June 1, 1948. F. W. STORCK 2,442,574

CLUTCH CONTROL FOR DUPLICATING MACHINES

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Fig. 1.

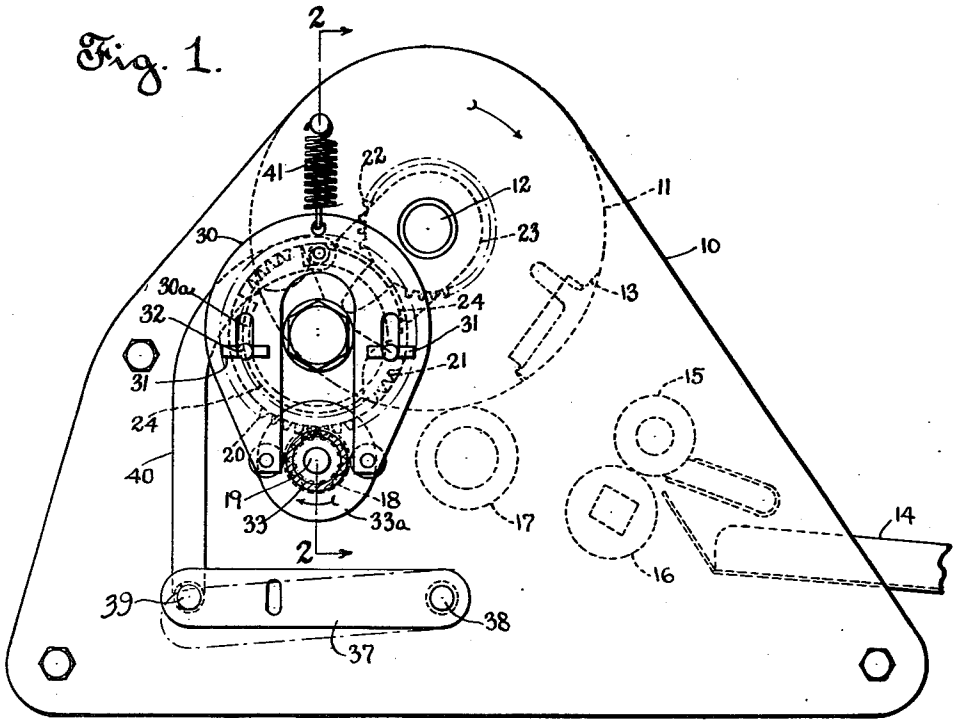


Fig. 9.

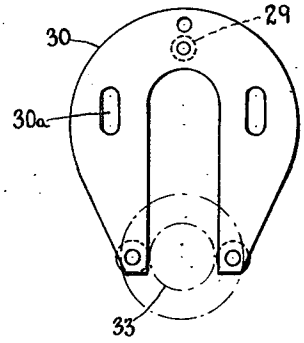


Fig. 10.

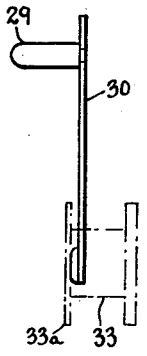
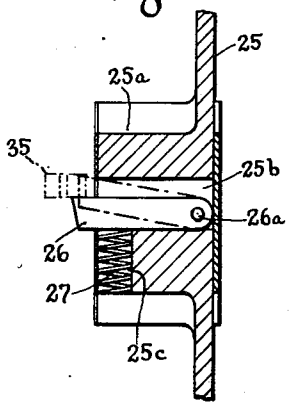


Fig. 8.



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CLUTCH CONTROL FOR DUPLICATING MACHINES

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Fig. 3.

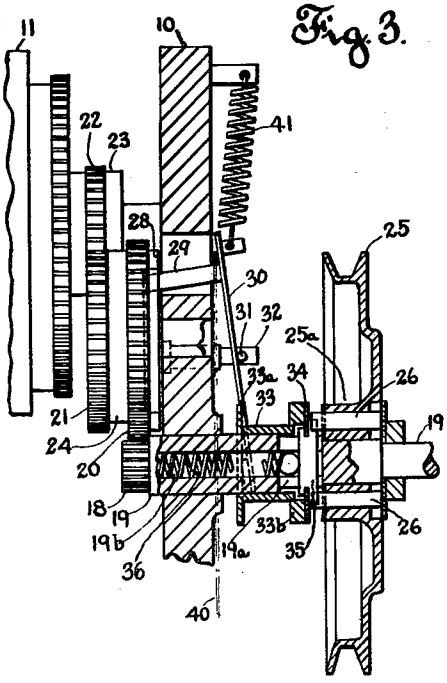


Fig. 2.

