Feb. 11, 1930. G. BRANDL ET AL 1,746,414

COMBINED PRINTING AND TABULATING MACHINE

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Fig. 1

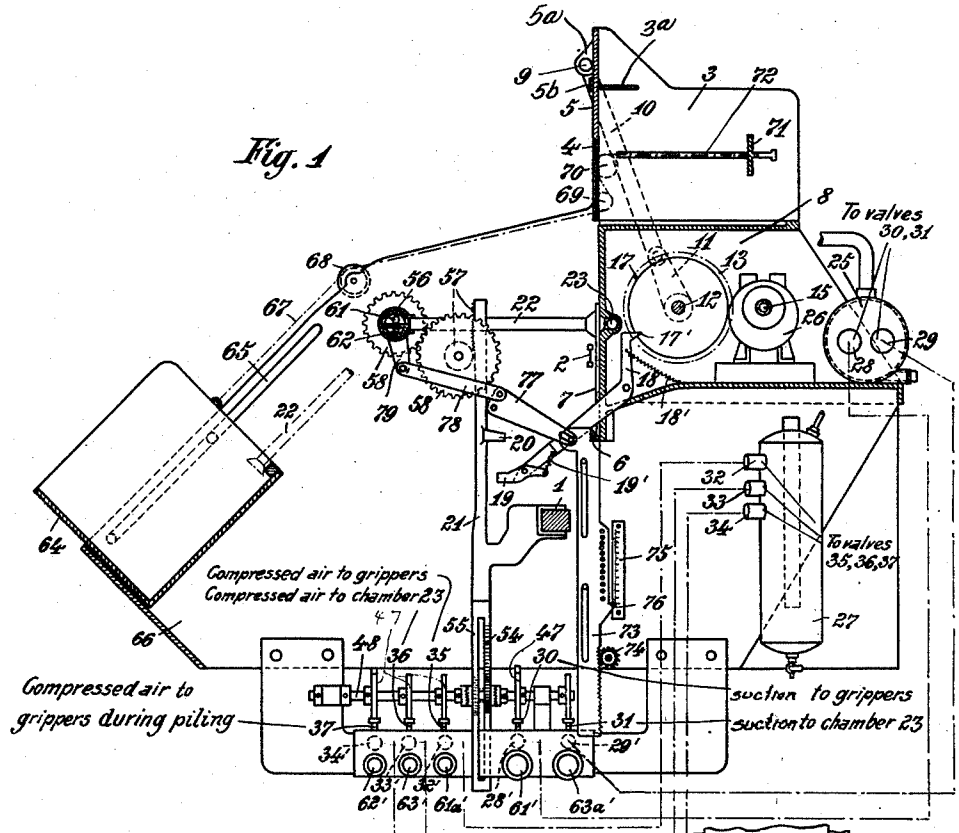
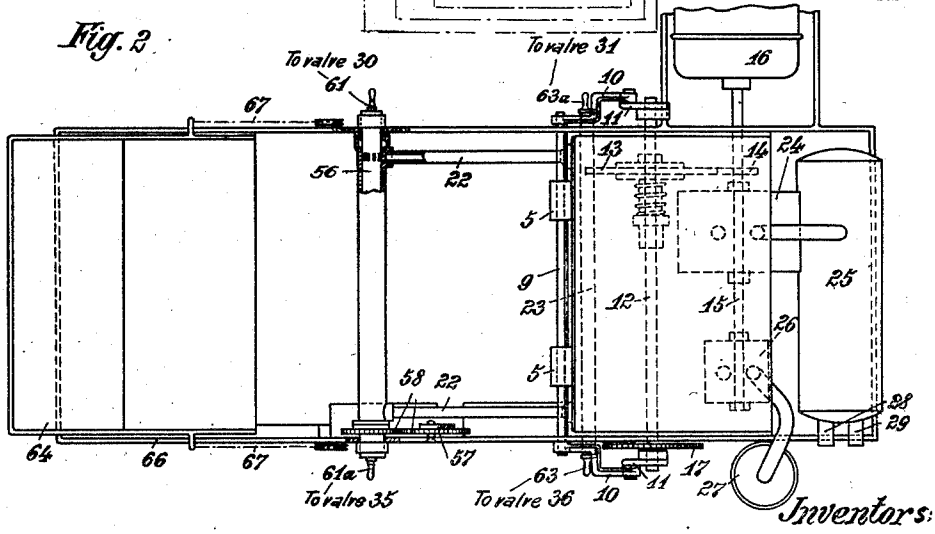


