June 13, 1950 W. T. GOLLWITZER 2,511,670

SHEET DETECTING MEANS IN PRINTING MACHINES

Original Filed Oct. 27, 1941 6 Sheets-Sheet 1

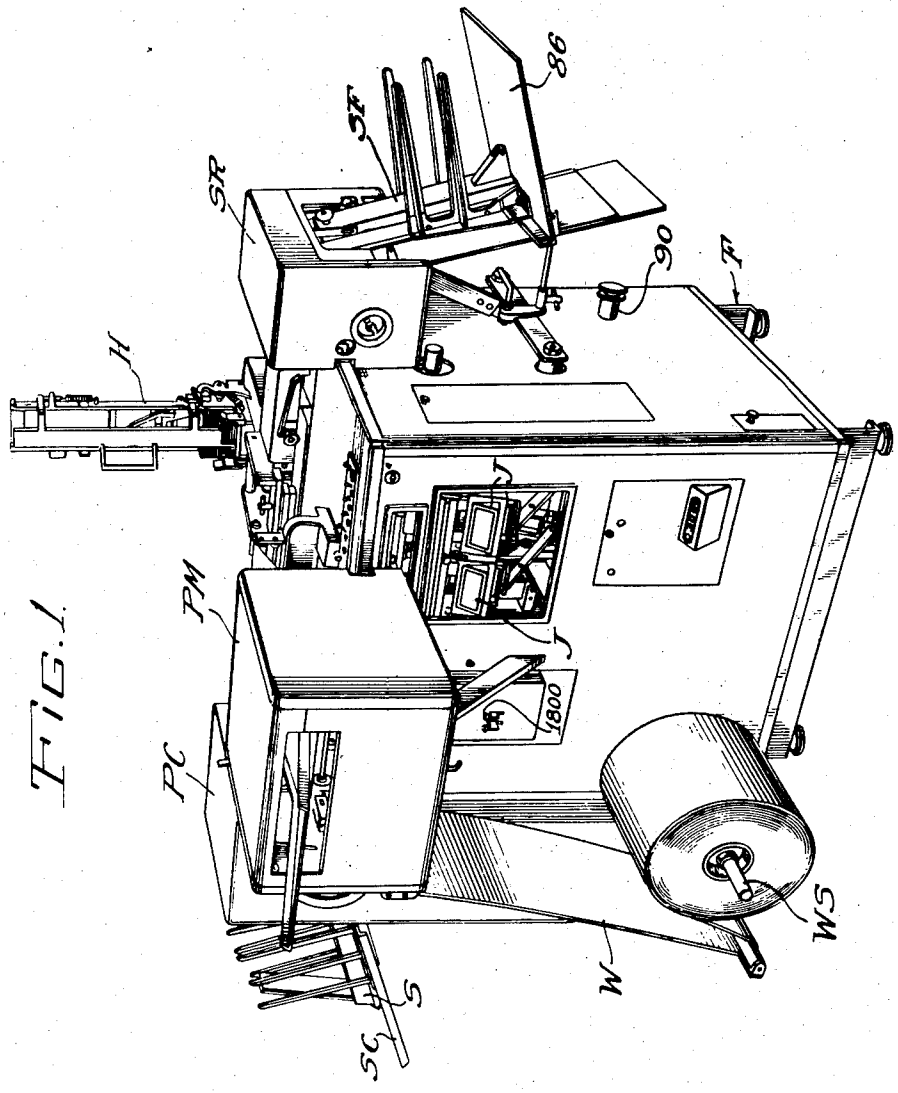


FIG. 1.

