

W. E. BARNARD.  
TYPE WRITING MACHINE.  
APPLICATION FILED AUG. 20, 1909.

990,797.

Patented Apr. 25, 1911.

Fig. 1.

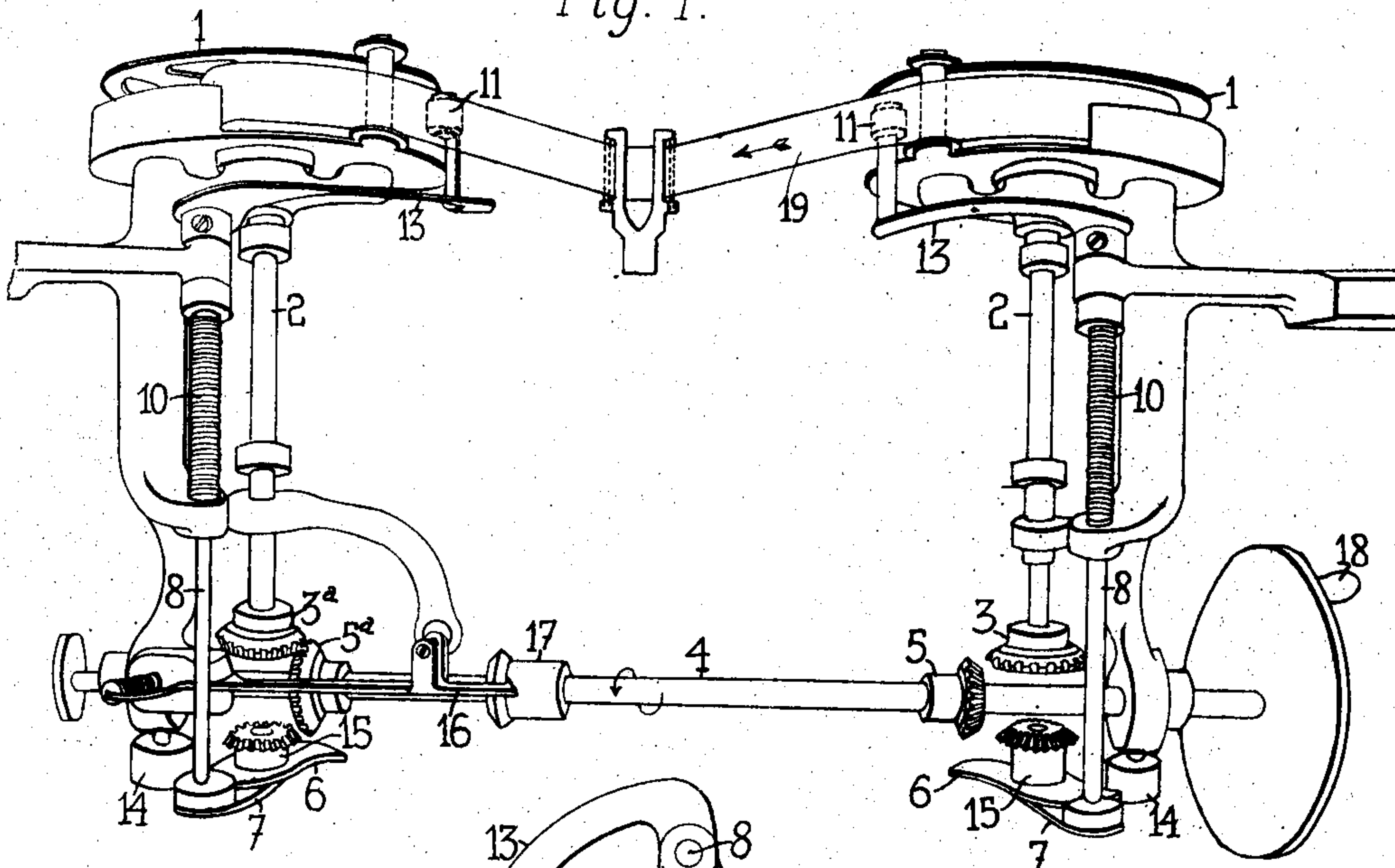


Fig. 5.