Fig. 2



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COMBINED PRINTING AND TABULATING MACHINE

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Fig. 9

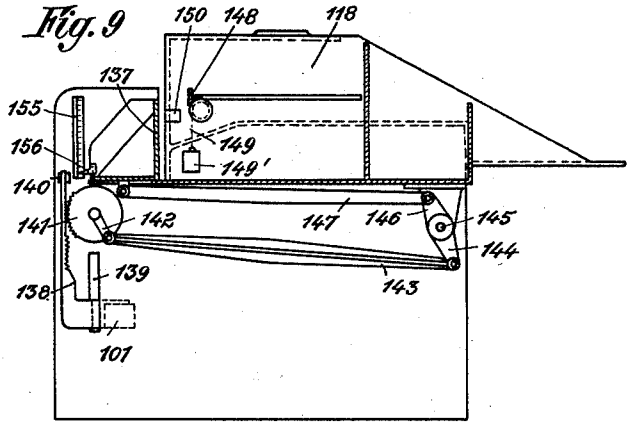


Fig. 1a.

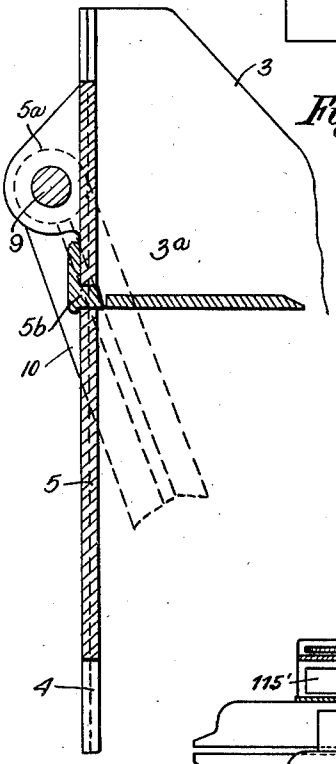


Fig. 10

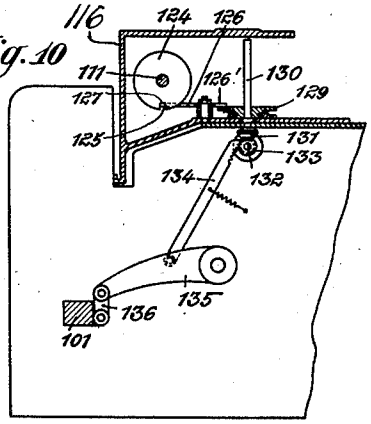
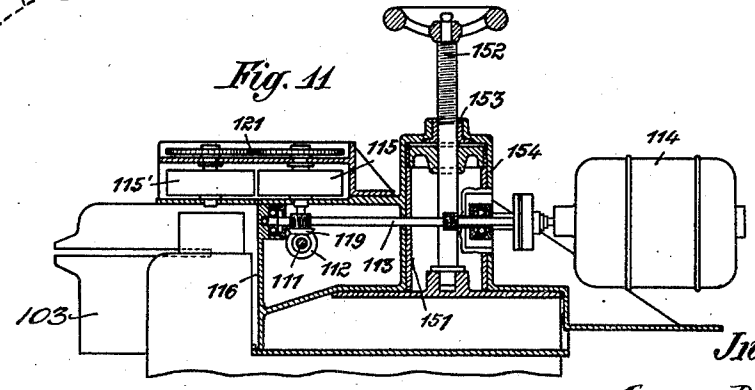


