

April 15, 1941.

R. J. COPELAND ET AL

2,238,359

DUPLICATING MACHINE

Filed Nov. 4, 1939

4 Sheets-Sheet 1

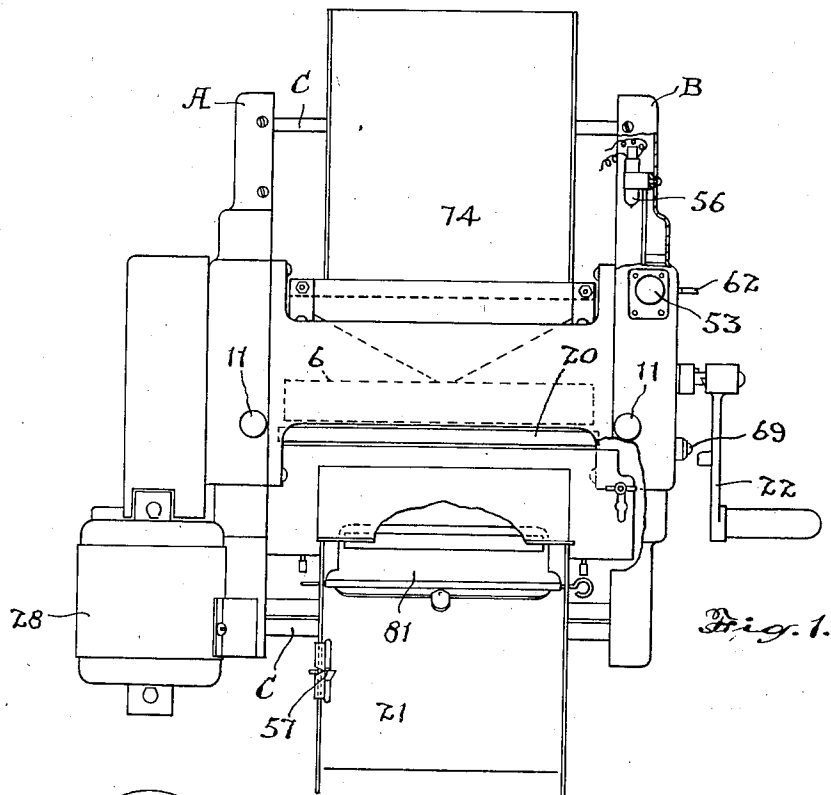


Fig. 1.

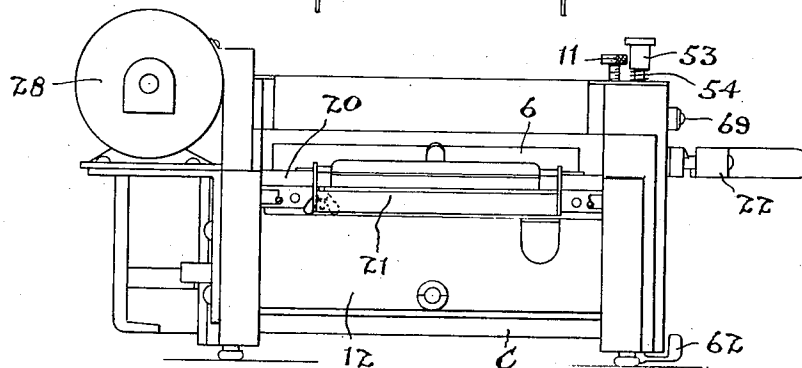


Fig. 2.

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4 Sheets-Sheet 2

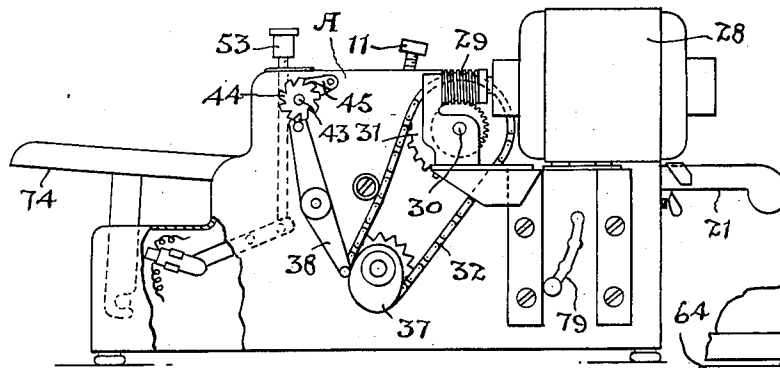


Fig. 3.