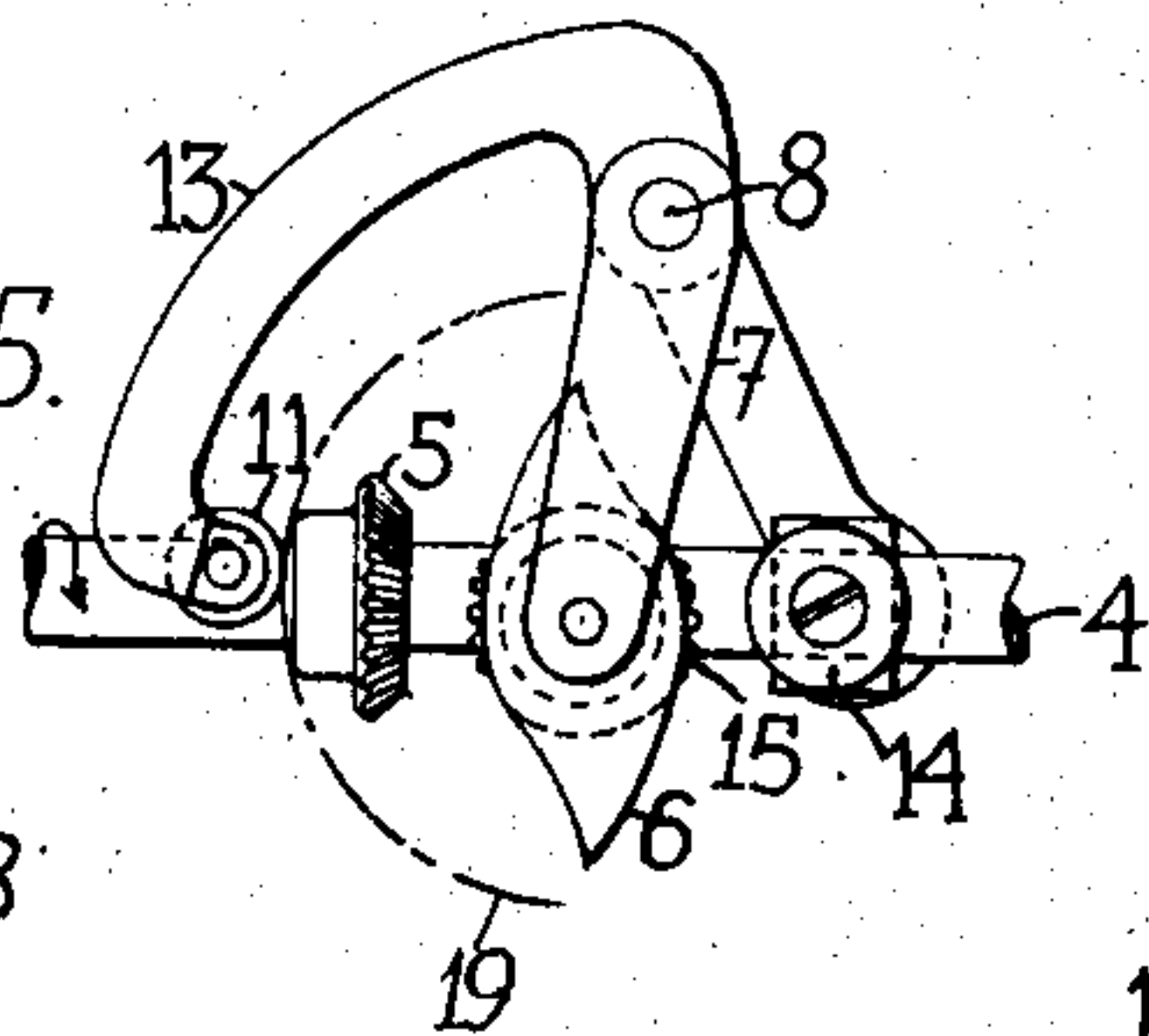


Fig. 4.