Fig. 10a



Fig. 11



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COMBINED PRINTING AND TABULATING MACHINE

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Fig. 3

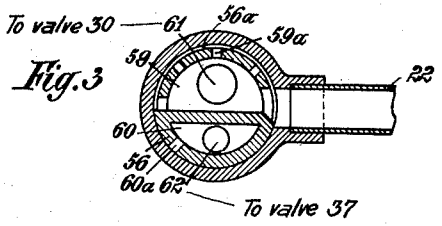


Fig. 4

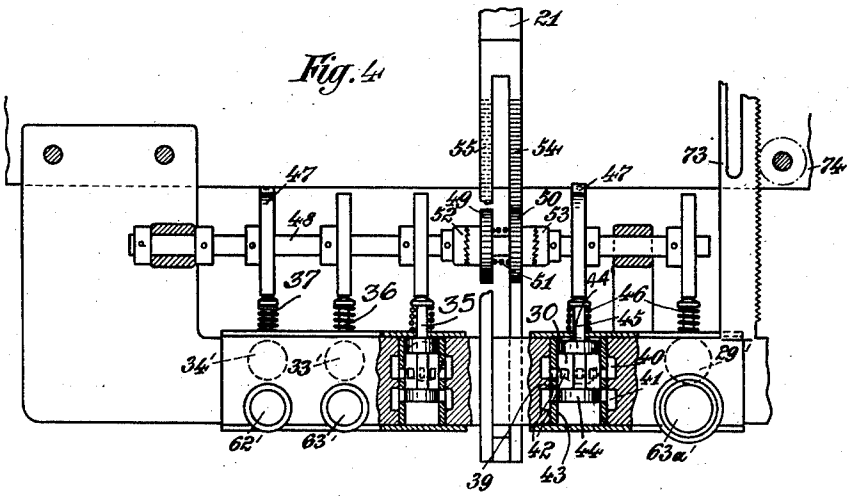
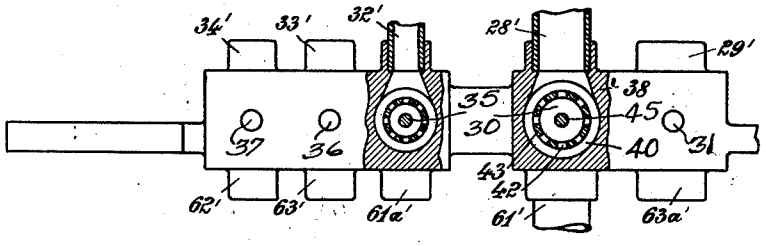


Fig. 5



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COMBINED PRINTING AND TABULATING MACHINE

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Fig. 6

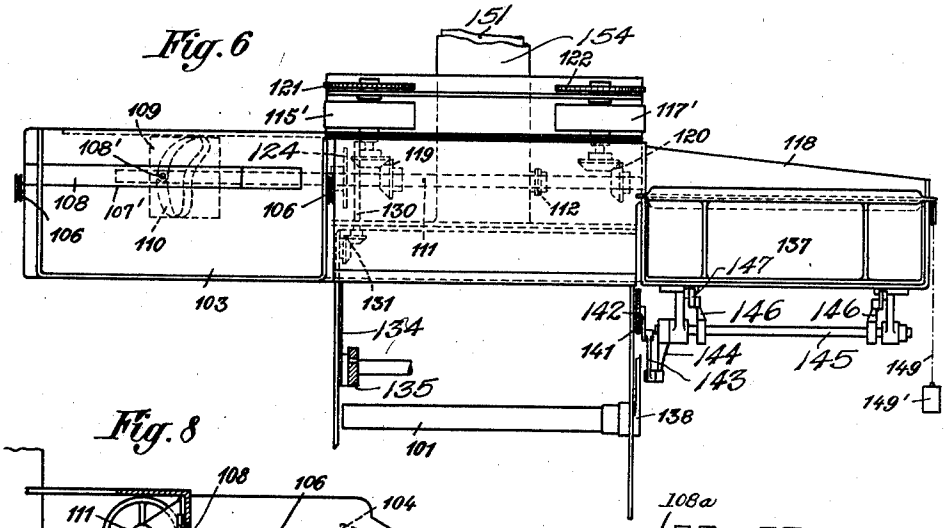
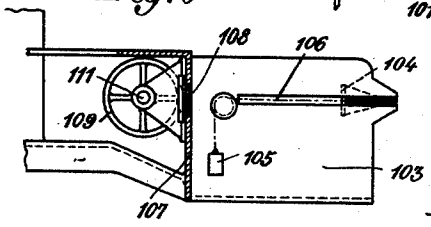


