April 20, 1937. F. W. STORCK 2,077,779

REVERSIBLE DRIVE FOR DUPLICATORS

Filed July 24, 1935 3 Sheets-Sheet 1

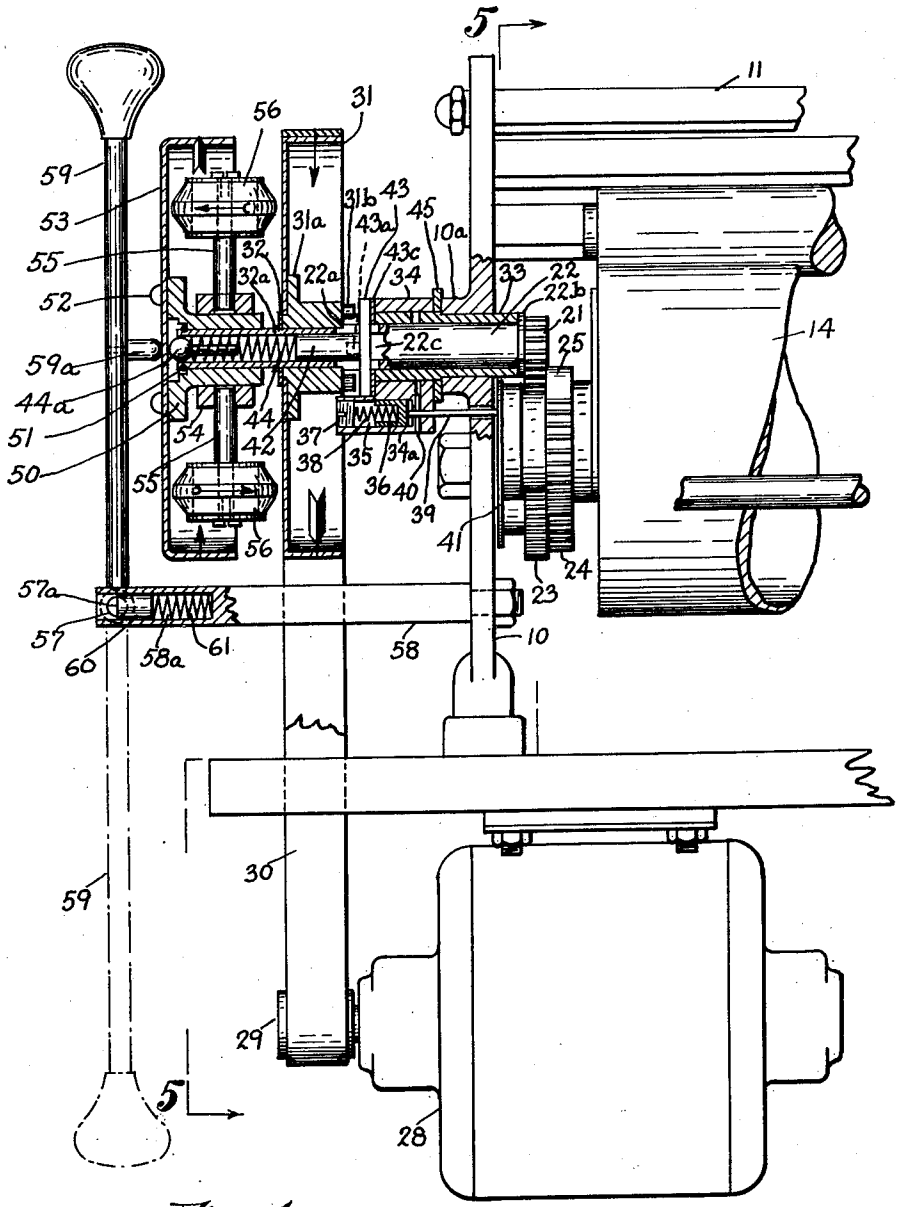


Fig. 1.

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REVERSIBLE DRIVE FOR DUPLICATORS

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Fig. 4.