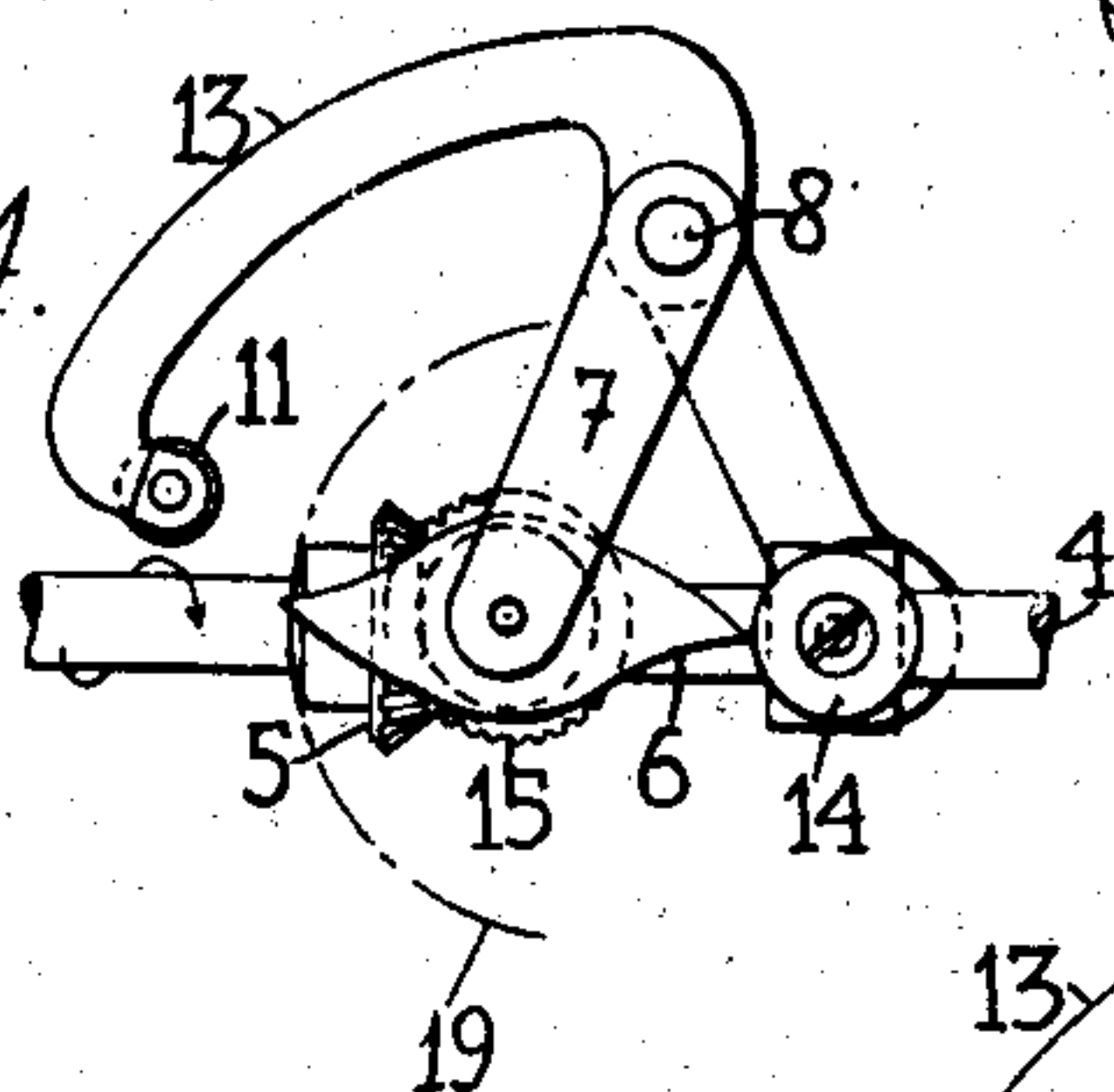


Fig. 2.