Fig. 8



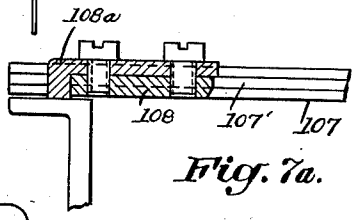
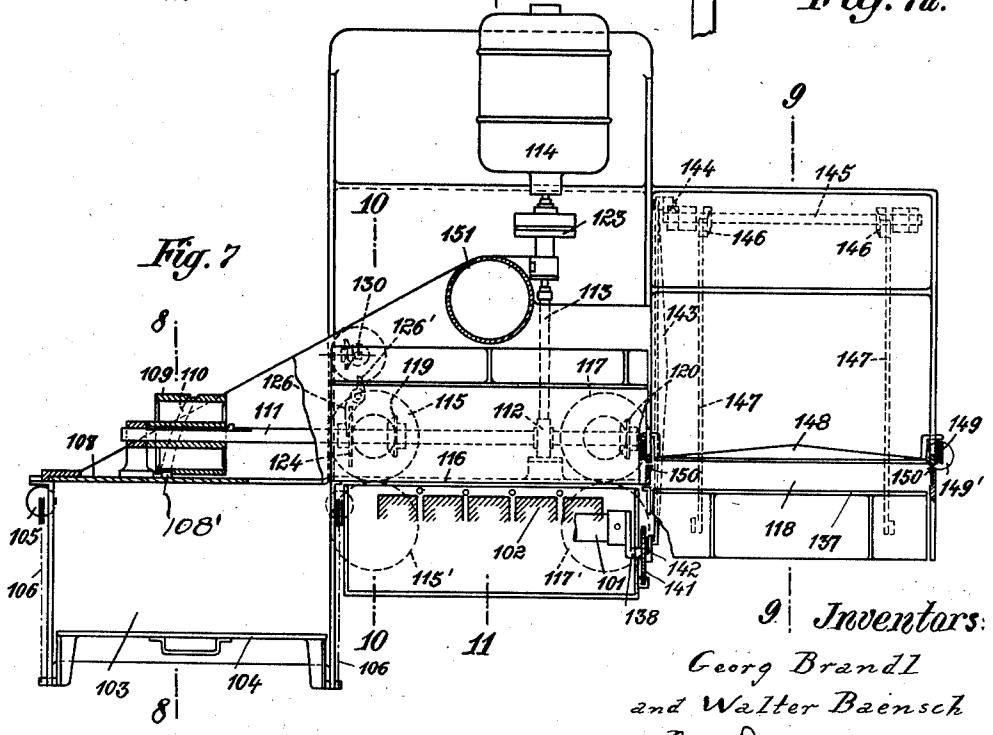


Fig. 7a.

Fig. 7



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Patented Feb. 11, 1930

1,746,414

UNITED STATES PATENT OFFICE

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COMBINED PRINTING AND TABULATING MACHINE

Application filed January 25, 1927, Serial No. 163,504, and in Germany April 12, 1926.

Printing and tabulating machines, as heretofore known, print totals taken from each of a plurality of groups of perforated cards—for instance, the totals of the amounts and values of certain goods in a definite sales territory—continuously on an endless strip of paper which is drawn from a roll. In many cases, it is required to record these totals at different time intervals, say monthly, one after the other on a card, in order to obtain an idea of the development of business transacted in a definite sales territory. In this case, the amounts can be transferred manually from the paper strip to the cards, but such transfer requires a very careful check and consumes much time, and even then errors are inevitable.

The present invention is of use here. It replaces the troublesome manual transfer by a machine which renders possible direct printing on the cards. For this purpose, a card is automatically guided to the printing mechanism on the tabulating machine from each group in the order of the groups. At the printing mechanism, the cards are printed at different intervals with the desired balance, at the corresponding line-height, and after the printing they are automatically removed and stacked. If, for instance, statistics must be obtained regarding sales of different goods in different countries, the perforated cards are sorted by a suitable sorting machine according to countries, goods and months, each goods-country forming a group. A card is supplied for each group, and these cards are arranged in the order of the perforated card groups and are guided individually, one after another, from a stack of cards through the printing mechanism and printed in the same succession as the perforated card groups in the tabulating machine. Printing can be effected at different line-heights, so that each line-height thus corresponds to a definite month. In this manner, it is possible to enter the totals on each perforated card group monthly, one beneath another, on the cards.