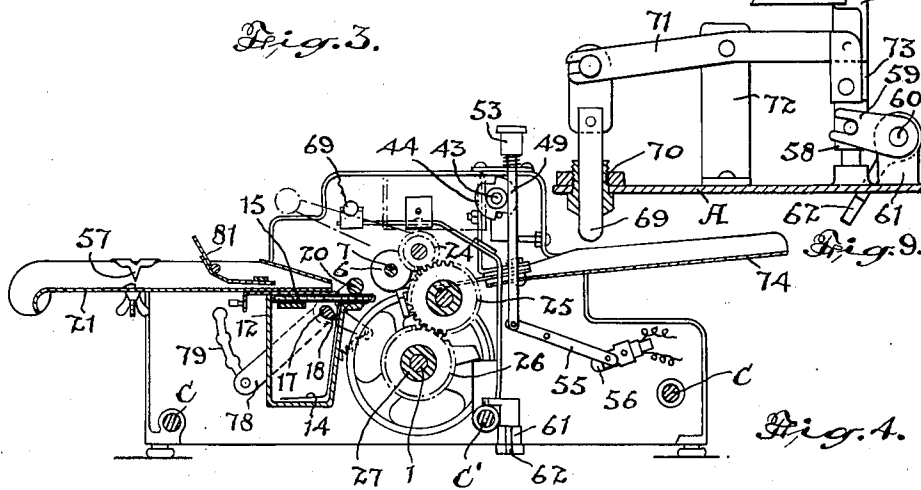


Fig. 4.

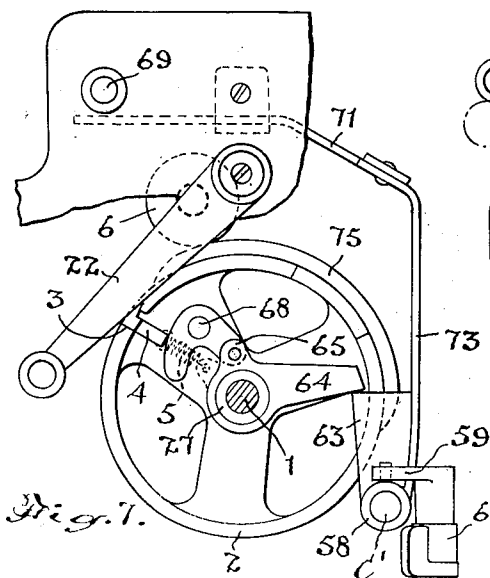


Fig. 7.

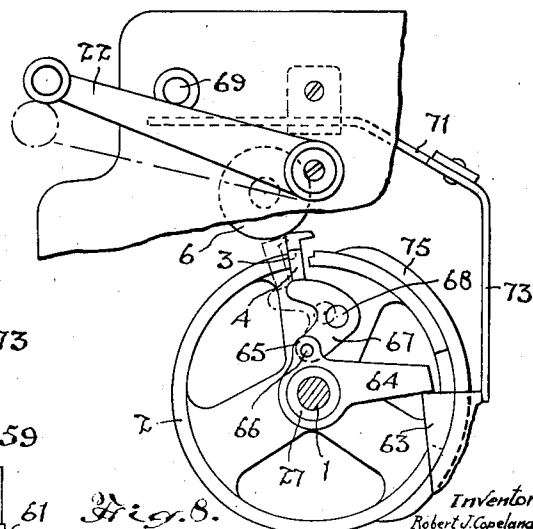


Fig. 8.

