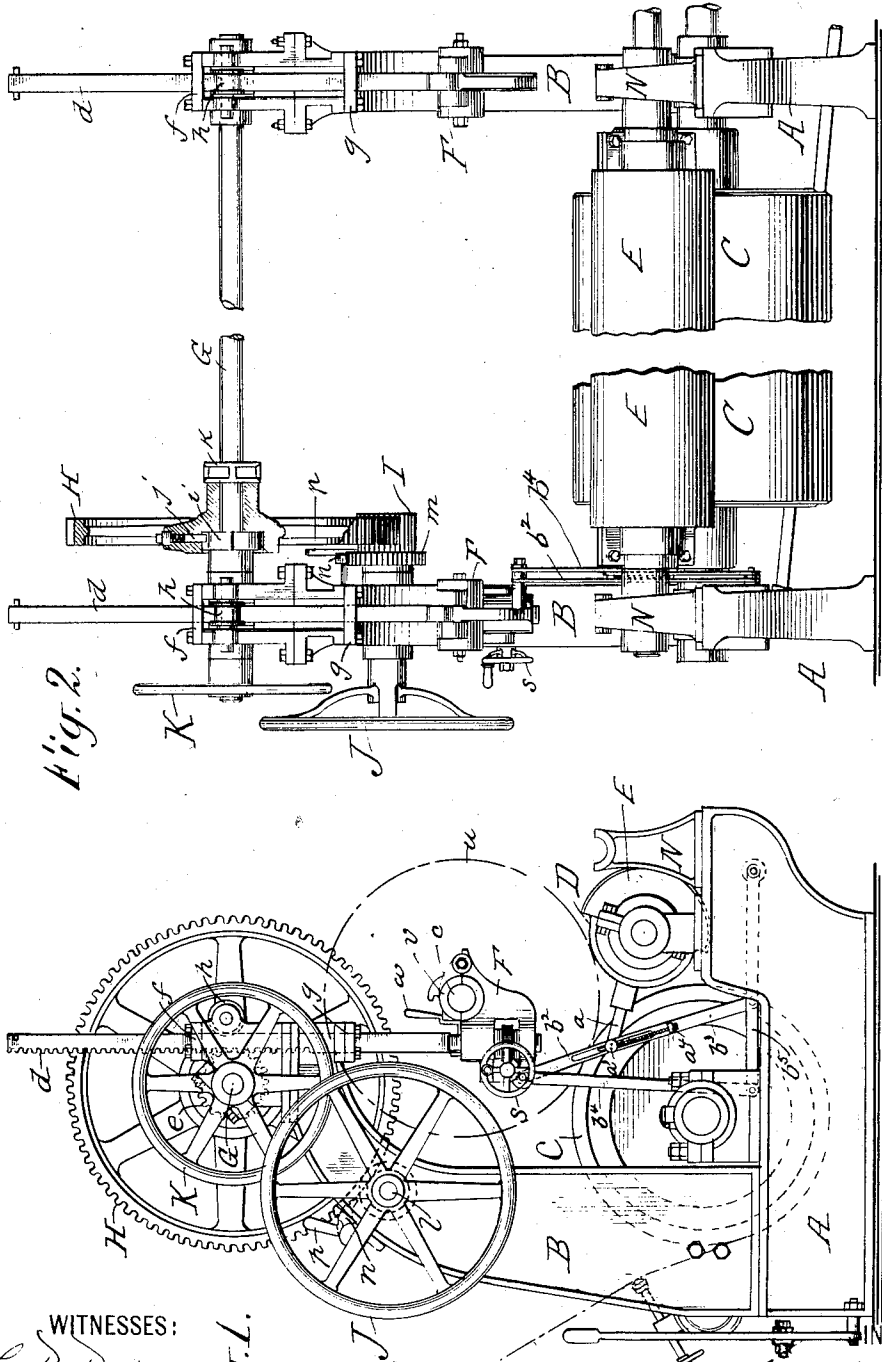


5 SHEETS—SHEET 1.

978,967.