In the drawing, two forms of a machine operating in this way, are represented.

The first form is shown in Figures 1 to 5, and in this form, the feed of the unprinted cards to the printing table or platen is effected by means of hooked slides, while the subsequent removal of the printed cards is effected by means of pneumatic grippers, actuated by compressed air and vacuum.

Figure 1 is a part-sectional elevation of a machine of this character;

Fig. 1ª is an enlarged view, partly in section, of the device for feeding unprinted cards;

Fig. 2 is a plan view thereof;

Fig. 3 is a section through the pivot head of the pneumatic grippers;

Fig. 4 shows, on a larger scale, and partly in longitudinal section, the construction of the valves controlling the compressed air and vacuum for the pneumatic grippers; and

Fig. 5 is a plan view of Fig. 4, partly in section.

The second form is shown in Figs. 6 to 11. This construction also uses hooked slides to withdraw the unprinted cards from the pile, but uses rollers to convey them to the platen and to the final pile.

Fig. 6 is an elevation of the machine;

Fig. 7 is a plan view thereof;

Fig. 7ª is an enlarged view, partly in section, of the device for feeding unprinted cards;

Fig. 8 is a section on line 8—8 of Fig. 7;

Fig. 9 is a section on line 9—9 of Fig. 7;

Fig. 10 is a section on line 10—10 of Fig. 7;

Fig. 10ª is a view of a detail of Fig. 10;

Fig. 11 is a section on line 11—11 of Fig. 7.

Referring first to the construction represented in Figs. 1 to 5, there is shown of the printing mechanism of the tabulating machine, only the vertically reciprocating universal bar 1, controlling the type members 2. The keys and associated levers for operating the individual type members are omitted for the sake of clearness.

The unprinted cards are piled in a box 3 and are pressed against the front wall 4 in which are guided two slides 5 that feed the cards singly in front of the type members 2 (hereinafter termed the printing mechanism), in which position the cards are supported by a vertically-adjustable bar 6 associated with the vertical printing table or

platen 7. The latter constitutes the front wall, and the box 3 the top wall, of a housing 8, in which are located the mechanism for moving the slides 5 and the apparatus for actuating the air compressor and pump. The box 3 contains a stationary cross-wall or shelf 3^a, which overlies the cards and serves not only to reinforce the box but also to prevent the cards from being forced upward or outward thereof, as hereinafter described.

The slides 5 are provided with card-feeding devices or hooks 5^b of angle-section (see Fig. 1^a) which are secured to the outer faces of the slides and have their shorter or horizontal arms secured in said slides and projecting slightly into the interior of the box. These slides are connected by perforated lugs 5^a to a rod 9, which is intermittently moved up and down by links 10 and cranks 11, and the latter are attached to a shaft 12 which is operatively connected with the shaft 15 of an electric motor 16 by means of interengaging friction gears 13—14. The hooks or feeders 5^b are thus reciprocated vetrically with the slides 5, as will be apparent, and the shelf 3^a is located directly opposite the point which the feeders reach at the top of their stroke, so that the shelf will, therefore, prevent the cards from being carried upward with the feeders when the latter, after having completed a downward movement, commence their succeeding up-stroke.

The shaft 12 mentioned above has associated with it a latch or stop device 17—18 which holds it stationary at certain times; and the wheel 17 of this device is fixed to said shaft outside the housing 8 near one of the cranks 11 and is provided with a single peripheral notch 17′, while the latch proper or pawl 18 is mounted on the housing directly in front of the platen 7 and is operated by a stop 20 on a vertically-reciprocating bar 21. To this end, the pawl is given the form of a bell-crank and is pivoted or fulcrumed at its apex, its upper arm being subjected to the action of a spring 18′ that tends to engage it with the notch in wheel 17. The lower arm of the bell-crank carries at its end a trip 19 which is pivoted thereto in known manner and subjected to the action of a spring 19′, so that it can rock idly about its pivot in a clockwise direction, but cannot rock anti-clockwise. The outer end of this trip projects into the path of stop 20, and, hence, when bar 21 descends, the engagement of the parts 20 and 19 will rock the bell-crank anti-clockwise, thereby releasing it from wheel 17 and, in consequence, unlocking shaft 12; the toothed end of the upper arm of the bell-crank thereafter riding along the smooth periphery of the wheel during the subsequent rotation of said shaft. At the end of the rotation of the shaft, the slides 5 are again in their raised, operative position and bar 21 then starts its up-stroke, during which time its stop 20 moves past trip 19 which swings about its pivot without producing any movement of the bell-crank.