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DUPLICATING MACHINE

Filed Nov. 4, 1939

4 Sheets-Sheet 3

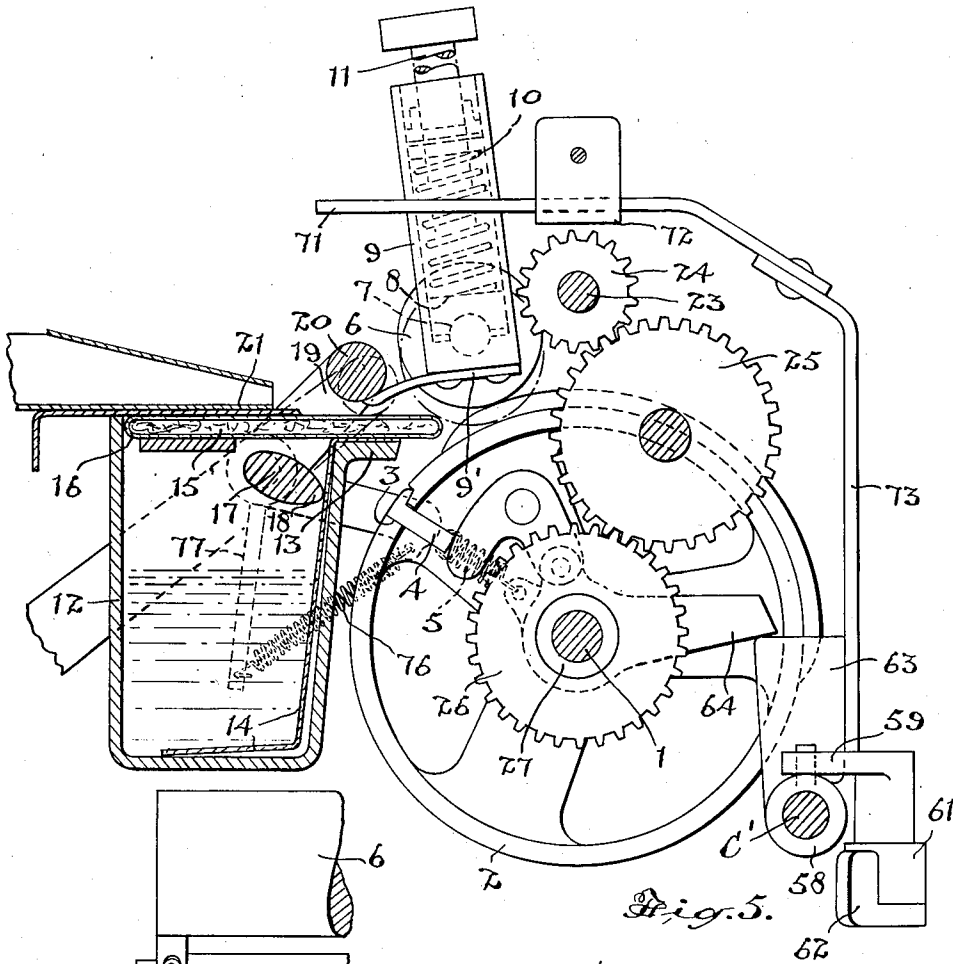


Fig. 5.

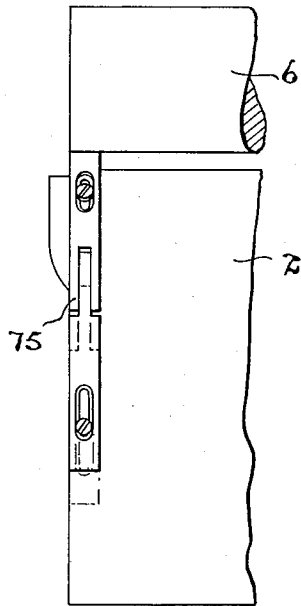


Fig. 6.

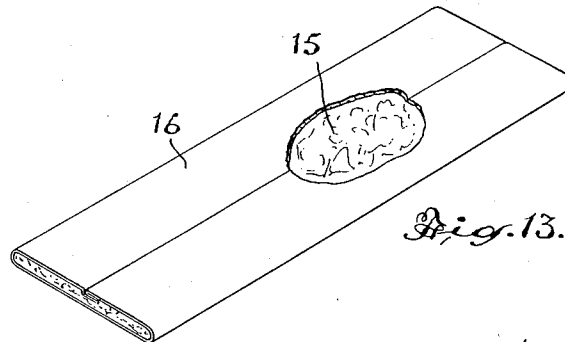


Fig. 13.

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UNITED STATES PATENT OFFICE

2,238,359

DUPLICATING MACHINE

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Application November 4, 1939, Serial No. 302,800
In Canada October 3, 1939

14 Claims. (Cl. 101—132.5)

This invention relates to improvements in duplicating machines of the type in which successive copies are obtained by first preparing a "master" sheet on which the matter to be duplicated is produced with a substance soluble in a special fluid, then successively moistening the copy sheets with such fluid and bringing them into engagement with the "master" sheet to receive an impression therefrom.

The principal objects of the present invention are to provide an improved duplicating machine which may be operated by hand or by power to produce the desired number of copies and which may be operated to print automatically a certain predetermined number of copies on "continuous form" sheets.

Further and important objects are to increase the speed of production of the desired copies and to greatly simplify and reduce the manual operations, thereby effecting a material increase in the capacity of the machine and reducing the cost of copying.

Still further objects will be defined in the following specification.

The principal features of the invention consist in the application of certain improvements and additions to a duplicating machine of the type wherein the "master" sheet is mounted on a cylinder which is rotated manually one revolution at a time and copy sheets are drawn over a surface moistened with a special fluid and fed between the "master" sheet cylinder and a pressure roll, the improvements being principally applied to the application of a motor drive mechanism for operating the "master" cylinder and of switch mechanism for starting and automatically stopping the said motor drive when the predetermined number of copies has been made.

Further important features consist in the application of means operated by the motor for automatically controlling the number of revolutions the "master" cylinder may make to effect the consecutive printing of a predetermined number of copies.

Other features of importance comprise a novel means of insuring the positive stopping of the "master" cylinder in the position to receive a new "master" printing sheet.

In the accompanying drawings,

Figure 1 is a plan view of our improved duplicating machine, parts of the casing being broken away to disclose structure underneath.

Figure 2 is an elevation of the machine from the feed end.

Figure 3 is an elevation of the machine taken

on the side of the motor drive and with part of the casing removed.

Figure 4 is a longitudinal sectional elevation of the machine taken from the side opposite to that of Figure 3.