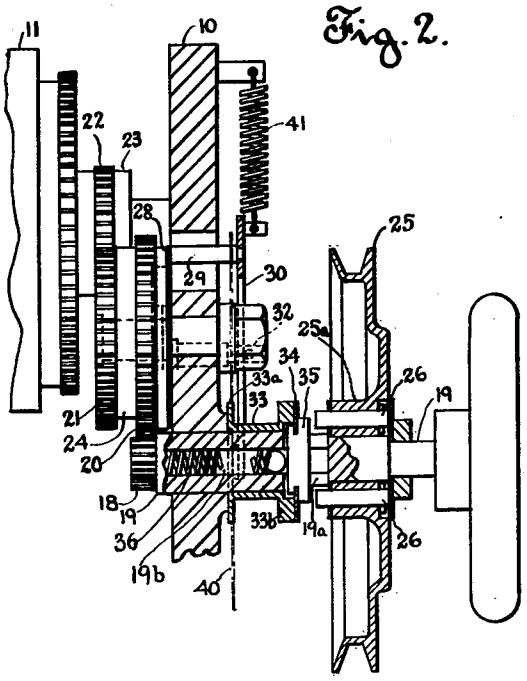


Fig. 4.

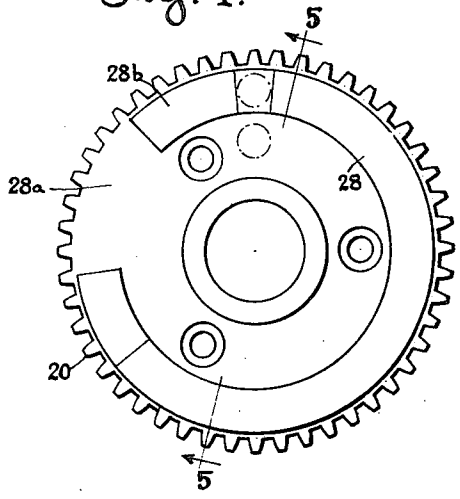


Fig. 5.

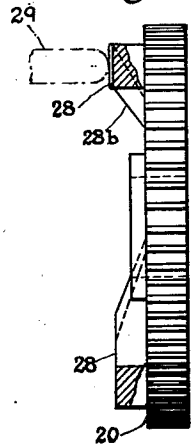
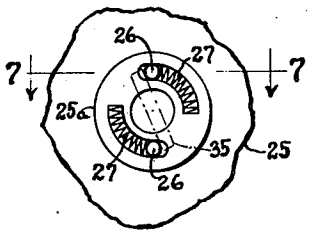


Fig. 6.



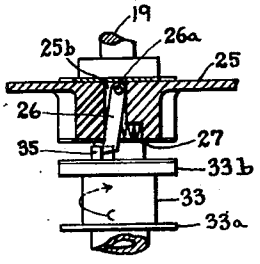


Fig. 7.

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UNITED STATES PATENT OFFICE

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CLUTCH CONTROL FOR DUPLICATING MACHINES

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Application May 11, 1946, Serial No. 669,024

4 Claims. (Cl. 192—33)

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This invention relates to duplicating machines and more particularly to a drive and clutch that is adapted to operate the machine for a single cycle of operation or in continuous successive cycles wtih a determinate stopping point between the cycles of operation.

To illustrate a practical embodiment of the invention, the present novel features are shown embodied in a fluid process duplicating machine.

In general, duplicating machines, and more particularly machines of the character of the presently illustrated machine, are provided with means for securing a master copy to the printing platen or drum. Clear sheets, upon which the master copy is to be duplicated, are singularly positioned for feeding into registered engagement with the master copy. During the feeding function the clear sheet is simultaneously moistened by various methods known in the art.

After the clear sheet is positioned for feeding, the machine mechanism is actuated to advance the sheet and engage the master copy in a registered relation to complete the duplicating or printing function. Each time this operative cycle has been completed, the beginning of the next cycle must start at a determinate point so that the next successively positioned clear sheet will be advanced to register with the master copy.