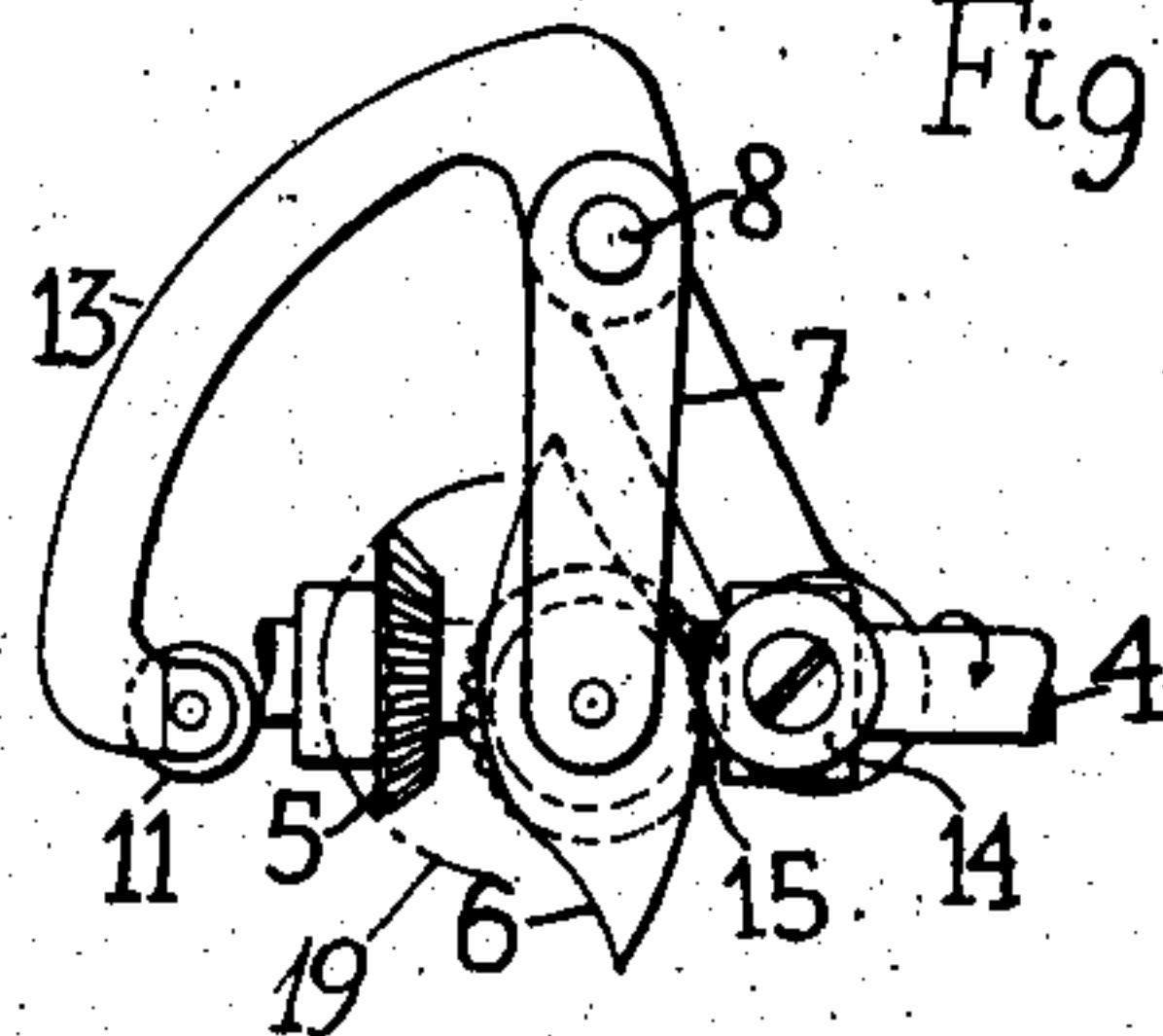


Fig. 3.