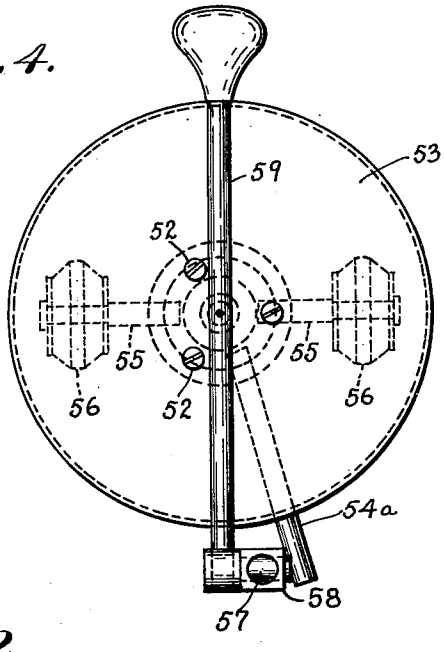


Fig. 2.

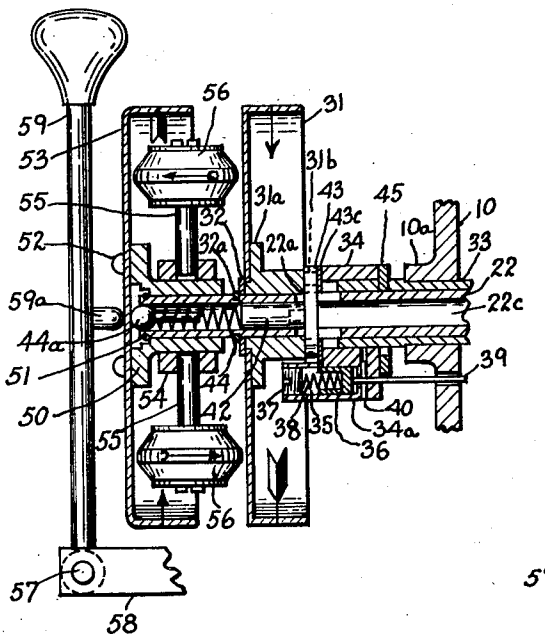
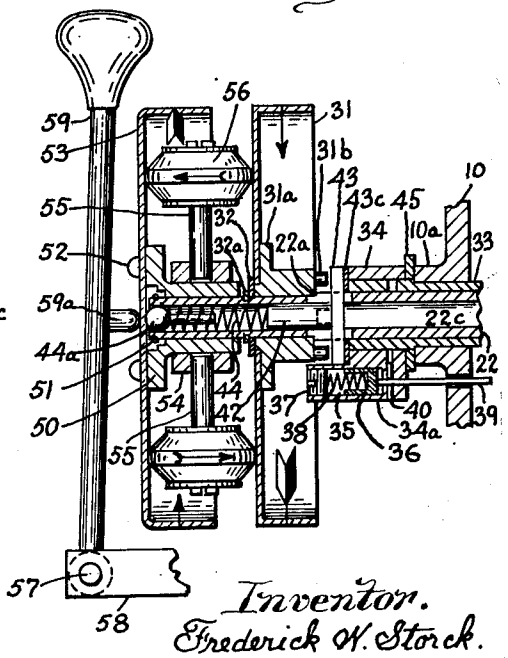


Fig. 3.