To obtain proper registration of the clear sheet with the master copy, it is obvious that the sheet feeding elements and actuating mechanism for the master copy carrying member must be correlated. Coacting feed rolls functioning in a direct relation to the master copy carrying member have been used for positioning and advancing a clear sheet to register with a master copy. The feed rolls are preferably provided with an intermittent dwell period so that the leading edge of a clear sheet may be properly positioned in the bight formed by the feed rolls.

Machines for effecting the above functions are now well known in the art and one such machine embodying the required features is fully shown and described in U. S. Reissue Patent No. 19,951 issued to Frederick W. Storck on April 28, 1936.

Motive power is frequently desirable to operate duplicating machines. A suitable source of power may be employed and directly associated with a prime mover embodied in the machine mechanism. Such a prime mover may be in the form of a pulley continuously driven from the source of power and freely rotatable relative to the machine operating mechanism. Motive power of this character presents a problem in machines having cyclic operations and more particularly

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in machines operating on material in which positioning, feeding and registering requirements exist and such as is present in a duplicating machine. Duplicating machines may be operated in a single cycle manner wherein it is required that the driving and driven members disengage after each complete cycle or the machine may be operated in continuous successive cycles that requires the driving and driven members remain in engagement until the desired number of cycles has been completed, and in either instance the printing element must be stopped in a registering position on the completion of the operative cycle.

To effect an operative engagement between the driving and driven members it is desirable to use a form of clutch that may be readily engaged or disengaged. To function in the present required manner the control must be effective to instantly disengage the machine mechanism from the prime mover so that the master carrying member will again be determinately positioned for the next successive cycle of operation.

Accordingly, one of the primary objects of the present invention is to provide a clutch and clutch control for a machine drive that will automatically disengage the driven members of the machine from a continuously rotating prime mover in a manner that will arrest movement of the printing element at a determinate combined stopping and starting point relative to a cycle of operation of the machine.

Another object of the invention is to provide a clutch control for machines having a determinate combined stopping and starting point for each complete cycle of operation that may be selectively positioned to cause disengagement of the driving and driven member after a single cycle of operation or a continuity of cycles of the machines that in either instance will arrest movement of the printing element at the determinate stopping and starting point.

A further object of the invention is to provide a simple manually controlled means for effecting optional engagement between the driving and driven members for a single or a continuity of cycles of operations of the machine.

A still further object of the invention is to provide clutch engaging elements that are pivoted and arcuately moved when in their inoperative position and automatically increases the clearance between the driving and driven clutch engaging elements when the members are disengaged.

The foregoing objects are intended as a general statement and are not to be construed as limiting the invention thereto as other objects and advantages will become apparent from the following description of a preferred form of the invention and wherein many changes and modifications may be made by those skilled in the art without departing from the spirit and scope of the invention.

Referring to the drawings:

Fig. 1 is a side elevation of a fluid process duplicating machine having the present invention embodied therewith.

Fig. 2 is a vertical section taken substantially along line 2—2, Fig. 1, but shows the continuously driven prime mover in addition.

Fig. 3 is a view corresponding substantially to Fig. 2 but shows some of the parts in a different position.

Fig. 4 is a detail of one of the driven members having an annular cam associated therewith.

Fig. 5 is a side elevation of the member shown at Fig. 4 with the cam broken substantially along line 5—5, same figure.

Fig. 6 is a fragmentary face view of the continuously driven prime mover showing its clutch engaging elements.

Fig. 7 is a sectional plan view taken substantially along line 7—7, Fig. 6, and also shows the opposed clutching member.

Fig. 8 is a view, on an enlarged scale, corresponding substantially to Fig. 7 but shows some of the parts in a different position.

Fig. 9 is a detail of one of the clutch control members, and

Fig. 10 is a side elevation of the member shown at Fig. 9.

As illustrated the duplicating machine is provided with opposed stationary side frames 10 which support the functioning elements of the machine. The printing platen or drum 11 is rotatably mounted upon a stationary shaft 12 suitably supported in the side frames 10. This drum 11 is provided with a clamping device 13 that is adapted to receive and secure the leading edge of a master copy to be duplicated upon clear sheets.