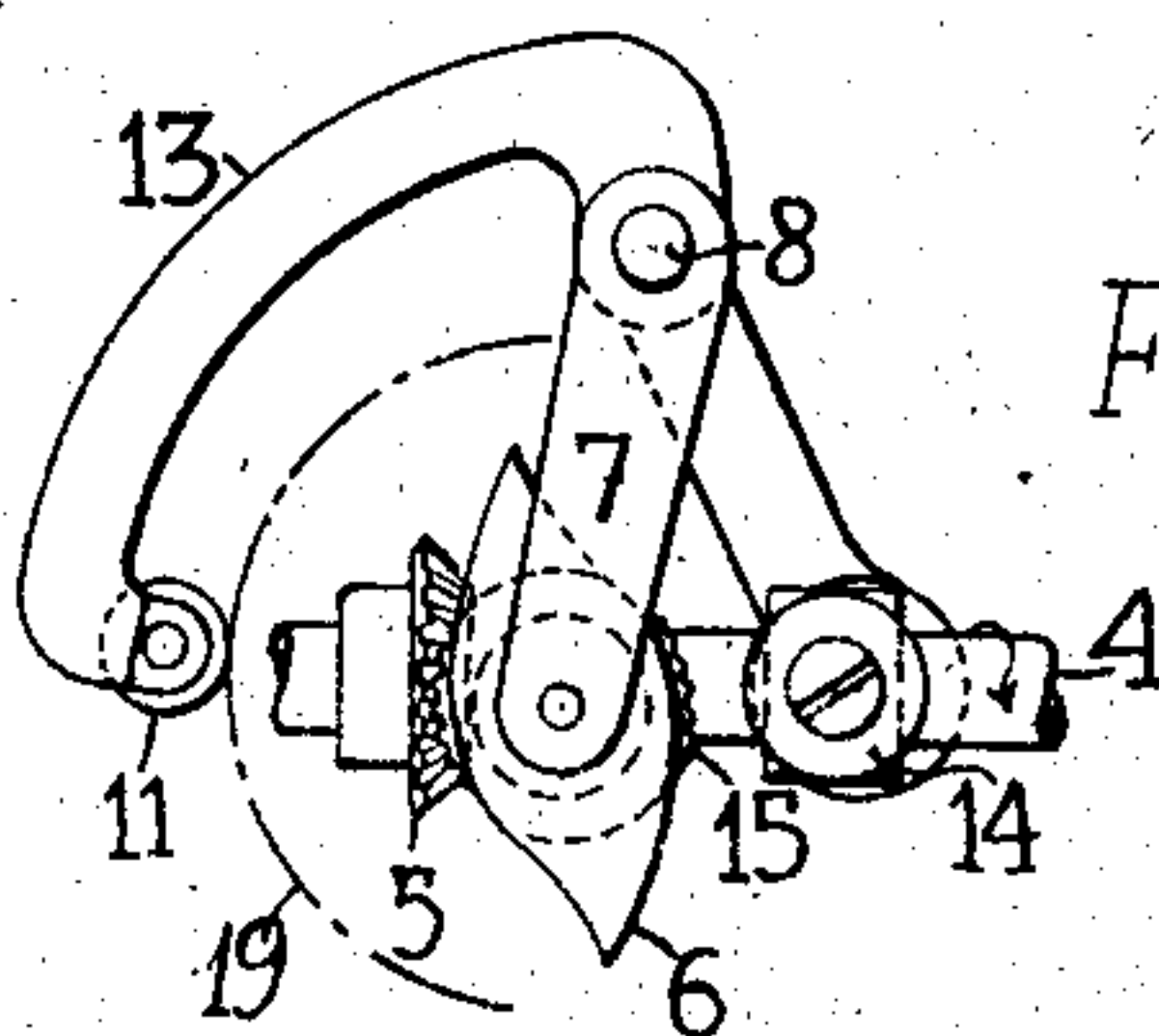
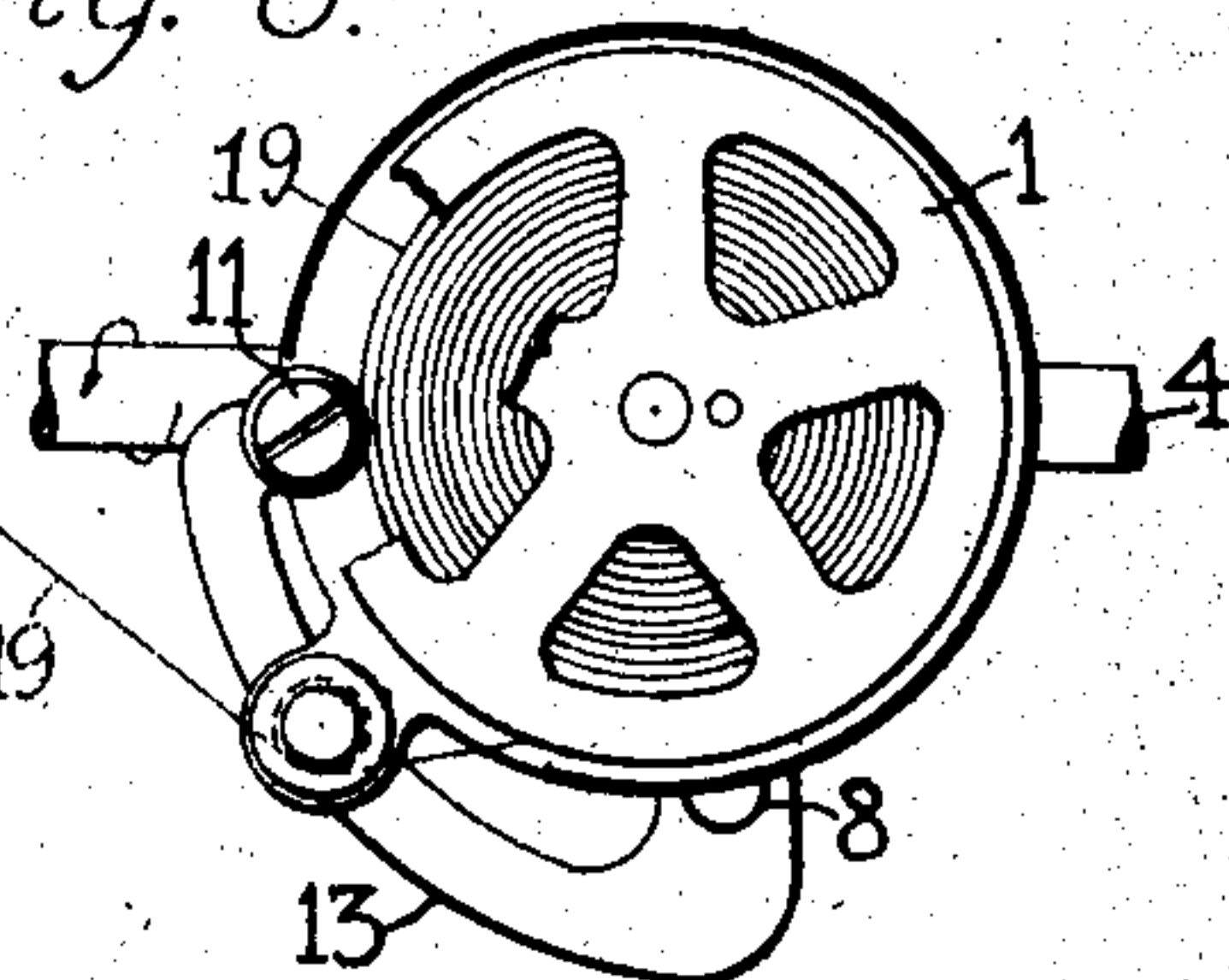


Fig. 6.



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# UNITED STATES PATENT OFFICE.

WALTER E. BARNARD, OF HARTFORD, CONNECTICUT, ASSIGNOR TO UNDERWOOD TYPE-WRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## TYPE-WRITING MACHINE.

990,797.

Specification of Letters Patent.

Patented Apr. 25. 1911.

Application filed August 20, 1909. Serial No. 513,850.

*To all whom it may concern:*

Be it known that I, WALTER E. BARNARD, a citizen of the United States, residing in Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to ribbon winding mechanisms for typewriting and other machines, and is more particularly directed to means for effecting the automatic reversal of the direction of travel of the ribbon.