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William H. Davis

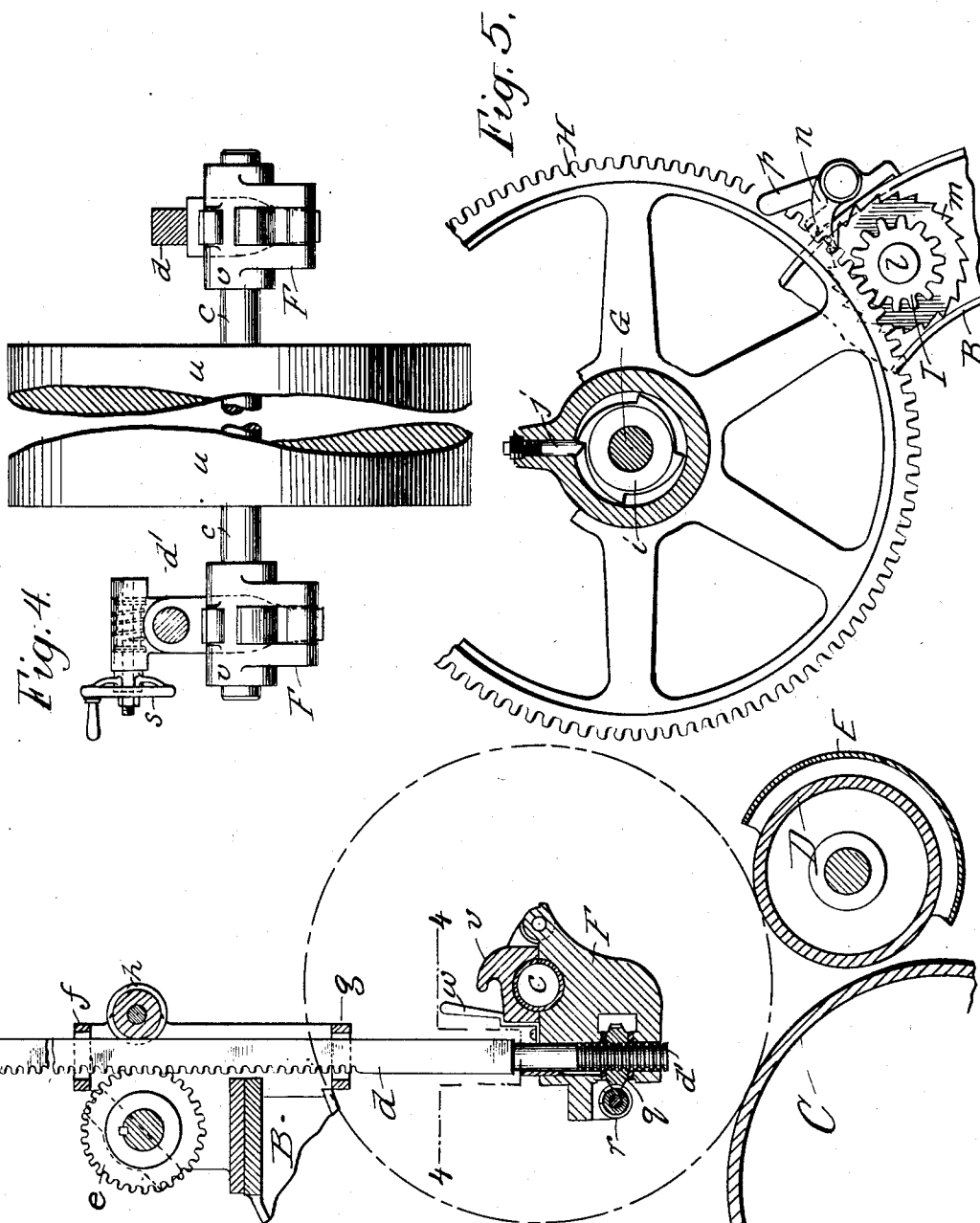
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WINDING MACHINE.

Patented Dec. 20, 1910.

5 SHEETS--SHEET 2.

978,967.



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Fig. 3.