A clear sheet to be duplicated upon is advanced from a support 14 until the forward edge of the sheet contacts and is positioned in the bight of opposed feed rolls 15, 16 that are intermittently rotated in a direct relation to the rotation of the drum 11. The starting of the feed rolls 15, 16 and advancement of the forward edge of a sheet to be duplicated upon is in a direct relation to the edge of the master secured by the drum clamping member 13 so that the clear sheet will correctly register with the master copy when both are engaged between the drum and its coacting pressure roll 17.

In the present machine the drum 11 and feed rolls are both intermittently actuated by mechanism that includes a driving pinion 18 secured to a drive shaft 19 which is suitably mounted for rotation in the machine frame 10. The driving pinion 18 meshes with and drives an intermediate gear 20 to which an intermittent gear 21 meshes with and actuates a coacting intermittent gear 22 that is attached to the drum 11. These intermittent gears 21, 22 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 enmesh.

In this particular instance I have provided coacting lock slides 23, 24 which are associated with the opposed intermittent gears 21, 22. These lock slides 23, 24 function in a manner corresponding to the usual blank spaces of opposed intermittent gears. This construction is well known and utilized in instances wherein the blank space of one of the intermittent gears would permit only a very limited slide length which would have a tendency to produce a wedging action between the opposed slides.

A duplicating machine of substantially the above construction is fully shown and described in my patent previously referred to, therefore further detailed description is thought to be unnecessary and more particularly in view of the fact that my clutch control is not specifically limited thereto.

The clutch and clutch control

Freely mounted for rotation in a fixed position on the drive shaft 19 is a pulley 25 that functions as the machine mechanism prime mover and is continuously actuated by a suitable source of power, not shown. This pulley hub 25*a* is provided with opposed elongated bores 25*b* adapted to receive clutching elements 26 that are pivotally supported at 26*a* in a manner that permits the elements to be disposed in opposed engaged and disengaged positions. See Figs. 6, 7 and 8. The inner face of the hub 25*a* is provided with arcuate recesses 25*c* each adapted to receive a compression spring 27 that has its bearing at one end in the recess and its opposite end in engagement with the clutch element 26 and this spring urges the elements to their normal disengaged positions as shown by broken lines, Fig. 8.

In the present instance the side face of the pinion driven gear 20 is provided with an interrupted raised annular cam face 28 with the terminating portions of the cam face inclined down to the face of the gear. The cam face 28 is adapted to engage a cam contact element 29 associated with a connecting lever 30. This lever 30, in the present arrangement, is substantially an inverted U-shape and is provided with elongated openings 30*a* adapted to receive studs 32, that are secured in the side frame, which are provided with cross pins 31 that are adapted to engage the face plane of the lever 30 and form a bearing against which the lever may be rocked. The opposed terminating ends of the U lever have their bearing against a flange 33*a* of a sleeve 33 that is slidably mounted on the drive shaft 19. This sleeve 33 is provided with an opposed flange 33*b* having a washer 34 secured thereto that engages with and carries a clutch key 35 that extends through the drive shaft 19 in a longitudinally extending slot 19*a*. A chamber 19*b* is provided in the drive shaft 19 and is adapted to receive a compression spring 36 having one of its ends bearing against an end wall of the chamber and its opposed end associated with the transversely extending clutch key 35 in a manner that continuously urges the key 35 to its outward operative position in the path of the pulley clutch elements 26. Through the pressure exerted by the spring 36 and its action through the slidable sleeve 33 and the lever 30 pivoted against the cross pins 31, the cam contact element 29 is urged into contact with the cam face 28.

Operation

When the machine mechanism is at rest, the cam contact element **29** is in engagement with the cam face **28** and by means of the cross pin bearings **31** the lever **30** restrains the sliding sleeve **33** and clutch key **35** in their inoperative position against the action of the compression spring **36** with the prime mover pulley **25** freely rotating on the drive shaft **19**.