One object of the invention is to provide a simple and durable mechanism readily applicable to existing machines for effecting a shifting of the ribbon feeding mechanism when the ribbon has about run off one spool without imposing undue stress longitudinally or otherwise on the ribbon itself, which is often narrow and weak.

In carrying out the invention, the ribbon-reversing mechanism is directly actuated by the main power shaft, so that the necessity of the imposition of a severe longitudinal pull or strain on the ribbon is avoided. To effect this result I have provided an interponent between the drive shaft and an abutment or support on the framework, said interponent swiveled upon a ribbon-operated carrier for movement into engagement with the driving shaft member when either spool becomes full. The effect of engaging the interponent with the drive shaft member is to cause the interponent to turn on its swivel, whereby it is carried into engagement with the abutment or support; and as the interponent continues to turn, it re-acts upon the part carried upon the shaft with the effect of shifting the shaft out of connection with the full spool and into connection with the empty spool.

In the accompanying drawings, Figure 1 is a perspective view showing one embodiment of my invention. Figs. 2, 3, 4 and 5 are enlarged detail bottom plan views of the successive positions assumed by the parts when effecting the reversal of the ribbon travel. Fig. 6 is a top plan view of a full spool showing the position of the follower when crowded away by the multiplied coils of ribbon.

The invention is illustrated in connection with ribbon winding mechanism such as is usually employed on the Underwood front

strike typewriting machine, in which the ribbon spools 1, 1 are carried upon a pair of vertical shafts 2, 2, the latter being provided at their lower ends with winding gears or pinions 3, 3<sup>a</sup>. A horizontal driving shaft 4 extends across the machine and carries driving gears 5, 5<sup>a</sup> conveniently shiftable, as by the shifting of the drive shaft, alternately into engagement with the spool gears 3, 3<sup>a</sup>. The drive shaft is actuated step by step by the usual pawl and ratchet mechanism (not shown).

A cam-member 6 is rotatably mounted on a shifting support or carrier, as the arm 7, which in this instance is operated by a vertical shaft 8, provided with a coiled spring 10, to yieldingly maintain a follower 11 carried by an arm 13 on the upper end of the shaft 8 in position to be engaged by the ribbon coils on the spools when the latter become nearly full.

The cam normally lies adjacent an abutment 14 which may consist of a roll, and the cam is conveniently provided with means to be moved into mesh with a gear on the main power shaft 4, whereby to actuate the cam against its abutment and effect a shifting of the power shaft to reverse the ribbon feed. The cam is equipped with a normally idle pinion 15 fixedly secured thereto and movable into engagement with a gear on the power shaft, as the driving gear 5.

The usual spring detent 16 and beveled collar 17, the latter fast on the power shaft, are used to releasably maintain the reversing mechanism in set position, and the power shaft may be manually rotated by the handle 18.

In operation, the ribbon 19 is wound on one spool until the limit of capacity of the spool is about reached, at which time the spring-pressed follower 11 adjacent thereto is engaged by the coil of ribbon. As the coils multiply, the follower is forced or crowded away from the spool against the tension of its spring 10. This movement of the follower imparts a partial rotation to its vertical shaft 8 which is transmitted to the arm or carrier 7 on which is carried the interponent cam and pinion, and results in moving the pinion into mesh with the drive gear 5 thereto adjacent on the power shaft. The drive gear, because of its rotary movement, immediately rotates the pinion as shown by the arrows, thereby causing the



cam to bear against its abutment 14. The reaction of the cam forces the latter with its pinion and arm away from the abutment in the same direction in which the arm was first actuated by the follower; and, as a result, the idle pinion will push or crowd the driving gear 5 and its shaft away from the spool gear 3 with which it was primarily in mesh, thereby causing the remaining drive gear 5<sup>a</sup> on the power shaft to engage the opposite spool gear 3<sup>a</sup> and effect the reversal of travel of the ribbon. The shifting movement of the power shaft will also cause the spring detent to ride across its beveled collar and engage the latter on the opposite side. As soon as the shifting of the power shaft has been accomplished, the spring 10 returns the cam and its arm to normal inoperative position, as shown in Figs. 1 and 5. The spring also returns the follower 11 to its original position.

By referring to the drawings, the various steps of the operation are shown. Thus Fig. 2 indicates in bottom plan view, the normal inoperative position of the parts when the coil of ribbon on the spool is small, the arc-shaped dot-and-dash line diagrammatically indicating the coil of ribbon.

Fig. 3 shows the position of the parts when the coils of ribbon have so multiplied on the spool as to engage and crowd the follower laterally, thereby operating the arm 7 to move the idle pinion 15 into engagement with the drive gear 5 thereto adjacent.