Inventor
Walter T. Gollwitzer
By Wallace and Cannon
Attorneys

June 13, 1950 W. T. GOLLWITZER 2,511,670

SHEET DETECTING MEANS IN PRINTING MACHINES

Original Filed Oct. 27, 1941 6 Sheets-Sheet 2

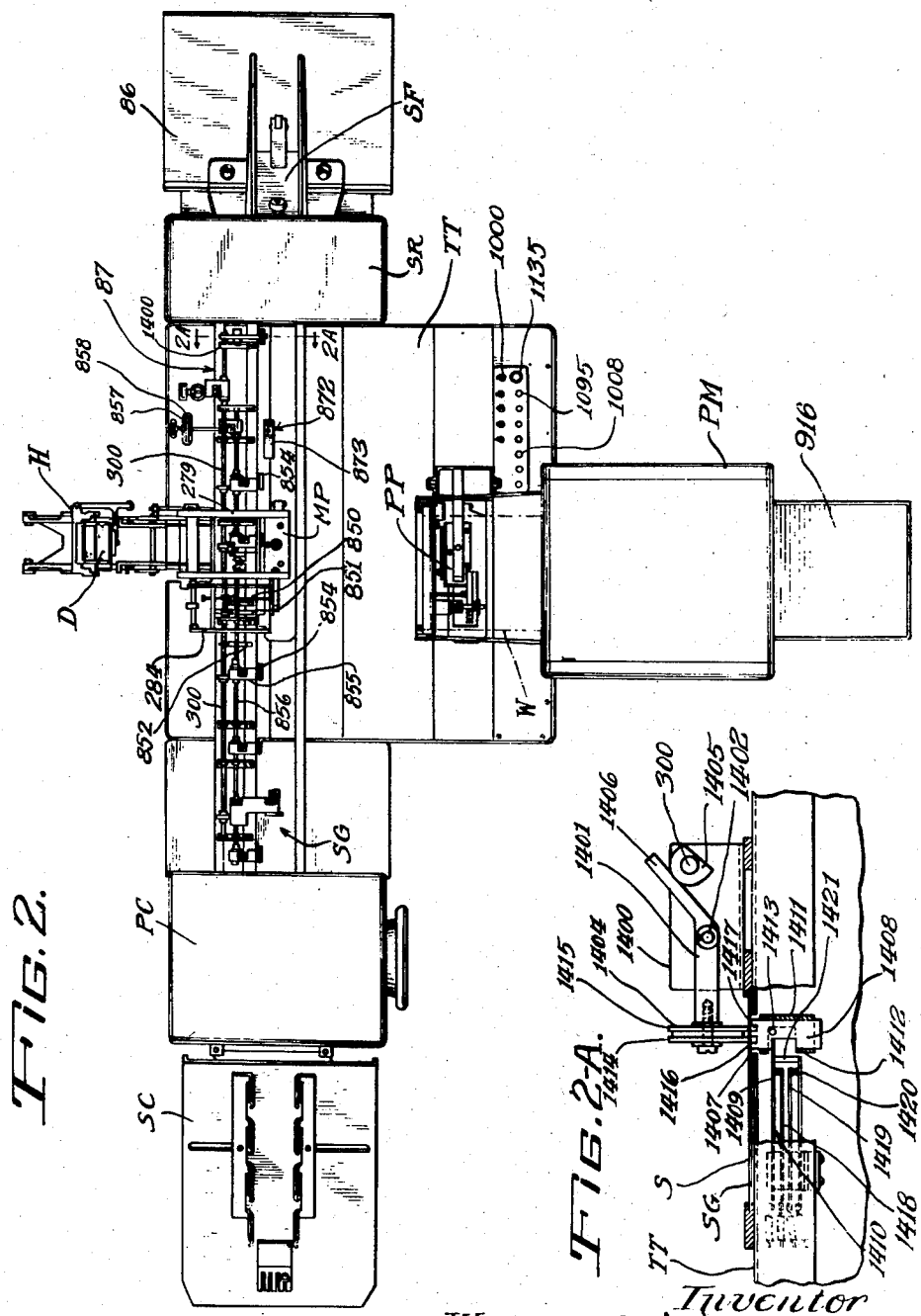


FIG. 2.

FIG. 2-A.

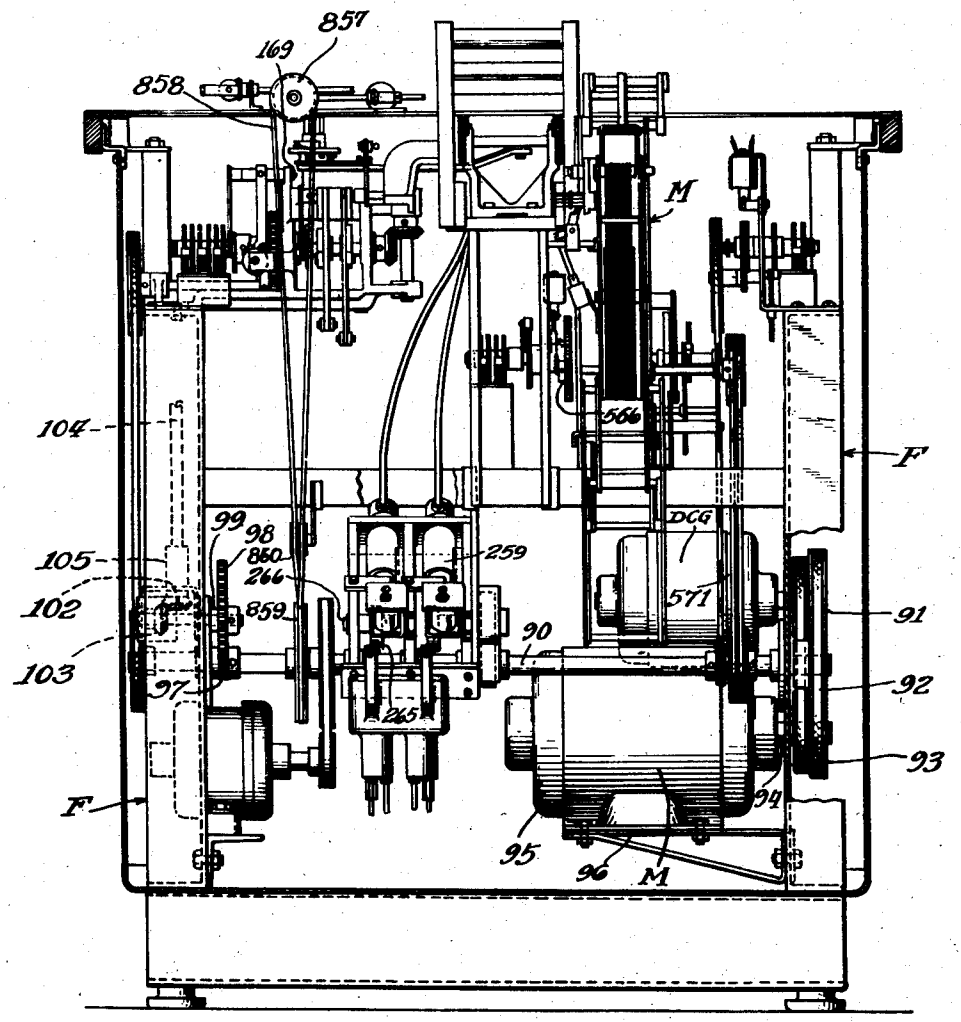
Inventor
Walter T. Gollwitzer
By Wallace and Cannon
Attorneys.