Figure 5 is an enlarged part sectional elevation showing the hand-operated mechanism for driving the machine.

Figure 6 is an elevational detail of one end of the "master" roll showing the adjustable cam for raising and lowering the feed roll.

Figure 7 is an elevational detail showing the "master" roll and the means for gripping the "master" or printing sheet.

Figure 8 is a detail similar to Figure 7 showing the gripping device in the released position and also illustrating the stop for the hand-operated drive.

Figure 9 is a plan sectional view showing the hand lever stop and its co-operating parts.

Figure 10 is an enlarged perspective detail of the counting mechanism operated by the power drive, showing the clutch connection to the "master" roll shaft.

Figure 11 is an enlarged perspective detail of the switch mechanism operatively connected with the control illustrated in Figure 9.

Figure 12 is a diagram illustrating an electric control circuit.

Figure 13 is an enlarged perspective view of the preferred form of "copy sheet" dampening pad.

The duplicating machine as herein shown comprises a pair of side frames A and B which are spaced apart and rigidly connected by cross bars C arranged at either end and a cross bar C' arranged substantially midway of the length thereof.

A shaft 1 mounted in suitable bearings in the side frames A and B extends across the machine about midway of the length thereof and on this shaft is mounted a "master" cylinder 2 which is adapted to carry the "master sheet" from which copies are to be printed. The "master" cylinder 2 is provided with a radial slot 3 which extends across its perimeter and in this slot is slidably mounted a clamp bar 4 which is substantially L-shaped in cross section and the projecting edge of the L fits into the enlarged outer edge of the slot 3. The clamp 4 is held to its inward position by means of springs 5 extending radially inward therefrom and secured at the inner end to a suitable part of the cylinder.

The clamp 4 is adapted to be extended to permit the insertion of the "master" sheet under

the flange thereof and the retraction of the clamp then grips the sheet firmly so that upon the turning of the cylinder the sheet will be held securely.

The means for extending and retracting the "master" sheet clamp will be hereinafter described in further detail.

A pressure roller 6, which is preferably made of rubber or a similar resilient material, is mounted on a shaft 7 extending between the side frames A and B and is adapted to engage the surface of the "master" cylinder and to hold the copy sheets in close contact with the "master" sheet carried by the cylinder 2 in the printing operation.

The pressure roller shaft 7 is mounted at the ends in suitable bearings 8 slidably mounted in radially arranged guide members 9 and suitable spiral compression springs 10 are arranged in these guides to press downwardly against the bearings so as to hold the roller 6, and the copy sheets fed thereunder in close contact with the "master" sheet on the cylinder.

Suitable means for adjustment of the pressure of the pressure roller against the "master" cylinder is provided in the form of adjusting screws 11 arranged in the upper ends of the guides 9.

The paper sheets upon which the copies of the "master" sheet are to be printed are fed between the "master" cylinder 2 and the pressure roller 6, and the under surface of the copy sheets is moistened with a suitable liquid. The means for moistening these sheets is here shown in the form of a trough-shaped reservoir 12 secured between the side frames of the machine adjacent to the "master" roller, said trough having a shelf 13 projecting toward the "master" roller over which a flat sheet of capillary wicking 14 extends, said wick being immersed in a suitable liquid in the trough. A pad of absorbent material 15 rests upon the portion of the wick lying upon the shelf 13 and moisture is conducted thereto through said wick. The pad 15 as herein shown is specially constructed consisting of a sheet of felt, or other suitable fibrous and absorbent material, which is encased in an endless envelope 16, preferably formed of chamois skin which readily absorbs moisture. This envelope may be shifted from time to time in relation to the felt strip so that the entire surface may be used to obviate excessive wear at any one spot.

A rod 17 journaled in openings in the ends of the member 12 is provided with a shoe 18 which engages the wick 14 to regulate the flow of liquid therethrough. A bell crank arm 19 is mounted on each end of the rod 17 and a pressure bar 20 extends between the upper ends of these arms and across the pad 15.

A guide plate 21 is suitably mounted between the side frames A and B and extends over the major portion of the pad 15, which is moistened from the reservoir 12, and the copy sheets are fed from this guide plate between the pressure bar 20 and the pad 15, the pressure bar being periodically lifted by means hereinafter described, so that the copy sheets may be fed in to be carried between the pressure roller 6 and the "master" cylinder 2.

A hand crank 22 is mounted on a shaft 23 journaled in the frames A and B, and said shaft carries a spur pinion 24 which meshes with an idler pinion 25 mounted in suitable bearings in the frame, and the idler pinion in turn meshes with a gear 26 mounted on a sleeve 27 surround-

ing the shaft 1, said sleeve carrying the "master" cylinder 2.

The hand crank 22 is provided with a ratchet connection between it and the shaft 23 which enables the shaft to turn freely without the operation of the crank.