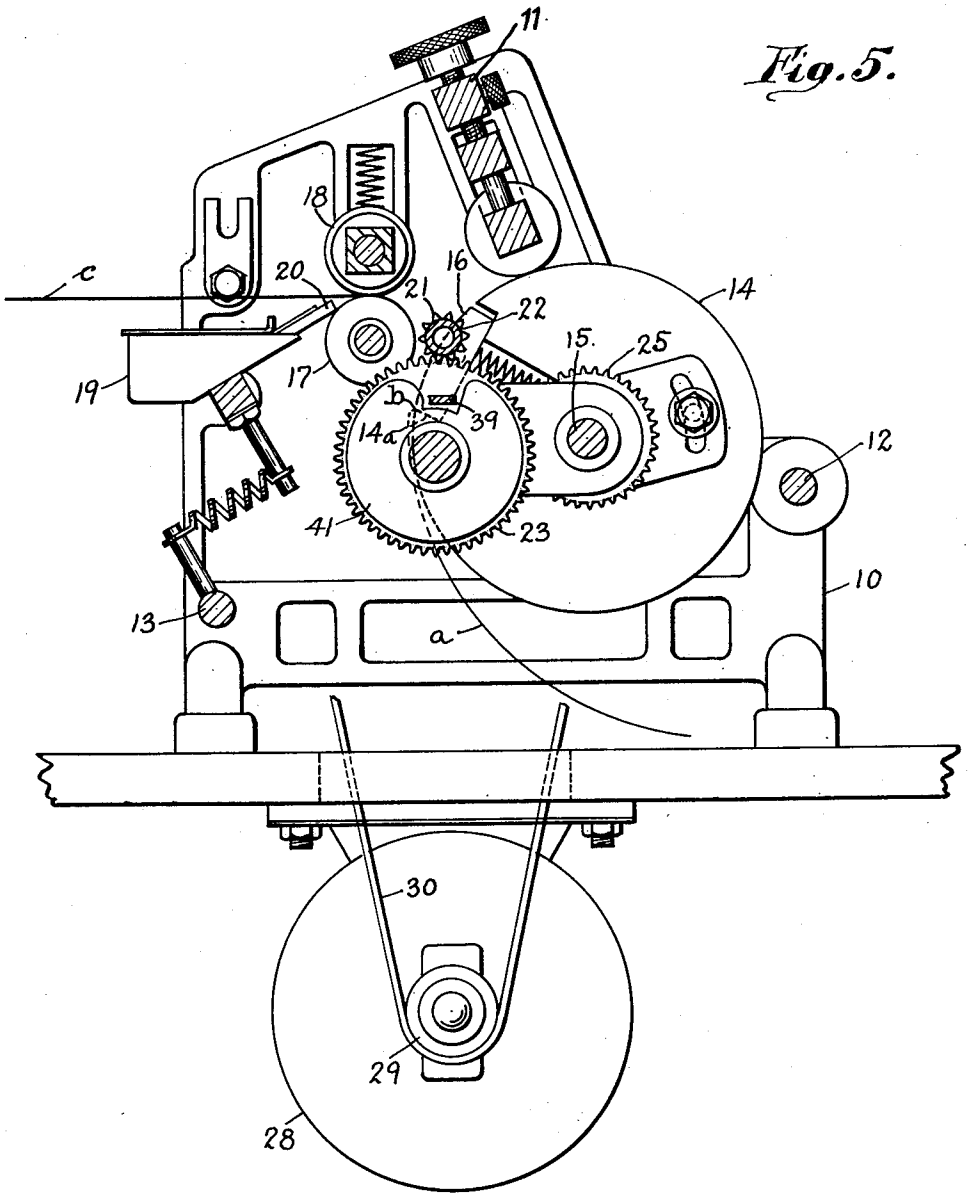
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REVERSIBLE DRIVE FOR DUPLICATORS

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Fig. 5.



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UNITED STATES PATENT OFFICE

2,077,779

REVERSIBLE DRIVE FOR DUPLICATORS

Frederick W. Storck, Arlington, Mass., assignor to Standard Mailing Machines Company, Everett, Mass., a corporation of Massachusetts

Application July 24, 1935, Serial No. 32,886

9 Claims. (Cl. 101—132)

This invention relates to duplicating machines and more particularly to a reversing mechanism combined with an optionally selective motor drive which actuates the machine for a single cycle or in continuous successive cycles, as is completely shown and described in my co-pending application Serial No. 5,426.

Duplicating machines of the herein referred to character, to which my reversing mechanism is particularly adapted, are provided with a printing platen or drum to which one edge of the master copy is secured by means of a suitable clamping device. The clear sheets, upon which the master copy is to be duplicated, are singularly positioned for feeding into registered engagement with the master copy and a coacting pressure roll. During the feeding function, the face of the clear sheet is moistened, by various methods now known in the art, and subsequently engaged, under pressure, with the master copy.

To accomplish the desired registration of the clear sheet and master copy, it is essential to effect a positive stopping of the printing platen at a given point and in a direct relation to the positioning point for the advanced edge of the clear sheet.