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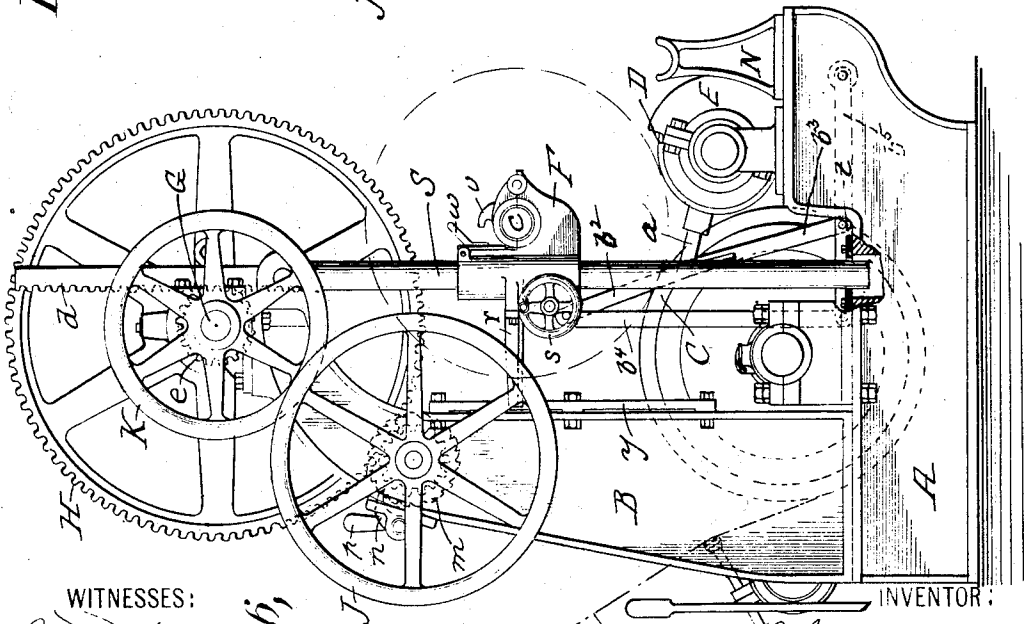
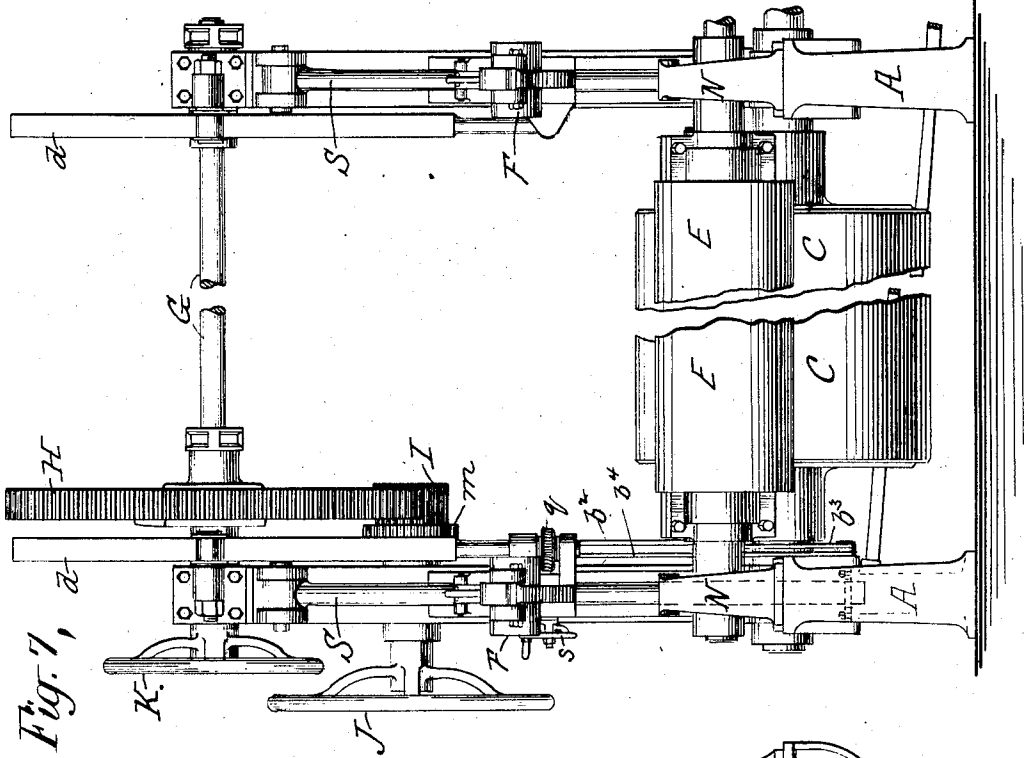
J. J. WARREN.
WINDING MACHINE.

APPLICATION FILED MAR. 2, 1909.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 3.

978,967.



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Fig. 6,

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WINDING MACHINE.
APPLICATION FILED MAR. 2, 1909.