The general construction referred to above is disclosed in United States Patent 2,177,578, granted October 24, 1939, to George G. Neidich, the present application being directed to structural modifications thereof and embodying power-operated and control features, provision being made whereby the machine may be selectively operated by power or by hand.

In the application of power to the machine as herein shown and described an electric motor 28 is mounted on a suitable bracket on the side frame A and upon the shaft thereof is mounted a worm 29 which meshes with a worm wheel mounted on a cross shaft 30 journaled in the bracket support.

A sprocket wheel 31 is mounted on the shaft 30 and a sprocket chain 32 is carried from the sprocket wheel 31 around the sprocket pinion mounted on a clutch sleeve 34 encircling one end of the sleeve 27 mounted on the shaft 1.

A one-way drive clutch member 35, here shown in the form of a pawl is mounted in a recess in the clutch sleeve 34 and is adapted to engage in a notch 36 in the sleeve 27 so that the operation of the motor will drive the sleeve 27 and the "master cylinder," but permitting the "master" cylinder to be driven through the hand crank 22 previously described.

A cam 37 is mounted on or forms part of the clutch sleeve 34 and engages one end of a rocker arm 38 which is pivoted intermediate of its length on a stud 39 secured to the frame of the machine. The rocker arm extends in an upward direction and has a forked upper end 40 which engages a pin 41 on a rocker arm 42 mounted on a shaft 43 extending across the frame.

A ratchet wheel 44 is secured to the shaft 43 adjacent to the arm 42 and its notched periphery is engaged by a pawl 45. The cam 37 in its rotation operates the rocker arm to swing through a limited arc and this operates the rocker arm 42 and the pawl in turn rotates the ratchet wheel and the shaft 43.

This mechanism is shown in enlarged detail in Figure 10, and in Figure 11 the opposite end of the shaft 43 is shown with its co-operating mechanism which constitutes a cam 46 mounted thereon, which cam has its circumferential periphery broken by a pair of diametrically opposed notches 47.

A collar 48 is mounted on the shaft 43 spaced from the cam 46 and between the cam and the collar there is slidably mounted a bar 49 which extends past the shaft but has mounted thereon a block 50 in which is mounted a pin 51, which pin is adapted to drop into either of the notches 47 as the shaft 43 is rotated.

The upper end of the bar 49 extends through an orifice in the casing 52 enclosing the mechanism and it is provided with a hollow cap 53 in which is housed a spiral compression spring 54 which holds the rod normally in the raised position so that the pin 51 engages in pressure contact with the surface of the notched cam 46, causing the pin to move into the notches as the cam is rotated.

The lower end of the bar 49 is connected to a rocker arm 55 which is operatively connected with a tilting mercury switch 56 so that the con-

tacts of the switch, which controls the motor, are open when the bar 49 is raised, and the pin 51 thereof rests within one of the notches of the cam 46.

It will be understood that by the simple operation of pressing downwardly with the hand upon the cap 53 the pin 51 is withdrawn from the notch in the cam 46, the switch is operated so that the electrical contacts to the motor are closed and the motor starts to operate. Immediately this occurs the cam 37, through the rocker arm 38 and ratchet mechanism described, rotates the shaft 43 and the rotation of the shaft turns the cam 46 so that the notch 47 thereof is removed from the path of movement of the pin 51 of the bar 49. Consequently the switch is locked in circuit closing position.

It will be understood that with each rotation of the "master" cylinder the cam 37 operates the rocker arm 38 and the ratchet pawl moves the ratchet a distance of one notch and in accordance with the number of notches in the ratchet wheel, and within the ambit of the cam and rocker arm the shaft 43 is turned a part of a revolution, and a plurality of operations of the "master" cylinder ultimately moves the shaft 43 to turn the cam 46 a half revolution, and the pressure of the spring 54 causes the pin 51 on the bar 49 to enter the notch in the cam, thereby moving the switch rocker arm 55 to operate the switch and thereby open the motor circuit.

By means of this mechanism, which can be altered by changing the cam 37 or the ratchet wheel 44, several copy sheets can be printed in succession without the necessity of the manual operation of the hand crank. This feature is particularly desirable so that "continuous form" copy sheets may be used, that is to say, an endless strip of paper may be used for the copies. These can be printed with desirable headings and ruling and it is particularly desirable that they be notched for the particular length required so that the copies may be readily severed and separated the one from the other after they have been printed.

The arrangement of the notches in the "continuous form" sheets enables the use of a guide or marker upon the guide plate 21. This is shown particularly in Figure 1 as a member slidably adjustable on the side flange of the guide and having a pointer 57 with which the notches in the "continuous form" sheet are brought into register in the initial feeding to the printing roll.

It will be readily understood that following the printing of multiple copies from a "master" sheet it will be necessary to properly position the "master" cylinder in order to release the "master" sheet from which the copies have been printed and in order that a new "master" sheet be replaced in the cylinder. It is therefore necessary that the "master" cylinder be operated to bring it to a definite position and to operate the clamp member 4 holding the "master" sheet on the cylinder.