A preferred method of feeding the clear sheet in a positive registering engagement with the master copy comprises opposed feed rolls which are correlated with the printing platen to which the master copy is secured. The printing drum and feed rolls are intermittently actuated with a determinate dwell period between each cycle of operation.

During continuous sequential operations of the machine, the referred to dwell period is of a sufficient increment of time to permit of the proper positioning of a clear sheet into engagement with the bight of the feed rolls.

In utilizing my preferred feed rolls, the clamp edge of the master copy is disposed in a plane below the bight of the feed rolls during the dwell period.

A duplicating machine embodying the above general characteristics is completely shown and described in my U. S. Letters Patent No. 1,964,933.

The referred to required positioning of the clamped master does not permit of convenient access to the clamping device, therefore, when it becomes necessary to remove or replace the master, it is essential to partially rotate the printing platen to position the clamping device where it will be readily accessible. It is obviously undesirable to position the clamping device by a forward movement of the printing platen as this would cause the master to engage with the pressure roll and thereby effect an off-set of the matter contained on said master on to said roll.

This partial rotating of the printing platen and positioning of the clamping device is readily accomplished with the so-called hand operated machines wherein the machine is manually operated by a crank handle. In this type of machine it is only necessary for the operator to reverse the direction of movement of the crank handle until the clamp is in a desired position.

In my above referred to co-pending application, Serial No. 5,426, I have provided motive power for actuating a duplicating machine for either a single complete cycle or continuous sequential cycles of operation with provision whereby the operator can manually reverse the printing platen until the clamping device is in a desired position for clamping or non-clamping the master copy.

Therefore, the principal object of my present invention is to provide a power driven reversing mechanism whereby the operator may reverse the printing platen by degrees to position the clamping device where it will be readily accessible.

Another object of my invention is to provide a simplified reversing mechanism with few working parts and which may be conveniently operated.

A further object of my invention is to utilize my primary drive as motive power for my reversing mechanism and thereby eliminate the necessity for interrupting or shifting of the power of my primary drive.

With the above and other objects in view my invention comprises a novel combination and arrangement of parts hereinafter described and more specifically pointed out in the appended claims.

In the accompanying drawings I have shown my reversing mechanism embodied with a duplicating machine of the hereinbefore referred to type, sufficient to enable those skilled in the art to understand the construction and operation thereof. It is to be understood that, while I have shown my reversing mechanism embodied with a particular type of duplicating machine, this showing is not to be construed as limiting my invention thereto, but for illustrative purposes only.

Referring to the drawings:—

Fig. 1 is a partial end view of a motor driven duplicating machine having my reversing mechanism embodied therewith. In this view a portion of the drive and my reversing mechanism is shown in section.

Fig. 2 is a view corresponding substantially to the sectional portion of Fig. 1, but shows some of the parts in a different position.

Fig. 3 is a view corresponding substantially to Fig. 2, but shows my reversing mechanism in its engaged driving relation.

Fig. 4 is an end view of my reversing mechanism.

Fig. 5 is a sectional view taken substantially along line 5—5, Fig. 1.

The duplicating machine

The duplicating machine illustrated comprises opposed stationary side frames **10** in which are mounted the operating elements of the duplicator. The frames **10** are retained in spaced relation by transverse tie rods **11**, **12** and **13**.

The printing platen **14** is rotatably mounted upon a stationary shaft **15** suitably supported in the side frames **10**. This printing platen **14** is provided with a clamping device for holding a reverse master copy *a*, its upper end *b* being clamped between the radial wall **14***a* and the edge face of the clamp segment **16**.

When feeding a clear sheet of paper *c* to the duplicator, it is moved forward from a support, not shown, until the forward edge of said sheet evenly contacts with the bight of the feed rolls **17**, **18**, see Fig. 5. The lower feed roll **17** is geared directly to the platen **14** and driven in a direct relation thereto. This feeding of the clear sheet *c* is accomplished during the dwell period of the machine and while the feed rolls **17**, **18** are at rest.