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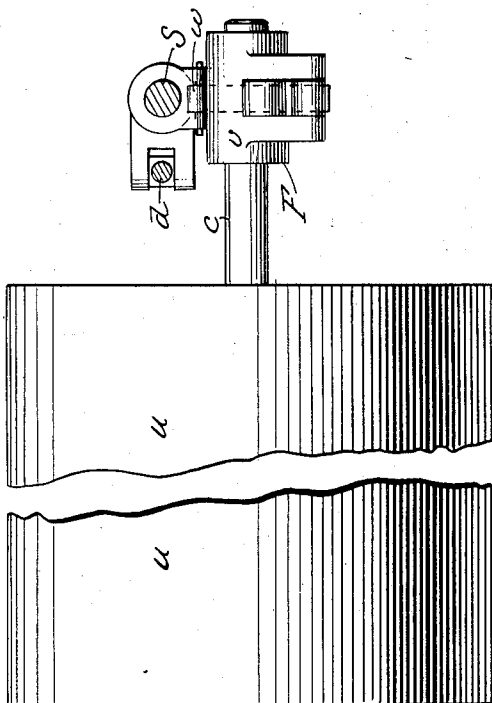


Fig. 9,

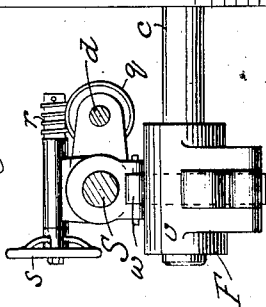


Fig. 15

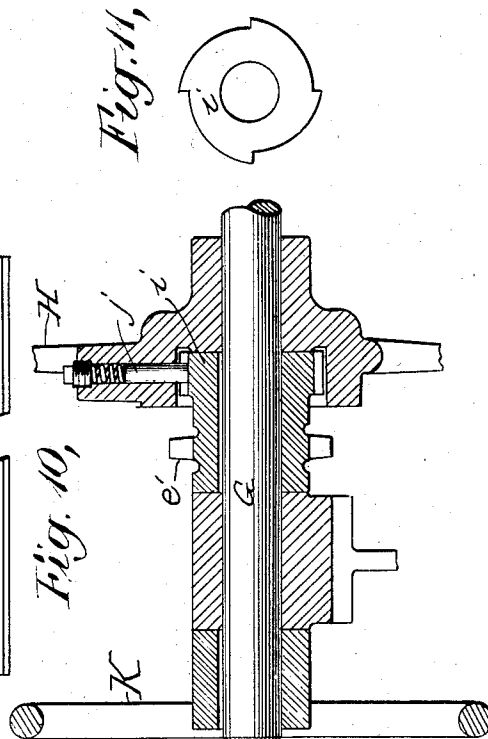


Fig. 10,

Fig. 11,

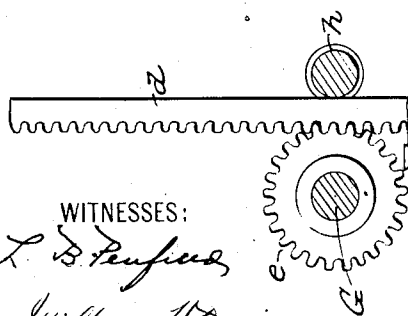
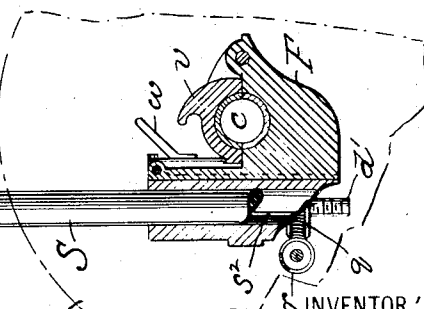
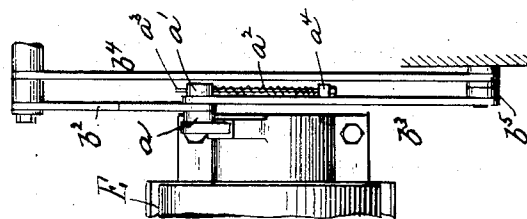