June 13, 1950 W. T. GOLLWITZER 2,511,670

SHEET DETECTING MEANS IN PRINTING MACHINES

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FIG. 3.



Inventor
Walter T. Gollwitzer
By Wallace and Cannon
Attorneys

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SHEET DETECTING MEANS IN PRINTING MACHINES

Original Filed Oct. 27, 1941 6 Sheets-Sheet 4

Fig. 4

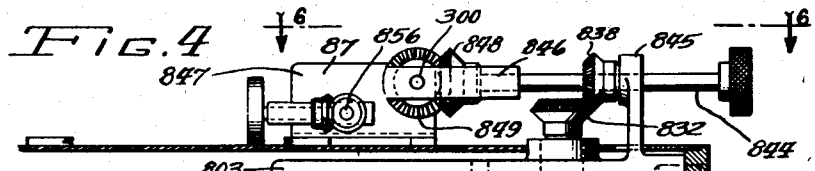
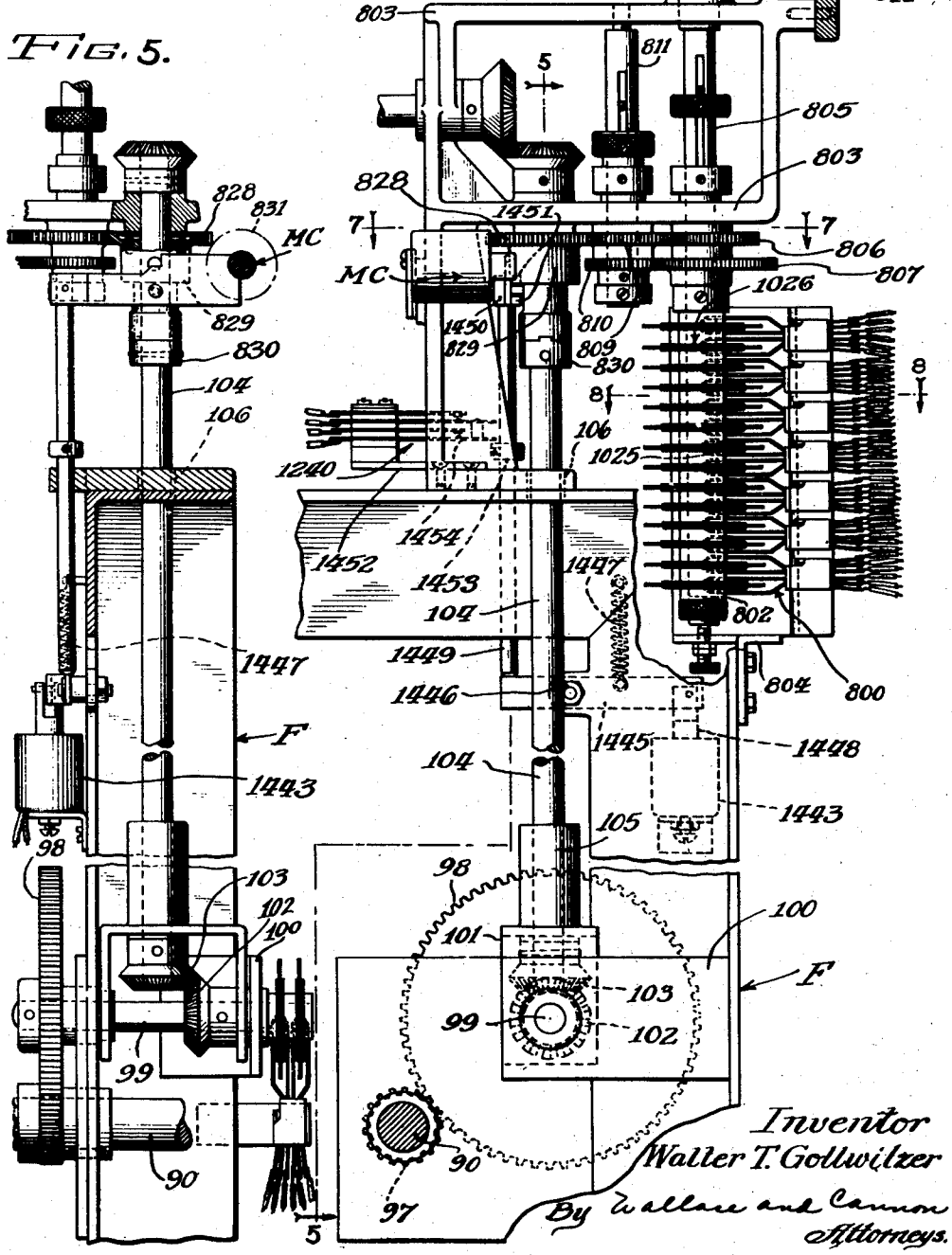


Fig. 5.



Inventor
Walter T. Gollwitzer
By Wallace and Cannon
Attorneys.