In this instance, a suitable moistening fluid is applied, preferably to the under side of the clear sheet, by the roll **17** as the sheet *c* passes through the feed rolls **17**, **18**. This moistening fluid is fed from a reservoir **19**, by means of the capillary action of a bibulous material **20**, to the moistening and feed roll **17**.

The mechanism for intermittently rotating the printing platen **14** comprises a driving pinion **21** formed, in this instance, integrally with the tubular drive shaft **22** which is rotatably mounted in a suitable bearing **10***a* of the side frame **10**.

The driving pinion **21** meshes with and drives an intermediate gear **23** to which the intermittent gear **24** is secured. The intermittent gear **24** meshes with a coacting intermittent gear **25** which is adjustably secured to the printing platen **14**. These intermittent gears **24**, **25** are of the usual construction wherein a predetermined portion of the periphery of each is free from teeth and continued rotation of the driving gear will not rotate the driven gear until the blank space in the driving gear has passed the blank space in the driven gear and the teeth of both engage.

The gears **23**, **24** are adapted to be continuously rotated and are preferably proportioned relative to the gear **25** so that the gears **23**, **24** will make approximately one and one-quarter revolutions to one revolution of the gear **25** which is secured to the printing platen **14**.

The prime mover and motor drive

The motor **28** is preferably mounted on the under side of a table top on which the duplicating machine is positioned. The motor pulley **29** is connected by means of a belt **30**, or other suitable connection, to and rotates the prime mover or drive pulley **31** in the direction of the arrow, said pulley **31** having its hub **31***a* freely mounted on the pinion shaft **22**. The inner end face of the pulley hub **31***a* abuts against a shoulder **22***a* of the shaft **22**, the opposed end of said hub **31***a* abutting against the friction disc **32** which is retained in position by means of a snap ring **32***a* engaged in a recess in the shaft **22**.

The frame hub **10***a* is provided with a bushing **33**, the inner end of which abuts against a collar **22***b* formed integrally with the pinion shaft **22**. The opposed end of said bushing **33** extends beyond the outer face of the hub **10***a* and has slidably mounted thereon a hub **34** of a clutch releasing device. The lower portion **34***a* of the hub is provided with a longitudinal bore **35** in which is slidably mounted a plunger **36**. The open end of the bore **35** is closed by means of a screw plug **37** which acts as a bearing for one end of a compression spring **38** positioned within the bore **35**. The opposed end of said spring **38** has its bearing against the plunger **36** and urges the plunger into contact with the inner end of an indicating lever **39** which is pivoted at **40** to the lower portion **34***a* of the hub **34**. The outer end of the indicating lever **39** is adapted to contact and engage with the lever control disc **41**.

Slidably mounted within the bore **22***c* of the pinion shaft is a plunger **42** which is adapted to engage the pilot pin **43***a* of a clutch key **43** which extends transversely of said shaft and projects therefrom through suitable longitudinal slots formed in the shaft. A compression spring **44** is also mounted within the bore **22***c* of the pinion shaft **22**, said spring having one end bearing against the plunger **42** and its opposite end bearing against a pivot ball **44***a* which is also slidably mounted in the bore **22***c*. This spring **44** urges, through the plunger **42**, the clutch key **43** into contact with a friction washer **43***c* which is interposed between the clutch key **43** and the outer face of the clutch releasing device hub **34**.

The clutch operating lever **45** is positioned between the inner face of the clutch releasing device hub **34** and the outer face of the frame hub **10***a*.

As aforesaid, this particular motor drive and control is completely shown and described in my co-pending application, Serial No. 5,426, therefore, further detailed description is thought unnecessary as my hereinafter described reversing mechanism is adaptable to any suitable duplicating machine drive mechanism.

The reversing mechanism

Slidably keyed to the shaft **22** is a hub **50** which is retained on said shaft by means of a split lock-ring **51**. The hub **50** has secured thereto, by means of screws **52**, a flanged disc wheel **53** which may be of any suitable form. This hub **50** freely supports a hub **54** having oppositely extending shafts **55** on the outer ends of which are rotatably mounted the reversing drive rolls **56**, these rolls being rotatable at right angles to the side face planes of the disc wheel **53** and prime mover **31**. The disc wheel **53** is normally retained against the split lock-ring **55** in an inoperative spaced relation to the prime mover by means of the compression spring **44** which acts against the pivot ball **44***a*, said ball having its bearing against the inner face center of the disc **53**. To prevent radial movement of the rolls **56**, I have, in this instance, provided a stop pin **54***a* which is secured in the hub **54** and bears against a support bracket **58**.