Fig. 8,



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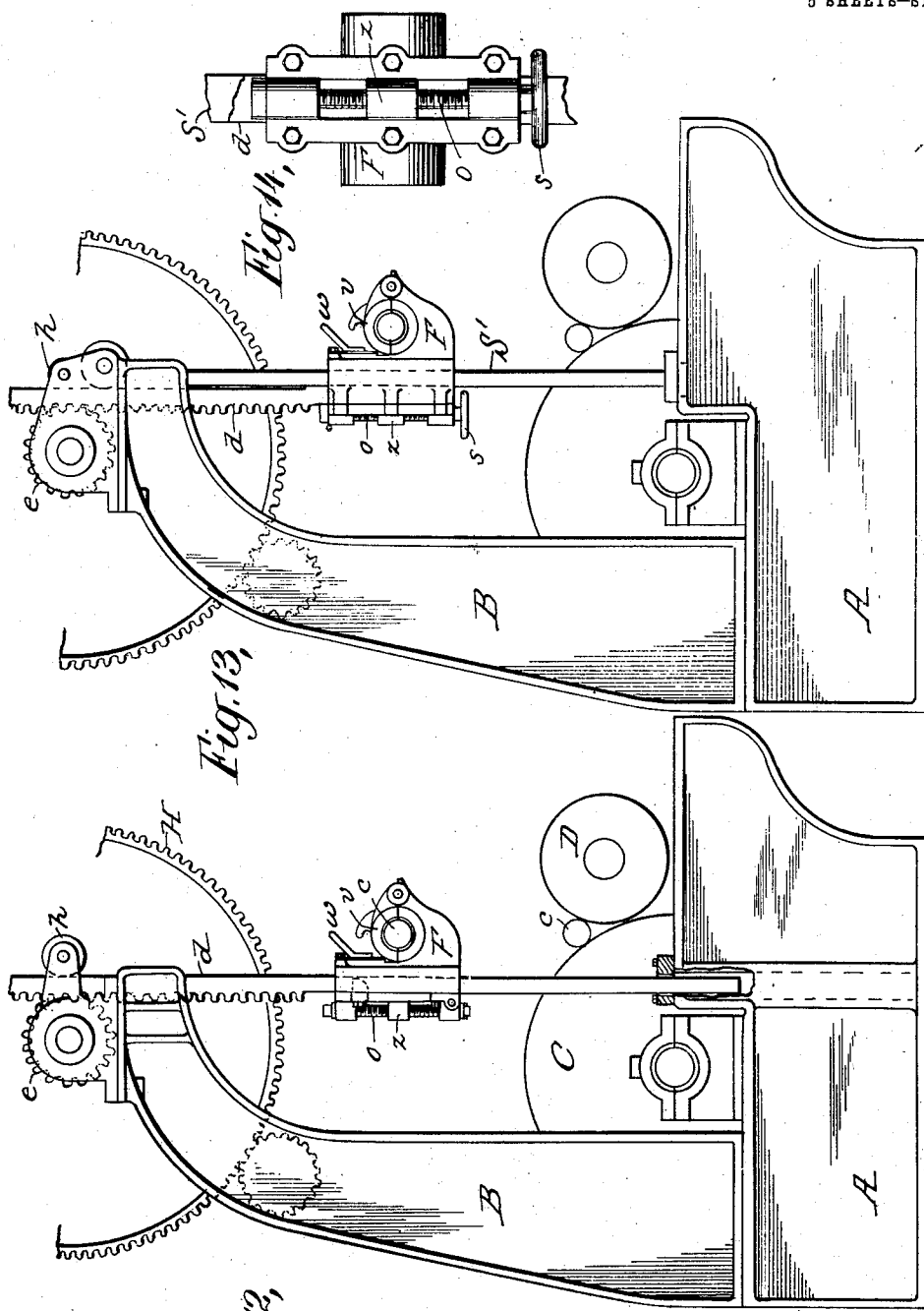
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J. J. WARREN.
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APPLICATION FILED MAR. 2, 1909.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

JOHN J. WARREN, OF BROWNVILLE, NEW YORK.

WINDING-MACHINE.

978,967.

Specification of Letters Patent. **Patented Dec. 20, 1910.**

Application filed March 2, 1909. Serial No. 480,953.

To all whom it may concern:

Be it known that I, JOHN J. WARREN, a citizen of the United States, residing at Brownville, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Winding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for winding paper. It is designed for use in connection with paper making machines which form the sheet in a continuous length and supply it to the winding machine, which thereupon reduces it to compactly wound rolls of appropriate sizes for commercial use.