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SHEET DETECTING MEANS IN PRINTING MACHINES

Original Filed Oct. 27, 1941 6 Sheets-Sheet 5

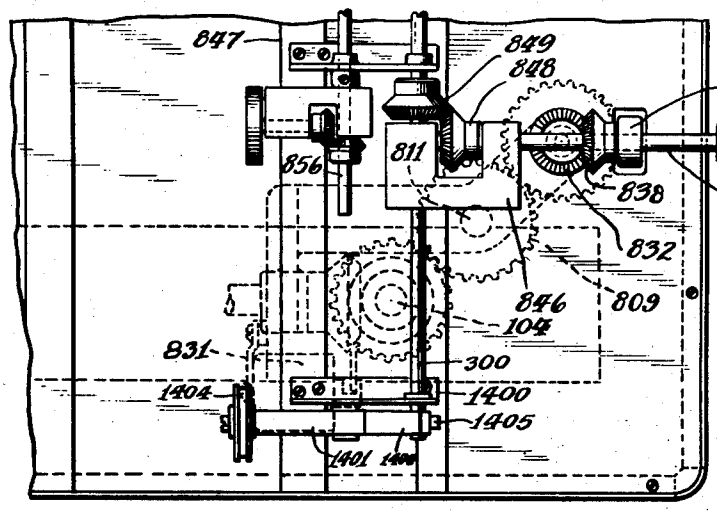


Fig. 6

Fig. 7

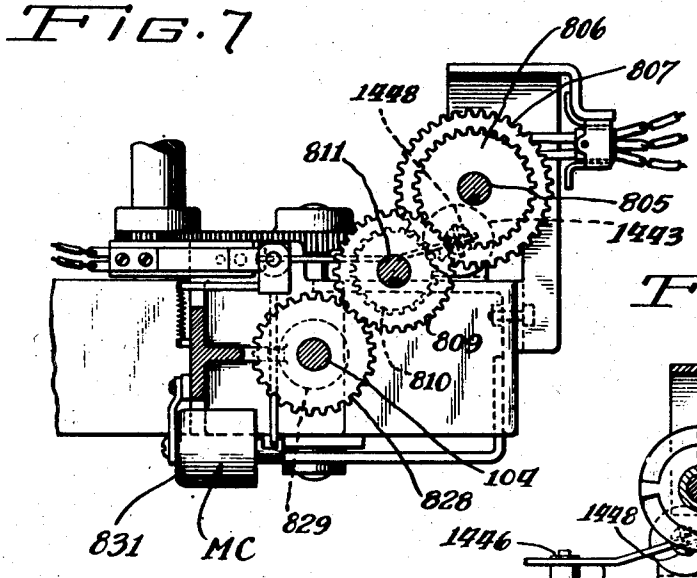
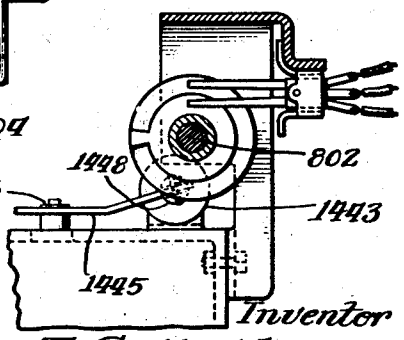


Fig. 8



Inventor
Walter T. Gollwitzer
By Wallace and Cannon
Attorneys.