Suitably pivoted at **57** to the supporting bracket **58** is a reverse mechanism operating lever **59**. This lever **59** is provided with a projection **59***a* which is adapted to engage the outer face center

of the disc **53**. The pivot **57** of said lever has a cutaway portion **57***a* adapted for engagement with a plunger **60** slidably mounted in a bore **58***a* in the supporting bracket **58**. This plunger is forced against the cutaway portion of the pivot **57** by means of a compression spring **61** and thereby retains the lever in its operative position as shown by full lines, Fig. 1, or, by means of this snap lock, permits the lever to be conveniently moved to an inoperative position as shown by broken lines, Fig. 1. This construction is a matter of convenience in disassembling or assembling elements embodied with the shaft **22**, and further retains the lever **59** in a vertical position without exerting any inward pressure on the disc **53**.

Operation of the drive

At Fig. 1 the drive engaging elements are shown in their inoperative position and thus the primary drive pulley may be continuously and freely rotated on the shaft **22**, in the direction of the pulley arrow, while the machine elements are at rest.

To engage the shaft **22** in driving relation with the primary drive pulley **31**, the lever **45** is operated to move the collar **34** to the left, thus causing the clutch key **43** to be moved into engagement with the driving pins **31***b*, projecting from the pulley hub **31***a*, and rotated therewith, see Fig. 2. This, in turn, rotates the shaft **22** and the pinion **21** which is in engagement with the intermittent gear cluster and thereby rotates the printing platen **14** in a clockwise direction and corresponding to the direction of movement of the primary drive pulley. During this driving relation of the elements, the reversing mechanism remains in a spaced-apart relation relative to the primary drive pulley **31** and the disc will rotate with and in the direction of the shaft **22**.

The reversing drive

When the clutch key **43** is disengaged from its driving relation with the pulley **31**, see Fig. 3, the pulley is then freely rotated on the shaft **22**. To reverse the normal direction of rotation of the drive shaft **22** and its connected elements, the operator moves the control lever **59** to the right, the projection **59***a* engaging the center of the disc **53** and thus causing the hub **54** to slide on its bearing until the peripheral faces of the reversing drive rolls **56** are engaged between the inner side face of the disc **53** and the side face of the primary drive pulley **31**.

Through the frictional contact of the rolls **56**, the operator may vary the speed and movement of the elements by exerting more or less pressure upon the operating lever. When the rolls **56** are thus engaged, they will be rotated by the primary drive pulley **31** in the direction of the arrows, thus causing the disc pulley **53**, which is non-rotatable on the shaft **22**, to be rotated contrawise to the primary drive pulley.

When the operator releases the pressure exerted upon the lever **59** to cause engagement of the reversing elements, the compression spring **44**, acting against the pivot ball **44***a*, will cause the hub **50** to move to the left against the split lock-ring **51**, thus spacing the reversing elements apart from the primary drive pulley.

Having thus described my invention, what I claim is:—

1. A duplicating machine having a master printing platen with means for securing a master copy thereto, said platen being adapted for continued rotation with a dwell period in its cycle of operation, a gear train for actuating said platen, a drive shaft directly connected to a member of said gear train, a freely rotatable primary drive member mounted on said shaft and adapted for continuous rotation, clutch elements slidably supported by said shaft, means to actuate said clutch elements to engage said shaft and said second member in driving relation, means urging said clutch elements to their normal disengaged position and operable upon release of, and independent of, said first means; a hub slidably keyed to said shaft and having a flange integral therewith, radially stationary rotatable elements disposed between said flange and the side face of said primary member and at substantially right angles thereto, said rotatable elements being normally spaced apart from said flange and primary member with means for engaging said last elements in a driving relation and whereby said flange member and shaft are conversely rotated relative to said primary drive member.