The invention relates particularly to paper-winding machines of the type known as "double drum winders," wherein two winding drums of unequal size operate a displaceable core upon which the paper is wound into a roll as it is received from the paper making machine. In these double drum winders, the smaller drum is driven at a relatively higher rate of speed than the larger drum, for the purpose of effecting the uniform, compact and smooth winding of the roll of paper.

The purpose of my present invention is to simplify and cheapen the cost of product and the maintenance and repair of machines of this general character, to make certain parts of the apparatus more positive and reliable in their operation and to greatly broaden the scope and usefulness of paper-winding machines of this general type.

The construction and mode of operation of the machine will be hereinafter fully described and the features of novelty will be set forth in the claims.

Referring to the drawings, Figure 1 represents, in side elevation, the preferred form of my improved paper-winding machine; Fig. 2 represents a side elevation thereof, broken away centrally so as to permit its illustration on a correspondingly large scale, and being likewise shown partly in section; Fig. 3 represents, partly in section and partly in side elevation, certain of the main elements of the machine,—particularly the means for suspending the journal boxes for the core shaft of the roll to be formed; Fig. 4 represents a sectional plan view taken on a plane indicated by the line 4—4 of Fig. 3;

Fig. 5 represents, partly in section and partly in side elevation, a part of the means for raising the roll of paper and its core, under certain circumstances; Figs. 6 and 7 represent respectively a side elevation and a front elevation (partly broken away) of a modified form of the apparatus; Fig. 8 represents, partly in section and partly in side elevation, the means for suspending and guiding the journal boxes of the core shaft in the machine shown in Figs. 6 and 7; Fig. 9 represents a sectional plan view taken on a plane indicated by the line 9—9 of Fig. 8; Fig. 10 represents a longitudinal sectional view, showing the way in which the "backing ratchet" of my invention may conveniently be coördinated with a sprocket wheel drive; Fig. 11 represents a face view of the backing ratchet proper; Figs. 12 and 13 represent respectively, in end elevation, the main elements of modified forms of my invention; Fig. 14 represents a detail view thereof; Fig. 15 represents a detail view of the links for automatically actuating the safety guard.

Referring to the drawings and particularly to the form of the invention illustrated in Figs. 1 and 5 thereof, A represents stout castings, constituting the bed plates of the machine, upon which are mounted the end standards B having overhanging upper portions as shown, the said bed plates A and standards B constituting the frame work of the machine and supporting the journal bearings of the several machine shafts. The smaller drum D of the winder is driven at a higher rate of speed than the larger drum C, for the purpose of effecting the uniform, compact and smooth winding of the roll of paper. The shaft of the smaller drum D is driven by means of a belt (not shown) from the shaft of the larger drum C, and the peripheries of both drums are preferably provided with spirally shaped grooves or recesses, formed or cut therein to prevent the paper from becoming crimped during the winding operation and for straightening it out so that it will wind smoothly and evenly as the roll is being formed. The spiral grooves are the same as those shown in Letters Patent No. 798,241, granted to me August 29, 1905, and are for the same purpose. So also, the smaller drum is preferably provided with a semi-cylindrical guard E mounted to rock upon the shaft of the drum D, and connected by an arm *a*,

and by links b , b' , b^2 , b^3 , with one of the journal boxes F in which is mounted the displaceable core shaft c for the roll of paper. The function of this rocking guard is to protect the operator from being caught between the roll of paper and the drum D , and, indeed, to prevent the accidental entry of any object between the forming roll of paper and the drum D ; the upper free edge of the guard is automatically kept at a preferred distance from the circumference of the roll of paper, regardless of the increase in diameter of said roll of paper. In order that the movement may be more rapid up to the time when the roll attains a diameter of say eight inches, the two links b^2 , b^3 are slotted, as shown, and the arm a has a projection a' which passes through the slots (as shown in Fig. 15) and which bears against the upper end of a spring a^2 surrounding a guide rod a^3 supported below by the fixed pin a^4 and passing freely through an aperture in the end of the projection a' .