To begin a machine cycle of operation, the operator either through a foot pedal or other connections (not shown) depresses a lever **37** which has one end attached to a fixed pivot **38** and its opposed end pivotally connected at **39** to a connecting link **40** that engages with the U-shaped lever **30**. As the lever **37** is depressed to move the lever **30** downwardly, the cam contact element **29** is displaced radially from the annular cam face **28**, as shown by broken lines, Fig. 4, and releases the action of the compression spring **36** which causes the clutch key **35** to be forced outwardly into the engaging path of the drive pulley clutch elements **26**. When the drive pulley elements **26** are engaged they are moved from their inoperative positions, indicated by broken lines, Fig. 8, thus compressing their engaging spring **27** and locking the clutch elements **26** against one end wall of the elongated bore **25***b* to rotate the machine mechanism with the pulley **26**.

To obtain only a single cycle of operation of the machine, the lever **37** is depressed and immediately released, thus causing the spring **41** to urge the lever **30** upwardly so that, as the annular cam **28** is rotated, the cam contact element **29** will be urged to enter the opening **28** of the cam and be disposed in the engaging path of the cam face. As the cam contact element engages the incline **28***b* and travels to the cam face, the lever **30** through its engagement with the sleeve flange **33***a* causes the clutch key **35** to be disengaged from the pulley clutch elements **26** and again compresses and loads the actuating spring **36**. As the pulley clutch elements **26** are disengaged, their engaging springs **27** cause their outer ends to be rocked and stopped against the opposite end wall of the elongated bore **25***b* and disposes the ends of the elements in a manner that provides an added clearance between the ends of these elements and the face of the clutch key **35**. The drive disconnecting action is arranged to be effective in the dwell period of the intermittent gears **21**, **22** so that rotary movement of the drum **11** is arrested at a determinate point. It is obvious that when the control lever **37** remains depressed and restrains the cam contact **29** from entering into the path of the cam face **28**, the machine mechanism will continue its rotary movement while the intermittent gears effect a dwell period of the drum **11** during each operative cycle of the machine.

While there has been shown and described a preferred embodiment of the invention, it is obvious that changes and modifications may be made therein by those skilled in the art without department from the spirit and scope of the invention and therefore the novel features of the invention are not to be limited to the specific details herein disclosed.

What is claimed is:

1. In a duplicating machine having single and continuous cycles of operation, and a drive comprising a primary driving member and members to be driven with means for engaging and disengaging said members that includes oppositely disposed clutch engaging elements carried by said driving member and a slidable sleeve adapted to coact with said elements to engage said members in a driving relation with pressure means urging said sleeve into its operative position; clutch control means adapted to actuate said sleeve to its inoperative position at a determinate point after an operative cycle of the machine and selectively release said sleeve for operative engagement, said last means including a lever rockably and vertically movable relative to a fixed pivot point, said lever having one end associated with a cam embodied with said driven members and its opposed end associated with said clutch sleeve in a manner whereby said lever is retained in engagement with said cam and the cam functions to move the sleeve from operative to inoperative position when the lever is in one substantially vertical position and disposed to release said sleeve to its operative position when the lever is in another vertical position with means for positioning said lever in its substantially vertical positions.

2. In a duplicating machine having a determinate cycle of operation and a drive including driving and driven members with clutch means for engaging and disengaging said members in a driving relation that includes clutch engaging elements carried by one of said members and a slidable sleeve disposed between the driving and driven members and adapted to coact and engage said members in an operative relation; clutch control means including an interrupted annular faced cam and a lever rockably and vertically movable relative to a fixed pivot point with one portion of the lever associated with said cam and another portion associated with said slidable sleeve with a single pressure means urging said lever into contact with said cam face and forcing said sleeve to its operative position when said lever is displaced from its normal operative position in engagement with the cam face with means to position said lever for operative engagement by the cam face and whereby the clutch elements are disengaged from their driving relation in a determinate period of a cycle of operation of the driven members.

3. A device as set forth in claim 2 and having clutch engaging elements carried by one of said members that are pivotally disposed and yieldingly urged to their normal inoperative position with a stop to limit the yielding movement of said elements in opposite directions.

4. A device as set forth in claim 2 and having a clutch sleeve provided with a bearing flange and an engaging lever that is substantially an inverted U-shape and each leg having a bearing against said flange at opposed sides of the sleeve, the upper portion of said lever being provided with a cam contact adapted to be engaged by the annular cam face, said lever having opposed elongated guide openings adapted to receive a fixed pivot arranged to permit a combined rockable and vertical movement of said lever together with means for actuating said lever.

FREDERICK W. STORCK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
854 790	Lang	Sept. 3, 1907