Fig. 4 shows the position of the parts at the extreme limit of movement afforded by the cam when in engagement with the abutment to crowd the power shaft endwise, thereby throwing the drive gear 5 out of mesh with its spool gear and causing the engagement of the remaining drive and spool gears to reverse the ribbon feed. From this view, it will be observed that the point of the cam in engagement with the abutment might possibly slip over the abutment and thus take longer in operating the next time, because the cam would have to be completely rotated before its cam face could engage the abutment. Therefore, in order to expedite the operation, I employ a plurality of cams or a double cam, so that there will always be one in position to operate without loss of time. This view also discloses the fact that the cam action forces the follower away from the full spool.

Fig. 5 shows the position of the parts immediately subsequent to the shifting of the power shaft at which time the spring 10 has returned the follower and cam to normal inoperative position.

Variations may be resorted to within the scope of the invention, as for instance the interponent may be otherwise formed and operated, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. In a typewriting machine, the combination with a ribbon spool and a revoluble member shiftable into and out of position to wind said ribbon spool, of a normally idle revoluble member, means to enable the ribbon to throw said normally idle revoluble member into engagement with said shiftable revoluble member, and switching means actuated by the revolution of said normally idle revoluble member to throw said shiftable revoluble member relatively to said spool.

2. In a ribbon-reversing mechanism, the combination with a spool, a spool gear, and a driving shaft shiftable endwise to connect with said spool, said driving shaft having a gear to shift into and out of mesh with said spool gear, a ribbon-controlled arm carrying a gear normally idle, means being provided to enable the ribbon to cause said idle gear to swing into mesh with said shifting gear to be rotated thereby, and means operated by said idle gear to effect the shifting of said shiftable gear.

3. In a ribbon-reversing mechanism, the combination with a spool, a spool gear, and a driving shaft shiftable endwise to connect with said spool, said driving shaft having a gear to shift into and out of mesh with said spool gear, a ribbon-controlled arm carrying a gear normally idle, means being provided to enable the ribbon to cause said idle gear to swing into mesh with said shifting gear to be rotated thereby, a cam connected to said idle gear to be rotated thereby, and an abutment against which said cam may bear to enable said cam to swing the arm and thereby shift said shifting gear.

4. In a ribbon-reversing mechanism, the combination with a spool, a spool gear, and a driving shaft shiftable endwise to connect with said spool, said driving shaft having a gear to shift into and out of mesh with said spool gear, a ribbon-controlled arm carrying a gear normally idle, means being provided to enable the ribbon to cause said idle gear to swing into mesh with said shifting gear to be rotated thereby, said idle gear provided with a plurality of cams, and an abutment against which any one of said plurality of cams may bear to swing said arm and said idle gear, and thereby shift said shiftable gear away from the spool gear.

5. In a typewriting machine, the combination with a pair of ribbon spools and a pair of gears for winding them, of a driving shaft having gears shiftable alternately into mesh with said spool gears, a pair of ribbon-controlled supports, normally idle gears carried by said supports and lying in proximity to said driving gears, means controlled by the ribbon to move said normally idle gears alternately into mesh with



their associated driving gears, cams connected to said idle gears to be operated thereby, and abutments with which the cams cooperate to effect a shifting of said driving gear from one spool gear to the other.

6. The combination with a ribbon spool, a power shaft and a revoluble member on the shaft shiftable into and out of position to wind said spool, of a normally idle revoluble member, ribbon-controlled means for moving the normally idle revoluble member into position to be rotated from the shaft, and means actuated by the rotation of the normally idle revoluble member to throw the shiftable revoluble member relatively to the spool.

7. The combination with a ribbon spool, a power shaft and a revoluble member on the shaft shiftable into and out of position to wind said spool, of a normally idle revoluble member, ribbon controlled means for moving the normally idle revoluble member into position to be rotated from the shaft, and a cam actuated by the rotation of the normally idle revoluble member, to throw the shiftable revoluble member relatively to the spool.

8. The combination with a ribbon spool, a power shaft and a revoluble member on the shaft shiftable into and out of position to wind said spool, of a normally idle revoluble member, ribbon controlled means for moving the normally idle revoluble member into position to be rotated from the shaft, a cam actuated by the rotation of the normally idle revoluble member, and an abutment engaged by the cam to throw the shiftable revoluble member relative to the spool.

9. The combination with a ribbon spool, a power shaft and a revoluble member on the shaft shiftable into and out of position to wind said spool, of a normally idle revoluble member, ribbon controlled means for moving the revoluble member into position to be rotated from the shaft, a double cam actuated by the rotation of the normally idle revoluble member, and an abutment engaged by the cam to throw the shiftable revoluble member relative to the spool.

10. In a ribbon reversing mechanism, the combination with a spool, a spool gear for actuating the spool, a shiftable drive shaft and a gear on the shaft shiftable therewith into and out of mesh with the spool gear, of a normally idle rotatable member, means to enable the ribbon to throw the idle member into position for rotation from the shaft, a cam actuated by the idle rotatable member, and an abutment against which the cam wipes for actuating the shiftable gear relative to the spool gear.