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SHEET DETECTING MEANS IN PRINTING MACHINES

Original Filed Oct. 27, 1941 6 Sheets-Sheet 6

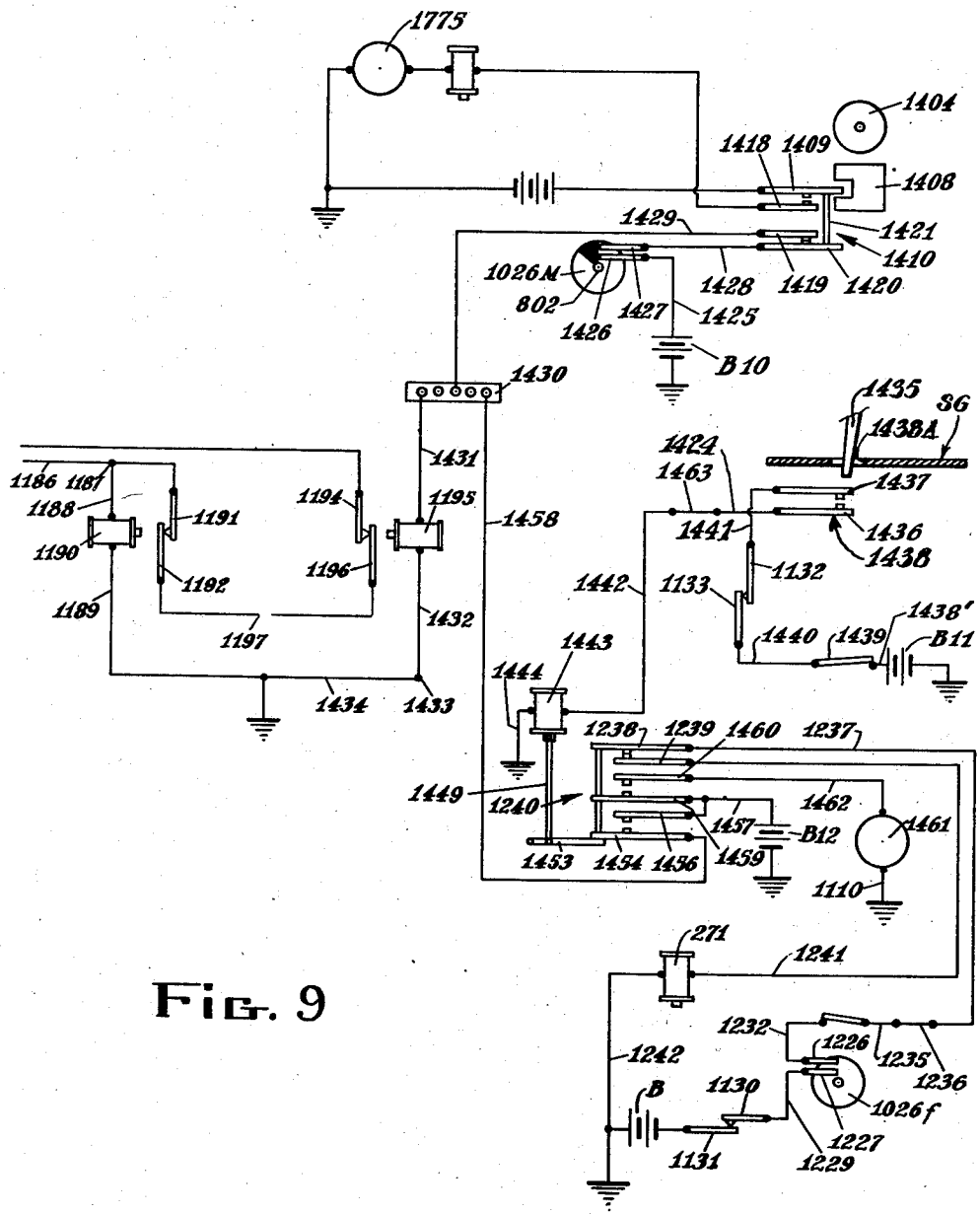


FIG. 9

INVENTOR.
Walter T. Gollwitzer
BY Wallace and Cannon
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,511,670

SHEET DETECTING MEANS IN PRINTING MACHINES

Walter T. Gollwitzer, Euclid, Ohio, assignor to Addressograph-Multigraph Corporation, Wilmington, Del., a corporation of Delaware

Original application October 27, 1941, Serial No. 416,745. Divided and this application February 16, 1946, Serial No. 648,073

1 Claim. (Cl. 101—322)

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This application is a division of my co-pending application, Serial No. 416,745, filed October 27, 1941, which has matured into Patent No. 2,427,049, Sept. 9, 1947, which describes a printing machine of the kind particularly adapted for use in preparation of business instruments and the like of which checks used to pay dividends declared by a corporation are exemplary.

Business instruments of the character prepared in the machine of the present invention usually bear changeable data characterizing or identifying the instruments and which are usually in the form of an address constituting a name, street and number, and city and state. Such instruments also bear variable data, usually expressed numerically, and in the case of a check these data are the amount for which the check is to be payable. Moreover, the instruments bear certain reoccurring data such as the date on which the instrument is issued and, in the case of checks, a signature, and usually such business instruments are numbered, preferably consecutively, and, of course, embody a form such as the name of the issuer and, in the case of checks, the bank whereat it is payable and the like.

The present invention pertains to means for feeding sheets of paper or the like, such as blanks for checks and for coordinating the functioning of the machine described in the aforesaid co-pending application with the feeding of such sheets to printing positions. As described in greater detail in the said co-pending application, two printing stations are provided at which printing and control devices are brought successively to perform printing operations on sheets such as checks.

It is an object of the present invention to provide means in a machine of the general character described in my aforesaid co-pending application for preventing undesirable operations of said machine such as printing and related operations in the event of failure for any reason to deliver a sheet to a desired position.

Other objects and advantages of the present invention will be apparent from the following description taken in connection with the accompanying drawings wherein,

Fig. 1 is a perspective view of a machine embodying my invention;

Fig. 2 is a plan view of the machine;

Fig. 2A is a sectional detail view of a safety device employed in the machine and is taken on the line 2A—2A on Fig. 2;

Fig. 3 is a fragmentary elevational view showing the main drive shaft of the machine and the manner in which various operative devices in the machine are connected thereto;

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Fig. 4 is a vertical sectional view of the machine illustrating the main control and the drive therefor;

Fig. 5 is a vertical detail view taken substantially on the line 5—5 on Fig. 4;

Fig. 6 is a plan detail view taken substantially on the line 6—6 on Fig. 4;

Figs. 7 and 8 are detail views taken substantially and respectively on the lines 7—7 and 8—8 on Fig. 4;

Fig. 9 is a wiring diagram showing certain electrical circuits and elements which are effected by sheet sensing operations of the mechanism embodied in the present invention.

The machine illustrated generally in Figs. 1 and 2 and more fully described in my aforesaid co-pending application is constituted and arranged to produce sheets such as dividend checks by printing certain changeable data, as for example names and addresses of payees, certain variable data such as numbers or amounts, and other suitable or necessary data such as check serial numbers, bank names, dates and the like on appropriate sheets of paper. In the machine referred to means not necessary to describe here are provided for printing certain data at a station where a platen MP, Fig. 2, is located and certain additional data at another station where another printing couple PC is located. Certain portions of the data mentioned above may be printed by impressions from printing and control devices D that are fed to printing position by appropriate means and are pressed into printing cooperation with the sheets, using, for example, an inked ribbon as a printing medium. Certain other portions of the data may be printed by printing members of other types which may include variable type members such as numbering wheels.

In addition to means for printing on sheets, means not described herein in detail are shown at PP and PM, Fig. 2, for taking certain paging and proofing impressions on a web of paper.

Checks or sheets S cut to size are placed on a sheet supporting platform 86, Fig. 1, of a sheet feeder SR which operates to withdraw the most inwardly disposed of such sheets from the stack thereof disposed on the platform 86 and thereafter to pass such sheet into the machine. While resort may be had to various types of sheet withdrawing means, that disclosed in my Patent No. 2,342,190, dated February 22, 1944, is typical of the means to which resort may be had for with-

drawing sheets or checks one at a time from the supply thereof disposed on the platform 86.