A characteristic feature of my present invention consists in the fact that the journal boxes or bearings F , in the preferred form of my invention, are suspended freely, by means of rack bars d , from pinions e with which said rack bars mesh. The rack bars pass through the slotted guards f , g , located respectively above and below the shaft G upon which the pinions e are mounted; with the resultant effect that the rack bars, while having a capacity to swing freely to the extent required by the change in position of the core shaft c as the roll of paper increases in size, are nevertheless guided in their movements by the slotted guides referred to, thereby limiting the swing of the rack bars and particularly relieving them from strain due to any incidental crowding of the roll of paper upon the journal boxes due to possible lack of absolute uniformity in the building up of the roll of paper. Idler rollers h keep the rack bars d in mesh with the gears e , and lessen the friction of the parts. The shaft G , upon which the gears e are fixed, has likewise splined or otherwise fixed upon it the backing ratchet i , which is adapted to cooperate with a corresponding spring-pressed driving pawl j mounted in the hub of a gear H which is mounted idly upon the shaft G and is restrained from longitudinal movement thereon by the collar k . The gear H meshes with a pinion I fixed upon a shaft l having a hand wheel J and likewise having a ratchet m cooperating with a pivoted holding pawl n having a releasing handle p . It will be apparent, from this construction, that, as the core shaft c rises with the increase in size of the roll of paper, carrying with it the journal boxes F , the racks d are likewise free to rise, revolving the gears e and with them the shaft G ; whereas gear H is per-

mitted by the backing ratchet i and its pawl j , to remain stationary, being locked or held in position by the locking pawl n engaging with the ratchet m , to which the idle pinion H is geared. It is also an incident to this construction that by means of the hand wheel K mounted upon the shaft G , the journal boxes F and core shaft c may, if desired, be conveniently raised when there is no considerable load of paper on the core shaft, and also that the said hand wheel K may be made available as a temporary means of pressing down on the said core shaft, which is sometimes desirable, for a few seconds, when starting the formation of a roll of paper thereon. It will be further understood that the function of the hand wheel J with its ratchet m and holding pawl n is to raise the roll of paper for making a splice, or for removing the roll, or for any other like purpose, the holding pawl n serving to prevent the descent of the racks and their journal boxes from the position to which they have been raised, and the power for raising them being appropriately multiplied by the relative size of the pinion I and gear H . In some instances, if the paper fed from the calender rolls to the winding machine is calendered thin on one side (as, for example, on the right hand side as viewed from the front of the machine) it is desirable to correspondingly raise the right hand side of the winder shaft c so that it may carry its appropriate part of the weight of the paper and to prevent it from giving to the forming roll of paper a smaller diameter at the right hand side than at the left hand side; or, instead of positively raising the right hand side of the winder shaft c , in such case, the same effect can be produced by lowering the left hand side thereof. This change in level or inclination of the winder shaft c , I effect by making the connection between the rack bar d on the side of the machine where the operator stands and the journal box F adjustable. This is preferably effected by means of hand operated gearing, as, for instance, by providing the lower end of the rack bar d (as shown in Fig. 3) with a screw-threaded portion d' carrying a nut q , which nut meshes with a worm r mounted upon a shaft which carries the hand wheel s .

It will be understood that the continuous length or sheet of paper as it comes from the calender rolls, passes over the spreader and beneath the larger drum C and thence is mounted upon the core shaft c . The roll of paper as it forms upon the core shaft c is indicated in dotted lines in Fig. 1 by the letter u and in full lines in Fig. 4 by the same letter. In front of the smaller drum D are located the stands or brackets N , which are provided for the purpose of receiving or supporting the core shaft c either

before or after the paper is wound thereon. The journal boxes F, as shown, are provided with a hinged upper portion *v* which may be held in the closed position by the spring catch *w*, thereby providing means for readily inserting and removing the core shaft *c*.

In the modified form of the invention shown in Figs. 6-11, the main features of construction are the same as those already described and are correspondingly indicated by like reference letters. In this instance, however, the rack bars *d* occupy a position closer to the gear H, and the pinions *e* on the shaft G with which the racks inter-mesh are centrally located. This arrangement permits the employment of hinged guide posts S depending from the overhanging standards B and passing through corresponding openings *s*² in the journal boxes F. The lower ends of these hinged guide posts S pass through corresponding slots in the bed plates A and the bed plates are provided with adjustable pieces *t* for appropriately limiting the swing of the hinged guide posts, which, nevertheless, have a sufficiently free lateral movement to permit the journal boxes F to shift their position automatically so that the forming roll of paper *u* may always rest upon the drums C, D, irrespective of any imperfection in the core or winding shaft. In order to protect the journal boxes F from any twisting or outward movement which might be caused by the crowding of the paper, I may, in this form of my invention, provide either or both of the journal boxes with a projecting arm *x* engaging at its free end in the vertical guide slot or way of a guide track *y* bolted to the upright B.