The movement of the bar 21 is derived from the universal bar 1 that controls the printing mechanism 2; and in consequence of this, uniformity between the movement of the printing mechanism and the feed of the cards out of the box 3 to said mechanism, is assured.

The removal of the printed cards is accomplished, in a known way, by pivoted pneumatic grippers 22, subjected alternately to the action of pressure and suction. During the printing, the grippers receive compressed air, whereby they press the cards firmly against the platen 7, while at the same time, said cards are held against said platen by suction created in a tubular chamber 23 located on the rear side of the platen in the plane of the grippers, suction and pressure alternating, as in the grippers. The pressure action comes into play when the grippers are connected with suction, in order to remove the printed cards.

The suction action is created by a pump 24, to which is connected a suction tank 25, while the blower 26 for creating the pressure action delivers the compressed air into a pressure tank 27. Both pump and blower are located in the housing 8 and are driven from the shaft 15 of the motor 16. The suction tank 25 has two pipe connections 28, 29 to the valves 30, 31, while the pressure tank 27 has three connections 32, 33, 34 to the valves 35, 36, 37. Of these valves, valve 30 controls the suction for the grippers 22; valve 31 the suction for the chamber 23 on the rear side of the platen 7; valve 35 the compressed air for the grippers 22 during the printing; valve 36 the compressed air for the chamber 23 during the removal of the printed cards from the printing table; and valve 37 the compressed air for the grippers 22 during the piling of the printed cards in the delivery receptacle. The previously mentioned connections between the suction and pressure tanks and the valves are made by flexible pipes indicated in dotted lines in Fig. 1; the pipe connections in the valve box 38 wherein the valves are arranged and corresponding to the connections 28, 29 being indicated by numerals 28′, 29′ and those corresponding to the connections 32, 33, 34 by numerals 32′, 33′ and 34′.

Each of the aforesaid valves is in the form of a double piston, as shown in Fig. 4. The pistons 44 and 44′ are rigidly secured on a common piston rod 45 which is pressed against a cam disk 47 by a spring 46. The pistons are guided in a bushing 43 which forms, with the casing 38, two chambers 40 and 41, separated by a horizontal partition 39. Each of these chambers communicates with the interior of said bushing by a plurality of ports 42. The upper chambers 40 of the suction valves 30 and 31 are connected

with the suction tank 25, while the lower chambers 41 are connected to the grippers 22 and to the chamber 23 by pipes 61′ and 63ᵃ′. In a similar manner, the upper chambers 40 of the pressure valves 35, 36, 37 are connected to the pressure tank 27, and the lower chambers 41 to the pressure chamber 23 and the grippers 22. The distance between the pistons and the length of their stroke are such that, in the upper position of the piston 44, the chambers 41 are temporarily shut off from the upper chambers 40 by the lower piston 44, while in the lower position of the piston, they communicate with the chambers 40 and 41 through the ports 42.

The construction of all the valves is the same; and all the cam disks 47 are carried on a common shaft 48 which is intermittently driven in one direction by a rack-and-pinion drive, likewise operated by means of the bar 21 that controls the pawl 18 of the latch wheel for the intermittent feed of the unprinted cards in front of the platen. At each upstroke and each down-stroke of the bar 21, the cam shaft 48 is given one turn in the same direction, to which end, two pinions 49, 50 are loosely mounted on said shaft and are pressed apart by a spring 51. The toothed hubs of these pinions form, in conjunction with the fixed toothed disks 52, 53, one-way clutches which act in such a way that, when the bar 21 goes up, the pinion 50 turns loosely while, when the bar goes down, the pinion 49 turns loosely. The corresponding racks 54 and 55 wherewith the bar 21 is provided engage the pinions 49 and 50 on opposite sides: thus, (see Fig. 4) rack 54 engages pinion 50 on the rear side of the latter, while rack 55 engages pinion 49 on its front side.