The sheet conveying means 87 which may, for example, be of the character shown and described in my Patent No. 2,211,772, dated August 20, 1940, is not only operative to advance sheets or checks as S through the machine but also functions to bring the sheets to rest in operative association with the platen MP and with a printing and control device disposed in printing relation therewith to thereby have impressions made on the sheets as S at selected positions thereon. After data have been printed on the checks S at the station MP, the sheet conveying means 87 functions to advance the sheets to the printing couple PC. Upon passage of sheets from the couple PC the sheets are discharged to a suitable collector SC to be stacked one upon the other in the usual manner as shown in Fig. 1.

As also described in my aforesaid co-pending application changeable and variable data may be printed on the stub as well as on the body of each check; also as described therein the platen MP normally makes four impression reciprocations during each complete cycle of operation of the machine, one sheet being fed for each complete cycle.

As shown in Fig. 3 a main drive shaft 90 is journalled in suitable bearings provided in the main frame F of the machine. A pulley 91 is fast on the main drive shaft 90 and an endless belt 92 is passed about this pulley and about a pulley 93 fast on the shaft 94 of the motor 95 carried by the bracket 96 secured to the main frame F.

A pinion 97, Figs. 3, 4 and 5, is fast on the drive shaft 90 and meshes with a gear 98 fast to the shaft 99 suitably journalled in bearings in the brackets 100 and 101 carried by the frame F. A bevel gear 102 fast on the shaft 99 is meshed with a bevel gear 103 at the lower end of the vertical shaft 104 journalled in a bearing 105 carried by the bracket 101 and in a bearing 106, Figs. 4 and 5, provided in the frame F. In a manner that will be described in detail hereinafter, the shaft 104 is effective to drive the primary timing means of the machine and other operative mechanisms thereof as, for example, the operative parts of the sheet conveying means 87.

A main control and certain auxiliary controls are included in the machine and in the present instance the main control is afforded by a plurality of switches 800, Fig. 4, which embody switch discs 1026 that are fast on a shaft as 802 journalled in bearings provided in brackets as 803 and 804. In the operation of my machine there will be instances where it will be advantageous to optionally produce either a consecutive or a duplicate cyclic operation. Therefore, I have so arranged the drive or the shaft 802 on which the discs of the main control switches 800 are mounted as to enable these switches to effect either consecutive or duplicate operation of the machine. By means shown generally in Figs. 4 and 5 but described more fully in my aforesaid co-pending application the gears 806 and 807 may be selectively driven from a gear 828 through means including gears 809 and 810 and shaft 811, so as to provide either consecutive or duplicate operation of the machine, depending upon whether or not it is desired to print changeable data merely on a check or on both a check and a stub.

Vertical shaft 104 is provided with a clutch MC comprising separable members 829 and 830 and this clutch is under the control of a solenoid 831 which normally causes the clutch to engage once for each normal cycle of operation of the machine.

A main cam shaft 300 which controls the passage of the sheets as S through the machine and controls other cyclic operations of the machine may be advantageously driven from the shaft 805. Consequently a beveled gear as 832 is fast on the shaft 805 and meshes with a beveled gear 838 fast on a shaft 844, Figs. 4 and 6, suitably journalled in bearings as 845 on the bracket 803 and a bearing 846 provided on a bracket 847 carried by the table top TT. Shaft 44 has another beveled gear 848 which meshes with a beveled gear 849 on the cam shaft 300. The ratio of beveled gears 832—838 and 848—849 is one to one so that the cam shaft 300 is driven in a one-to-one ratio with the cam shaft 805. As described in Letters Patent No. 2,211,772 dated August 20, 1940, the cam shaft 300 controls the movement to and from sheet stopping position of stop fingers 840, 851 and 852, Fig. 2. These fingers operate successively to dispose sheets as S in position to have changeable data and variable data printed thereon at the proper positions.

A plurality of sheet feed rollers 854, Fig. 2, are mounted in brackets 855 in the manner described, for example, in said Letters Patent No. 2,211,772. These rollers are suitably connected to a shaft 856 to be driven therefrom at high speed. The shaft 856 has a pulley 857 thereon about which an endless belt 858, Figs. 2 and 3, is passed. This belt also passes about a pulley 859 fast on the main drive shaft 90, being advantageously directed about idler pulleys as 860 to be clear of certain operative mechanisms in the machine. As fully described in my aforesaid pending application, Serial No. 416,745, additional means are provided for reversely feeding sheets S for certain printing operations which may be performed at the platen MP in each cycle of the machine operation.

The sheet S that is to receive impressions in a particular cycle of the machine is fed near the end of the preceding cycle. In the event that such a sheet is not fed, it is necessary to insure that the ensuing automatic cycle of operation of the machine be prevented.