11. The combination with a ribbon spool, a power shaft and a revoluble member on

the shaft shiftable into and out of position to wind the spool, of a normally idle revoluble member, means for rotating the normally idle revoluble member and normally out of engagement therewith, a swinging arm supporting the normally idle revoluble member, ribbon controlled means for swinging the arm into position whereby the normally idle revoluble member is rotated, and means actuated by the rotation of the normally idle member to throw the shiftable member relatively to the spool.

12. The combination with a ribbon spool, a power shaft and a revoluble member on the shaft shiftable into and out of position to wind, of a normally idle revoluble member, means for rotating the normally idle revoluble member, and normally out of engagement therewith, a swinging arm supporting the normally idle revoluble member, ribbon controlled means for swinging the arm into position whereby the normally idle revoluble member is rotated, and a cam actuated by the rotation of the normally idle member to throw the shiftable member relatively to the spool.

13. In a ribbon reversing mechanism, the combination with a spool, a ribbon to wind thereon, a gear for driving the spool, a shiftable driving shaft, a gear thereon adapted to be shifted therewith into and out of mesh with the spool gear, a ribbon controlled arm, a normally idle gear on the arm, means for enabling the ribbon to swing the idle gear into mesh with the gear on the driving shaft to cause the rotation of the idle gear, and means actuated by the idle gear for effecting the shifting of the shiftable gear.

14. The combination with a ribbon spool, a power shaft, and a revoluble member on the shaft shiftable into and out of position to wind the spool, of a rotatable shaft, yielding means for urging the shaft in one direction, an arm carried by the shaft, a normally idle revoluble member mounted on the arm, means for rotating the normally idle revoluble member, said means normally out of engagement with the normally idle member, ribbon-controlled means for actuating the arm against the tension of said yielding means to throw the normally idle member into position whereby it is rotated, and means actuated by the rotation of the normally idle member to throw the shiftable member relatively to the spool.

15. The combination with a ribbon spool, a power shaft, and a revoluble member on the shaft shiftable into and out of position to wind the spool, of a rotatable shaft, yielding means for urging the shaft in one direction, an arm carried by the shaft, a normally idle revoluble member mounted on the arm, means normally out of engagement with the normally idle revoluble member for rotating the same, a second arm carried by



the shaft, a ribbon engaged follower, the ribbon adapted to actuate the follower to partially rotate the shaft and swing the normally idle revoluble member into engagement with its rotating means, and means actuated by the rotation of the normally idle member to throw the shiftable member relatively to the spool.

16. The combination with a pair of ribbon spools, a ribbon adapted to be wound thereon, a power shaft, revoluble members on the shaft shiftable into and out of position to rotate one spool or the other, of a pair of idle rotatable members adapted for engagement with the shiftable members and normally out of engagement therewith, a pair of ribbon controlled means for swinging one or the other of the normally idle members into engagement with the shiftable revoluble members associated therewith, and means actuated by the rotation of either normally idle revoluble member for throwing the shiftable revoluble member engaged thereby relative to its spool.

17. In a ribbon reversing mechanism, the combination with a pair of spools, spool-gears for actuating the spools, a shiftable drive shaft, and gears on the shaft shiftable therewith into and out of mesh with the spool-gears alternately, to effect the reversal of the ribbon feed, of normally idle gears, ribbon controlled means for throwing the idle gears alternately into engagement with a gear on the drive shaft, and means actuated by the idle gears for effecting the reversal of the ribbon feed.

18. In a ribbon reversing mechanism, the combination with a pair of spools, spool-gears for actuating the spools, a shiftable drive shaft, and gears on the shaft shiftable

therewith into and out of mesh with spool-gears alternately, to effect the reversal of the ribbon feed, of ribbon-control revoluble members, means actuated by ribbon for throwing the revoluble member alternately into engagement with a rotating means, cams actuated by the revoluble means, and abutments engaged by the cams for throwing one shiftable gear out of mesh with its spool gear and simultaneously engaging the remaining shiftable gear with spool gear to reverse the ribbon feed.

19. The combination with a ribbon spool, a power shaft and a revoluble member shiftable into and out of position to wind the spool, of a normally idle revoluble member, a swinging support for the normally idle member, yielding means normally retaining the member in idle position, ribbon controlled means for swinging the support against the tension of the yielding means, a position in which motion is imparted to the normally idle revoluble member, and means actuated by the rotation of the normally idle member to throw the shiftable member relatively to the spools.

20. In a ribbon mechanism, the combination with a shiftable ribbon driving shaft, of a carrier whose movements are controlled by the ribbon, an interponent normally idle and swiveled upon said carrier, which is caused by the ribbon to move into engagement with a part upon said driving shaft and an abutment or support against which said interponent may rest for the purpose of shifting the shaft.

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Witnesses:

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