The hand crank is operated and through its ratchet connection it operates the gears 24, 25 and 26 to rotate the cylinder.

A sleeve 58 slidably mounted on the cross bar C' is slidably operated by means of a forked member 59 mounted on a pin 60 rotatable in a lug 61 arranged on the inside of the casing of the frame, as particularly illustrated in Figure 9, but shown also in Figures 4 and 7.

The pin 60 has a lever 62 secured thereto and extending outwardly through a slot in the frame

so that it may be operated by the thumb or finger of the operator. By pressing on this lever the fork member is caused to swing to slide the sleeve 58 toward the "master" cylinder so that an upwardly extending lug 63 carried by the sleeve 58 engages an arm 64 which is rotatably mounted on the sleeve support of the "master" cylinder 2.

The arm 64 has a lug projection 65 carrying a pin 66 which is pivotally connected to a rocker member 67 mounted on a pivot 68 on one of the radial arms of the "master" cylinder. The free end of this rocker arm engages the inner edge of the clamp bar 4 so that the relative movement of the arm 64 in relation to the turning of the "master" cylinder causes the tilting of the rocker member 67 to push the clamp 4 outwardly so that it releases the "master" sheet and permits the insertion of a fresh sheet.

In order that the cylinder may be turned to the desired position to receive the new "master" sheet after having released the old one, a stop member in the form of a pin 69 is slidably mounted in a bearing block 70 in the casing of the frame on the side upon which the hand crank is arranged. This pin is adapted to be extended into the path of movement of the hand crank so as to form a positive stop therefor.

The inner end of the pin is connected with a rocker bar 71 pivotally mounted intermediate of its length on a lug 72. The other end of this rocker bar is pivotally connected to an upright bar 73 secured to the sleeve member 58, so that when the sleeve member is pushed inwardly to operate the release of the "master" sheet from the clamp bar 4, the stop pin 69 is projected outwardly in the path of movement of the hand crank as illustrated particularly in Figures 8 and 9.

When the hand crank has been turned until it engages the stop pin then the old "master" sheet will have been released and a new one can be inserted and this is accomplished by sliding the sheet into position against the raised clamp from the sheet metal guide member 74 arranged on the end of the machine opposite to the guide plate 21.

It will be appreciated that it is necessary that the pressure roller 6 be raised from contact with the "master" cylinder periodically for a portion of the revolution of the "master" cylinder so that after the matter to be copied has been printed, the cylinder may rotate while the copy sheet is held by the pressure member 81 pivotally mounted on the guide 21. When the "master" sheet has been carried around by the rotation of the cylinder to a position to print the next copy on the copy sheet, the roller 6 is lowered into contact with said copy sheet to press it against the "master" sheet mounted on the cylinder, thereby causing the feeding and further printing of the copy sheet. This operation is repeated for as many copies as are required.

In Figures 7 and 8 the end elevational views of the "master" cylinder illustrate the arrangement of a peripheral cam 75 which lifts the pressure roller 6 from contact with the cylinder and the bar 20 from the position of holding the copy sheet against the moistening pad. The peripheral cam is formed in two sections adjustably mounted on the cylinder and having a tongue and slot connection so that their position and length may be adjusted while maintaining a constant peripheral surface to lift the pressure roller.

The pressure bar 20 mounted on the crank

arms 19 is held in spring contact with the copy sheet extending over the moistening pad 15 by coil springs 76 which are connected with rods 77 secured in the rod 17 extending across the moistener trough. The bar 20 is lifted periodically with the roller 6 by the fingers 9' mounted on the members 9, to release the copy sheet during the period the cylinder is rotating to relocate the "master" sheet in relation to the "continuous" copy sheet. A hand-controlled lever 78 is connected to the end of the rod 17 and it may be adjusted and held in adjusted positions in the notched slot 79 in the side of the casing to regulate the pressure of the member 18 and control the flow of liquid.

In the operation of this machine a "master" sheet upon which the desired printing has been placed, is laid upon the plate 74 opposite the guide plate 21.

The lever 62 is swung on its pivot to move the sleeve 58 inwardly to bring the lug 63 into the path of movement of the arm 64 connected with the rocker member for operating the clamp member 4. Simultaneously the members connected with the sleeve and the stop pin 69 cause the stop pin to be projected outwardly into the path of movement of the hand crank so that the crank engaging the stop pin arrests the movement of the "master" cylinder with the clamp member 4 projected upwardly from the surface of said cylinder in a position to receive the edge of the "master" sheet which is then pushed into place to abut the radial portion of the clamp member.

The lever 62 is then operated to move the sleeve outwardly on its guiding rod to withdraw the lug 63 from engagement with the arm 64, whereupon the springs 5 connected with the clamp member draw the clamp inwardly so that it grips the sheet. Simultaneously the stop pin is withdrawn from engagement with the hand crank. Said crank may then be turned and rotating in a clockwise direction the "master" cylinder wraps the "master" sheet around its perimeter.