To this end a frame 1400, Figs. 2 and 2A, is mounted on the table top TT immediately in front of the point whereat the sheets S are discharged from the sheet feeder SR, and a lever 1401 is pivotally mounted on this frame, as indicated at 1402. A roller 1404 is provided at the free end of this lever and the opposite end thereof bears on a cam 1405 on a cam shaft 300. At a predetermined time in the course of rotation of the cam shaft 300 which, as explained in my aforesaid copending application, makes one complete revolution in each cycle of operation of the machine, a rise on this cam moves into engagement with the end 1406 of the lever and thereupon the roller 1404 is forced toward the bottom of the sheet guideway SG afforded on the table top TT. An opening 1407 is provided in the bottom of the sheet guideway SG in alignment with the roller 1404 and a block 1408 of fibrous material is supported by a leaf 1409 of the switch, generally indicated by 1410, to be held in position in the guideway 1411 therefor supported from the table top TT. The guideway 1411 has a slot 1412 therein and a pin 1413 on the block 1408 is disposed in this slot and engagement of this pin with the upper end of this slot limits the upper position into which the block 1408 may move.

The roller 1404 has a pair of flanges 1414 and 1415 thereon which, in the event a sheet S is not disposed beneath the roller 1404 at the time the cam 1405 acts to lower this roller, move into a pair of slots 1416 and 1417 in the upper edge of the block 1408. When the flanges 1414 and 1415 move into the slots 1416 and 1417, the lowering movement imparted to the roller 1404 is ineffective insofar as the contacts included in the switch 1410 are concerned.

However, if a sheet S is discharged from the sheet feeder SR at the time in the course of operation of the machine when this should be effected, then when the cam 1405 forces the roller 1404 downwardly it moves into engagement with the sheet and in this instance it is effectively through the sheet to force the block 1408 downwardly in the guideway 1411 therefor. Such movement of the block 1408 downwardly in the guideway 1411 forces a contact on the blade 1409 into engagement with a contact on the blade 1418 and in certain embodiments of my machine this is utilized for effecting the operation of a unit 1775, as shown in my aforesaid co-pending application, which may be incorporated therein for the purpose of printing a signature on a sheet as S. In the present embodiment of my invention, however, the contacts 1409 and 1418 are ineffective for I utilize means including the printing unit PC for printing a signature on the check as S.

However, it will be noted that contacts on the blades 1419 and 1420 of the switch 1410 are normally engaged, and a pin of fibrous material 1421 is extended from the blade 1409 to the blade 1420 and if the block 1408 is forced downwardly when a sheet S is disposed between this block and the roller 1404, the contact on the blade 1420 is moved from engagement with a cooperating contact on the blade 1419. This is effective to so condition a circuit that an impulse cannot be set therethrough to energize the relay 1195, Fig. 9, through the contacts 1194 and 1196 of which the stick circuit for the relay 1190 is established.

An impulse is not sent through the circuit that is opened by disengagement of a contact on the blade 1420 from a contact on the blade 1419 until near the end of a cycle of operation of the machine so that circuit will not be broken to the relay 1195, and therefore to another relay 1190, which has certain cycle control functions described more fully in my aforesaid copending application, until shortly before an operation of the machine should be interrupted because of the fact that a sheet S should not be advanced into the machine until this time. The circuit through which an impulse is so sent extends from battery B10, Fig. 9, through a conductor 1425 to a blade 1426 associated with a switch disc 1026*m* on the timing switch shaft 802 and it is a contact strip on this disc that moves into engagement with the blade 1426 associated therewith at the time an impulse is to be sent through the circuit. The circuit is extended from the contact strip on the switch disc 1026*m* through the other blade 1427 associated therewith through a conductor 1428, Fig. 9, to the blade 1420 and therefore if a sheet S is disposed between the block 1408 and the roller 1404 to disengage a contact on the blade 1420 from a cooperating contact on the blade 1419, circuit is interrupted at this point and is not continued on to the relay 1195.

If, however, no sheet is present and the block 1408 remains in its aforesaid upper position, then the contact on the blade 1420 is engaging the contact on the blade 1419, and in such circumstance, when an impulse passes over the circuit to the blade 1420, as aforesaid, this circuit is extended from the blade 1419 through conductor 1429 to a terminal strip 1430. A conductor 1431 extends from the terminal strip 1430 to one end of the winding of the relay 1195, and a conductor 1432 leads from the other end of this winding to a terminal 1433. From the terminal 1433 circuit is extended through a conductor 1434 to ground. It will, therefore, be seen that if the contacts on the blades 1419 and 1420 are in engagement because no sheet has been fed into association with the roller 1404, then the relay 1195 is energized whereupon the contacts 1194 and 1196 thereof are disengaged and thereupon a stick circuit for the cycle control relay 1190 is broken so that, at the end of the ensuing cycle, operation of the machine is interrupted.

Furthermore, if a sheet S does not advance into proper operative relation with the main platen MP, a detector finger 1435 that is operated under control of a cam (not shown) included on the cam shaft 300, is rendered effective, prior to the time the main platen MP is caused to effect the first of the aforesaid four reciprocations thereof in a cycle of operation of the machine. If a sheet is not in proper operative relation with the platen MP, the detecting finger 1435 passes through an opening 1435A in the bottom of the sheet guideway SG and engages the blades 1436 and 1437 of the switch 1438 that is carried by the table top TT in position to cooperate with this finger. Closure of this switch is effective to close a circuit which brings about immediate interruption of operation of the machine.

In this instance, circuit is extended from battery B—1, through a conductor 1438' to a normally closed switch 1439. In this respect the switch 1439 is located at a convenient position in the machine so that it may be opened in those instances where only the pager and proofer mechanism PM and the platen PP are to be operated to prepare a list. The detecting finger 1435 will then be ineffective to interrupt operation of the machine for in such circumstances no sheets are fed through the sheet guideway SG and the switch 1438 is therefore to be ineffective. From the normally closed switch 1439 circuit is extended through conductor 1440 to the contact 1133 associated with a relay not shown herein but described in my copending application. This contact is engaged with the contact 1132 and circuit is extended through the conductor 1441 to the blade 1437 of the switch 1438. If the switch 1438 is closed under the influence of the detector pin 1435, as aforesaid, circuit is extended from the blade 1436 through a conductor 1442 to one end of a winding of a solenoid 1443, the other end of this winding being connected to ground through conductor 1444.