2. A duplicating machine having a rotatable printing platen with means for securing a master copy to said platen, driving connections for actuating said platen, a drive shaft directly connected to a member of said driving connections, a freely rotatable member mounted on said shaft and adapted for continuous rotation, clutch elements slidably supported by said shaft, clutch engaging and retaining means, spring-pressed disengaging means, indicating means associated with said spring-pressed means and said driving connections whereby said clutch is disengaged in a positioned relation to said platen; a hub slidably keyed to said shaft and having a flanged portion integral therewith, radially stationary rotatable elements disposed between said flange and the side face of said primary member and at substantially right angles thereto, said rotatable elements being normally spaced apart from said flange and primary member with means for engaging said last elements in a driving relation and whereby said flange member and shaft are conversely rotated relative to said primary drive member.

3. In a device of the character specified, a single rotatable shaft connecting to a part to be driven, a primary drive member having a discus side face portion, said member being freely mounted on said shaft with means for selectively engaging and disengaging said drive member with said shaft; a driven member having a discus side face portion, said driven member being slidably keyed on the terminating end of said shaft in a spaced relation to said drive member; radially stationary, spaced rotatable elements disposed between adjacent faces of said drive and driven members, with means for selectively engaging said rotatable elements and said drive and driven members in a driving relation and whereby said driven member and shaft are rotated conversely to said primary drive member.

4. In a device of the character specified, a single rotatable shaft connecting to a part to be driven, a primary drive member having a discus side face portion, said member being freely mounted on said shaft with means for selectively engaging and disengaging said member with said shaft; a driven member having a discus side face portion, said driven member being slidably keyed on the terminating end of said shaft in a spaced relation to said drive member; radially stationary arms disposed between said drive and driven members, freely rotatable elements supported by said arms with means, including said driven

member, for engaging and disengaging said rotatable elements with adjacent faces of said drive and driven members and whereby said driven member and said shaft are rotated conversely to said primary drive member.

5. The elements as set forth in claim 4 and wherein said driven member is yieldingly retained in inoperative spaced relation relative to said primary drive member.

6. A driving member and a driven member, driving connections between said members, said connections embodying a tubular drive shaft secured to said driven member, said driving member being freely rotatable on said shaft and adapted for continuous rotation, a compressible member slidably mounted within said shaft, a transverse longitudinally movable member in engagement with said compressible member and movable therewith, selective means to actuate said transverse member to engage said freely rotatable driving member in a driving relation with said shaft, said compressible member being adapted to disengage said transverse member upon the release of said last means, a second driven member slidably keyed on the terminating end of said shaft in a spaced relation to said driving member, radially stationary rotatable mechanism disposed between adjacent faces of said driving and last driven members with selective means for engaging said drive member in driving relation with said last driven member and whereby said last driven member and said shaft are rotated conversely to said first freely rotatable driving member.

7. In a device of the character specified, a single rotatably mounted shaft connected to a part to be driven, a drive and driven member mounted on said shaft in spaced relation, said drive member being free to rotate on said shaft and said driven member being slidably keyed to said shaft, a friction roll rotatably and movably mounted and located between adjacent faces of said drive and driven members and means for moving said friction roll in a manner whereby opposite sides of its periphery may bear respectively upon faces of said drive and driven member which are adjacent thereto.

8. In a device of the character specified, a single rotatable shaft connected to a part to be driven, a forward drive member freely mounted on said shaft, a releasable clutch means for operatively connecting said forward drive member with said shaft, a member to be driven, said member being slidably mounted on a terminating end of said shaft and secured against rotation with respect thereto, said member to be driven and said forward drive member being in spaced relation, a friction roll mounted between said drive members and means whereby said friction roll may be moved into and out of operative engagement with adjacent faces of said drive and driven members.

9. In a device of the character specified, a shaft connecting at one end to a part to be driven, said shaft having a driven member slidably keyed on its other end, a driving member freely mounted on said shaft, selectively operable means for connecting the driving member to the shaft for direct rotation therewith, radially stationary mechanism disposed between adjacent faces of said driving and driven members, and means for selectively moving the said first driven member into contact with said mechanism for driving said driven member reversely with respect to said driving member.

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