The copy sheet to be printed, which is desirably in the form of a "continuous form" sheet, is placed upon the surface of the guide plate 21 and fed under a weighted pivotal member 81 mounted between the sides of said guide plate and under the bar 20 which is raised to permit the insertion of the sheet.

The peripheral cam 75 on the "master" cylinder has engaged and lifted the pressure roller 6 from contact with the cylinder surface and the end of the "continuous form" copy sheet is pushed forward and brought into operating position by having a mark or a notch therein in register with the pointer 57 on the guide plate, which, as has been described, is adjusted in accordance with the length of the individual sheets of the "continuous form" copy sheet.

The operator then presses downwardly upon the cap 53 and through the mechanism described, swings the mercury switch to close the electric contact to operate the motor. The motor on starting into operation rotates the "master" cylinder to first lower the pressure roller 6 and the end of the copy sheet is gripped between the "master" cylinder and said pressure roller between which it has been fed. The "master" cylinder continues to rotate and print a plurality of copies upon the "continuous form" copy sheet which is moistened by the moistening device described so as to take an impression from the

printing on the "master" sheet, and on each revolution of the "master" cylinder the cam 37 operates the rocker arm 38, which, through the action of the pawl 45 mounted on the rocker 42, operates the ratchet wheel in accordance with the number of notches therein, and when this ratchet mechanism has turned the shaft 43 a predetermined distance the compression spring encircling the upper end of the bar 49, forces said bar upwardly, the pin 51 fitting into the notch in the cam 46. This upward movement of the bar 49 operates the rocker switch to open the electric circuit to the motor, thereby immediately stopping the operation of the machine.

It will be readily understood that the electric operation of a machine of this type, which will automatically print several copies from a "master" sheet, will effect a very considerable saving in time as compared with the individual feeding sheet by sheet of the same number of copies by hand and the hand operation of the "master" cylinder by turning the hand crank.

Immediately the number of copies to be printed have been completed the operator repeats the operation of releasing the "master" sheet and replacing it with another.

According to the present disclosure a counting ratchet and cam mechanism is used to determine the number of copies that shall be printed in the one operation of the machine, but this mechanism for counting and mechanically operating the motor switch may be dispensed with and an electrical control, such as is illustrated in diagram in Figure 12, substituted therefor. In this diagram M represents the motor arranged in a power circuit which is provided with a hand-operated switch S and interposed in this circuit is a relay switch R. The relay switch is arranged in a shunt circuit SS which is provided with a spring contact member s arranged over the guide plate 21. The paper copy sheet which is placed on the guide plate forms an insulation between the spring contact s and the plate 21, and after the motor has been started by the operation of the hand switch S it will continue to operate and print any desired number of copies from the "master" sheet until the relay circuit SS is closed. This is accomplished in a very simple manner by arranging at a desired point in the length of the copy sheet a small hole so placed as to pass under the contact s. When this occurs the current in the relay circuit flows through the guide plate 21, closing the circuit to the relay switch R which immediately operates to open the motor circuit.

It will be understood of course that in lieu of punching holes in the paper a bar or strip of an electrical conducting material may be placed on the paper to close the circuit between the contact s and the guide plate and thus operate the relay switch R.

It will be further understood, in order that the relation of the improvements invented by the present applicants be clear, that various parts of the previously known machine are shown and described, but the novel subject matter is clearly defined in the claims.

What we claim as our invention is:

1. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably supported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manu-

ally operated mechanism for rotating said "master" cylinder, of a free-wheel driving member connected with said "master" cylinder, an electric motor operatively connected with said free-wheel driving member, an electric switch connected with the power feed to said motor, and means governed by the length of the copy sheet to be printed for automatically operating said switch to stop the motor.

2. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably supported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manually operated mechanism for rotating said "master" cylinder, of a free-wheel driving member for operating said "master" cylinder, an electric motor operatively connected with said free wheel member, a ratchet counting mechanism operatively connected with said free wheel member including a switch control member rotatable about an axis offset from the axis of the free wheel member and pivotal link and cam means forming an operative connection between said free wheel member and said ratchet counting mechanism, an electric switch for controlling the operation of said motor, and means operated by said switch control member for operating said switch to break the electric circuit to said motor.

3. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably supported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manually operated mechanism for rotating said "master" cylinder, of a radially reciprocable clamp member mounted in said "master" cylinder adapted to grip the "master" sheet from which copies are to be made, manually operable means for moving said radially reciprocable clamp member outwardly to release the "master" sheet, and means operatively connected with the means for operating said clamp member forming a positive stop for the manually operable member for rotating the "master" cylinder.