The solenoid 1443 that is thus energized is effective to disengage the main clutch MC and is also effective to break certain operative circuits that are established in the machine. By referring to Fig. 4, it will be seen that a lever 1445 is pivotally mounted on the frame F, as indicated at 1446, and that a spring 1447 is normally effective thereon to urge the end of this lever connected to the armature 1448 of the solenoid 1443 upwardly. A rod 1449 rests on the opposite end of the lever 1445 and is extended through suitable supports therefor in the frame F and has a collar 1450 at the upper end thereof which is adapted for cooperation with a flange 1451 provided on the sleeve 829 of the main clutch MC.

Therefore, when the solenoid 1443 is energized and the armature 1448 thereof is attracted, the rod 1449 is forced upwardly and thereupon the collar 1450 thereon engages the flange 1451 so as to thereby move the sleeve 829 on the shaft 184 to disengage the clutch tooth thereon from the cooperating clutch teeth on the collar 830 and thereupon the main clutch MC is released to thereupon render the main controls for the machine, namely, the switch shaft 802 and the cam shaft 300, inoperative.

By referring to Fig. 4, it will be seen that the switches 1240 (see also Fig. 9) are carried by a bracket 1452 on the main frame F in position to cooperate with a collar of fibrous material 1453 on the rod 1449. The switches 1240 include the blades 1238 and 1239 which are normally engaged to establish circuit to a solenoid 271 that is effective to set a hydraulic pump 259 in operation to operate the main platen MP. Therefore, when the rod 1449 moves upwardly, as aforesaid, the normally engaged contacts on the blades 1238 and 1239 are disengaged and thereupon circuit to the pump controlling solenoid 271 is broken. Current to operate the solenoid 271 is carried from a battery B through contacts 1131, 1130, conductor 1239, disc 1026f having contact segment thereon, conductors 1235, 1236, 1237, through contacts 1238—1239, conductor 1241, the windings of solenoid 271, conductor 1242 and to ground, through certain control circuits described more fully in my aforesaid copending application, Serial No. 416,745.

It will be noted that the switch 1240 also includes a pair of blades 1454 and 1456 which have contacts thereon that are normally disengaged but when the collar 1453 engages the blade 1454, these contacts are engaged to thereby establish circuit to the relay 1195 to effect energization of this relay and thereby break the stick circuit for the starting and main control relay 1198. In this instance, circuit is extended from battery B12 through a conductor 1457 to switch blade 1456, and thence through switch blade 1454, conductor 1458 to the terminal block 1430 from whence circuit is established, in the manner described hereinabove, to energize the relay 1195.

Furthermore, the blades 1459 and 1460 in the switch 1240 have contacts thereon which are normally disengaged one from the other but upon closing of the switch 1240, as aforesaid, these contacts are effective to establish circuit to a signal lamp 1461. Circuit is extended in this instance from battery B12 through conductor 1457 to blade 1459 and thence through blade 1460, conductor 1462 to one terminal of the lamp 1461, the opposite terminal of this lamp being connected to ground at 1110 and thereupon this lamp is rendered operative.

It will be noted that a manually-operated switch 1463 is included in the conductor 1442 leading to the solenoid 1443 and in this respect it is to be noted that when the solenoid 1443 is energized, operation of the cam shaft 300 is interrupted in a position such that the detector pin 1435 maintains the switch 1436 closed to maintain the solenoid 1443 energized. However, operation of the lamp 1461 is indicative that operation of the machine has been interrupted by reason of the energization of the solenoid 1443 and when this occurs, the manually-operated switch 1463 may be opened to deenergize the solenoid 1443 and permit the rod 1449 and the parts associated therewith to be restored to their normal at rest positions. However, before the machine is again set in operation, the reason for energization of the solenoid 1443 is determined, and this erroneous condition is corrected. Thereafter the various operative mechanisms in the machine are manually restored to their normal at rest positions so as to thereby issure that proper timed relation will be maintained among the various operative mechanisms. Prior to such manual restoration of the various operative mechanisms in the machine, however, the main switch 1000, Fig. 1, is opened so as to enable such manual restoration of the various operative parts to be effected.

It will be understood from the foregoing description that a number of functions of the machine are controlled by sheet sensing means so as to prevent printing operations in the absence of a feed sheet.

Many other advantages and novel features of the present invention will be apparent to those skilled in the art and thus while I have shown and described selected embodiments of my invention, it is to be understood that these are capable of variation and modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alternations as fall within the purview of the following claim:

I claim:

In a machine of the character described, a guideway along which sheets may be sequentially fed to enable operations to be performed thereon in the machine, switch mechanism in said machine below said guideway and adapted to control an operation in the machine, means including a device arranged above said guideway, at a point above said switch mechanism, for sensing the presence or absence of a sheet in said guideway at a point above said switch mechanism, means coacting with said sensing means and with a sheet disposed in said guideway at a point above said switch mechanism for operating said switch mechanism to control an operation in the machine, and means for rendering said sensing means ineffective to actuate said switch mechanism when a sheet it not disposed in said guideway at a point above said switch mechanism.

WALTER T. GOLLWITZER.

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