the lever 58 against any suitable bearing. When a knot upon the thread is brought against the lower edge of the lever 58, the latter is lifted and the cam 59, bearing on the screw 63, depresses the end of the arm 44 of the lever E, rocking the latter and carrying the shoulder 43 away from the shoulder 46, so that the stop-motion is put into operation to arrest the movements of the machine.

In other machines which I have made the expansion-pulley has been carried by the swinging frame 27; but this has been attended with disadvantages and interference with nice adjustment, which I avoid by placing the expansion-pulley upon the driving-shaft 9. In order to facilitate and cheapen the construction, I make one section of the expansion-pulley adjustable upon the other, which latter, therefore, may be bored, so as to be readily connected to a driving-shaft without any turning or cutting of the latter. By making the belt V shape in cross-section, in combination with an expansion-pulley having two beveled sections, I secure a flat bearing for each face of the belt and a more accurate working of the device in securing minute variations in the increment of movement.

While I have shown a cylinder with an eccentric shaft 29, rotatably adjustable in the frame 27 to vary the distance between the axes of the gears 30 31, I do not limit myself to this means, as other adjustable bearings for the shaft 29 may be used.

It will also be evident that other means than those described may be employed for preventing the frame 27 from swinging toward the shaft 9, while permitting it to swing outwardly therefrom.

While I have shown the arm 58 with its slit for receiving the thread as combined with certain appliances which operate to stop the machine, it will be evident that such a swinging arm may be combined with stop devices of a different construction with like effect.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. The combination of the rotating spindle *a*, of a grooved swinging frame F, a guide C consisting of a blade of metal, and a guide-bracket 35 connected therewith and sliding in the frame, a projection extending from said bracket, and a driving-cam having a groove to receive such projection, substantially as set forth.

2. The combination of a swinging frame, a reciprocating guide carried thereby, and a driving-cam D, with a gear 31 detachably con-

nected with said cam, a gear 30, its shaft and stud therefor carried by the frame, and means for adjusting the said stud to different positions to shift the shaft of the gear 30 to and from the axis of the frame, substantially as set forth.

3. The combination of the rotating spindle and reciprocating guide, the cam D operating the guide, and gear 31 connected detachably therewith, and a swinging frame 27 carrying a cylinder *c*, rotatably adjustable in said frame, and a shaft passing through said cylinder eccentrically thereto and carrying a pinion 30, and means for operating the same, substantially as set forth.

4. The combination of the shaft 9 and its pulley F', the shaft 29 and its pulley D', a swinging frame carrying the shaft 29, and an eccentric L bearing upon said frame to prevent it from swinging toward the shaft 9, substantially as and for the purpose set forth.

5. The combination with the stop-shaft of a cop-winding machine, of an arm 45 extending from the shaft, having a shoulder 46, a lever E pivoted to the frame and having a shoulder 43 to engage the shoulder 46, a pivoted arm 51 pivoted to the lever E, and also a guide for the thread, a winding-shaft 9 and an eccentric thereon arranged to engage the opposite end of the arm 51, all substantially as set forth and for the purpose specified.

6. The combination with the shaft 21 of a cop-winding machine, of an arm 45 on said shaft, a lever E pivoted to the frame of the machine, and having an arm 42, engaging shoulders upon the said arms 45, 42, and a lever E' having a projection arranged to make contact with a projection on the lever E, substantially as set forth.

7. The combination with the stop devices carried by the frame of a winding-machine, and with a hand-lever E', of a detent-lever E for holding the stop devices out of operation, arm 58 pivoted to the lever E having a slot at the end and provided with a cam, and a bearing for the cam on the frame of the machine, substantially as set forth.

8. The combination with the shaft 21, of an arm 45 connected to said shaft and having a shoulder 46 and projections 13^b, 13^c, a detent-lever E having the shoulder engaging the shoulder 46, and a lever E' having projections 13 and 13^a, and an arm extending from the lever E in position to make contact with the projection 13^a, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL, JR.

Witnesses:

PHILIP E. BRADY,
G. N. CRANDALL.