4. A device as claimed in claim 3 in which a hand crank forms part of the manually operated mechanism and the manually operable means for effecting the operation of the clamp member includes a member slidably supported and the positive stop means comprises a stop member slidably mounted in the frame and operatively connected with said slidable member to project the stop member into the path of movement of the crank upon the movement of the slidable member into clamp-operating position.

5. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably supported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manually operated mechanism for rotating said "master" cylinder, of a spring-held pressure roller for pressing said dampened copy sheet into impression-receiving contact with the "master" sheet on the periphery of the "master" cylinder, and cam means mounted circumferentially on said "master" cylinder adapted to engage and lift said pressure roller periodically to relieve the copy sheet of pressure and permit the "master" cylinder and the "master" sheet thereon to

rotate a predetermined degree independent of the copy sheet prior to the next impression.

6. A device as claimed in claim 5 in which said cam means comprises arcuate strips formed in relatively adjustable sections to vary the effective peripheral length thereof.

7. In a device as claimed in claim 5, a rod extending across the dampening device, crank arms supporting said rod and spring-operated to press said rod in contact with the copy sheet to urge the latter into moisture-receiving contact with said dampening device, and means carried by said pressure roller for lifting said rod away from the dampening device concurrently with the lifting of the pressure roller.

8. In a device of the class described, the combination with a "master" cylinder for supporting an impression sheet and carrying same into impression-receiving relation to a copy sheet, of means for selectively operating said cylinder manually or automatically including counting means displaceable on the operation of the cylinder to automatically stop same after a plurality of rotations thereof, and means for initiating further operation of said cylinder independent of displacement of said counting means.

9. Means for duplicate printing on sheets of continuous strip form comprising the combination with a "master" cylinder, means for supporting an impression sheet thereon, and means for moistening said continuous sheets to render the same impressionable from said impression sheet, of motor-driven means for operating said cylinder, means for initiating the operation of said power driving means, and means for terminating the operation of said power driven means after a predetermined number of said continuous sheets have been impressioned, said means for initiating operation of the power means including a member manually displaceable to active operation-initiating position, and means dependent on the operation of said power driven means to retain said normally displaced member in said active position for a predetermined period.

10. Means for duplicate printing on sheets of continuous strip form comprising the combination with a "master" cylinder, means for supporting an impression sheet thereon, and means for moistening said continuous sheets to render the same impressionable from said impression sheet, of motor-driven means for operating said cylinder including an electric supply circuit to the motor, and means controlled by the travel of the continuous strip of sheets for controlling said motor circuit and thereby the operation of said motor-driven means.

11. Apparatus as claimed in claim 10 in which the means controlled by the travel of the continuous strip of sheets comprises electric contacts connected with the driving motor circuit, and means for opening the said motor supply circuit on the closing of said strip-controlled contacts.

12. Apparatus as claimed in claim 10 in which the means controlled by the travel of the continuous strip of sheets comprises electric contacts connected with the driving motor circuit, openings being formed at predetermined points in the length of the continuous strip through which the contacts engage to control the stopping of the motor drive after a predetermined number of said sheets have been continuously advanced through the impression-receiving zone, said contacts being connected with the control coil of a relay arranged in and controlling the motor circuit.

13. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably supported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manually operated mechanism for rotating said "master" cylinder, of a free-wheel driving member for operating said "master" cylinder, an electric motor operatively connected with said free wheel member, a ratchet counting mechanism operatively connected with said free wheel member, an electric switch for controlling the operation of said motor, means operated by said counting ratchet mechanism for operating said switch to break the electric circuit to said motor, said ratchet counting mechanism comprising a cam mounted on the free wheel driving member, a rocker member engaging said cam, a ratchet pawl operable by said rocker arm, a ratchet wheel engaged by said pawl, a shaft supporting said ratchet wheel, a cam mounted on said shaft, a rocker arm connected with the electric switch, and a slidable bar operatively engaging said latter cam and adapted to be controlled thereby to operate the switch to open the electric circuit to the motor.

14. In a duplicating machine, the combination with a frame, a "master" cylinder rotatably sup-

ported in said frame adapted to carry a "master" sheet from which copies are to be made, means for dampening copy sheets and applying an impression from the "master" sheet, and a manually operated mechanism for rotating said "master" cylinder, of a free-wheel driving member for operating said "master" cylinder, an electric motor operatively connected with said free wheel member, a ratchet counting mechanism operatively connected with said free wheel member, an electric switch for controlling the operation of said motor, means operated by said counting ratchet mechanism for operating said switch to break the electric circuit to said motor, said ratchet counting mechanism being operatively connected with the free wheel cylinder driving mechanism, a shaft extending from said ratchet counting mechanism, a cam having a notched surface mounted on the latter shaft, a reciprocating bar having an extension adapted to enter the notches in said latter cam, a rocker arm connected with said reciprocating member adapted to operate the switch, and a spring holding said reciprocable member in operative engagement with said cam to force the extension thereof into the notch on the cam when said notch is brought into co-operative relation with the extension.

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