In Fig. 10, which likewise illustrates the general arrangement of the parts constituting the backing ratchet connection between the gear H and the shaft G in the form of the invention shown in Figs. 6-9, I have substituted a sprocket gear *e*² for the pinion *e*; for the purpose of indicating that this same arrangement may be employed in connection with the sprocket chain shown in my Patent No. 798,241, hereinbefore referred to.

In the modification indicated in Fig. 12, I have shown the rack *d* as guided at its lower end in a slot of the bed plate A. In Fig. 13, I have shown the rack *d* as provided further with an auxiliary hinged guide stem S', which, passing through the journal box F, as in the modification shown in Figs. 6-9, likewise passes through an adjustable guide slot in the bed plate A. In both of these modifications, the journal box adjacent to the operator may be provided, as in the preceding modifications, with means for raising or lowering it, so as to level the core shaft *c*, for the purposes hereinbefore set forth. This may be conven-

iently effected, as shown, in Figs. 12-14, by providing the rack with an internally screw-threaded nut *z*, through which passes a screw shaft *o* supported in fixed bearings in the journal box and provided with suitable means for rotating it, as, for instance, the hand wheel *s*, so that, by actuating the hand wheel, the position of the journal box may be appropriately raised or lowered to obtain the inclination desired for the core shaft *c*.

While, for the purpose of more fully disclosing and elaborating the scope of my invention, I have shown the modifications illustrated in Figs. 6-14, I nevertheless prefer, as hereinbefore indicated, the construction shown in Figs. 1-5, as presenting the greater simplicity and economy in point of construction and maintenance; more especially since it enables me to dispense with the hinged guide posts and whatever expense and inconvenience are connected with their use.

What I claim is:—

1. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, rack bars from which the journals are suspended, and pinions meshing with the rack bars and upon which they have a free swinging movement; substantially as described.

2. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, and pinions and a rack bar pinion shaft for actuating the rack bars when it is desired to raise the winding shaft; substantially as described.

3. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, and pinions and a rack bar pinion shaft for actuating the rack bars when it is desired to raise the winding shaft, one of the journal boxes being connected to its rack bar by worm gearing so as to level the winding shaft; substantially as described.

4. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal

boxes, and pinions and a rack bar pinion shaft for actuating the rack bars when it is desired to raise the winding shaft, one of the journal boxes being provided with a hand shaft and intermediate gearing for shifting said journal box with respect to its rack bar; substantially as described.

5. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, and pinions and a rack bar pinion shaft for actuating the rack bars when it is desired to raise the winding shaft, one of the journal boxes being provided with a hand shaft and intermediate worm gearing for shifting said journal box with respect to its rack bar; substantially as described.

6. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, a rack bar pinion shaft having pinions engaging the rack-bars, and a hand wheel fixed upon the pinion shaft whereby the operator may temporarily exert a downward pressure upon the journal boxes for starting the formation of a roll; substantially as described.

7. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, a rack bar pinion shaft having pinions engaging the rack bars, a hand wheel shaft and pinion, a gear meshing therewith and mounted idly upon the rack bar pinion shaft and a backing-ratchet interposed between the said gear and rack bar pinion

shaft, whereby as the roll of paper increases in diameter the journal boxes and rack bars may rise without operating the said gear and its actuating hand-shaft; substantially as described.

8. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, journal boxes for the winding shaft, rack bars connected to the journal boxes, a rack bar pinion shaft having pinions engaging the rack bars, a hand wheel shaft and pinion and a holding pawl and ratchet therefor, a gear meshing with said hand wheel shaft pinion and mounted idly upon the rack bar pinion shaft and a backing ratchet interposed between said gear and rack bar pinion shaft; substantially as described.

9. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, rack bars from which the journals are suspended, and pinions meshing with the rack bars and upon which they have a free swinging movement, and guides for the rack bars; substantially as described.

10. In a machine for winding paper, the combination with a winding shaft upon which the paper roll is to be formed, of winding drums for supporting the winding shaft and the paper roll during the winding operation, rack bars from which the journals are suspended, and pinions meshing with the rack bars and upon which they have a free swinging movement, and swinging guide posts engaging the journal boxes; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

JOHN J. WARREN.

Witnesses:

JOHN C. PENNIE,
LAURA B. PENFIELD.