The hollow grippers 22 are pivoted on a stationary hollow shaft 56 (Fig. 3), and their swinging movement is likewise derived from the bar 21 through a rack-and-pinion drive 57 and a spur gear train 58. The hollow shaft 56 is divided longitudinally into two chambers 59, 60; the upper chamber 59 being connected at one end through a fitting 61 to the suction valve 30, and at the other end through a fitting 61ᵃ (Fig. 2) to the pressure valve 35, while the lower chamber 60 is connected only to the valve 37 through a fitting 62. The connections between said fittings and the valves are also made by flexible pipes or tubes (not shown). The fittings on the valves, corresponding to the fittings 61, 61ᵃ and 62, are indicated by numerals 61′, 61ᵃ′ and 62′.

The chamber 23 on the rear side of the platen 7 is connected at one end by a flexible pipe 63 to the fitting 63′ of the pressure valve 36, and on the other end to the fitting 63ᵃ′ of the suction valve 31 by a pipe 63ᵃ.

For piling up the printed cards, there is provided a box 64, guided in inclined slots 65 formed in the housing wall 66 and suspended by cords 67. These cords run over rollers 68, 69, 70, to a follower rail 71 which is guided in lateral slots 72 formed in the box 3 for the unprinted cards. These latter cards are subjected to the pressure of the follower 71 which is itself loaded with the weight of the box 64, so that they are constantly pressed against the slides 5.

The operation of this machine is as follows:

Assuming that the universal bar 1 of the printing mechanism for the control of the type members 2 is in its uppermost position, that bar 21 has been moved upwardly, and also assuming that a card has just been printed and is to be removed, at this moment the printed card must be removed by compressed air from the platen 7 and be gripped by suction by the grippers 22. The valves 36 and 30 are accordingly opened, and compressed air flows from tank 27 over the path 33, 33′, 63′, 63, into the chamber 23 on the rear side of the platen; at the same time, the suction existing in tank 25 is transmitted to the grippers 22 over the path 28, 28′, 61′, 61, 59.

As the bar 21 descends, the grippers 22 are swung anti-clockwise by the rack drive 57 and gears 58 into the dotted-line position in Fig. 1, thereby first of all closing (by means of its cam disk 47) the valve 36 that connects the chamber 23 with the compressed air tank 27. During the further descent of the bar 21, the pressure valve 37 is opened and compressed air from said tank 27 is admitted into the lower chamber 60 of the hollow shaft 56, over the path 34, 34′, 62′, 62. At the end of the swinging movement, the grippers come into registration with a port 60ᵃ in chamber 60, whereupon the compressed air enters the grippers and blows off the card. The grippers remain connected with suction throughout their swinging movement and until shortly before such movement is completed, due to the provision of radial ports 59ᵃ (Fig. 3) in the upper chamber 59 and of an annular passage 56ᵃ in the outer surface of the hollow shaft 56, the suction being cut off by the closing of valve 30.

During the descent of the bar 21, the stop 20 strikes the trip 19 carried by the pawl 18 and disengages the latter from the latch wheel 17. Consequently, the shaft 12 is driven through the friction drive 13, 14, and an unprinted card is drawn out of the box 3 by the slides 5 (actuated by cranks 11 and links 10) and is fed in front of the platen 7 until it comes to rest on the supporting bar 6. At this moment, the suction valve 31 is opened and the tank 25 is put in communication with the chamber 23, over the path 29, 29′, 63ᵃ′, 63ᵃ, whereby the card is held against the platen by the suction.

As the bar 21 rises, the grippers 22 are swung back by the rack drive 57 and gears 58; but at the completion of this movement,

however, the valve 35 is also opened, and compressed air flows from the tank 27 into the grippers 22, over the path 32, 32′, 61ᵃ′, 61ᵃ, so that the card is at the same time firmly pressed against the platen. The printing operation then follows, thus completing the cycle of operations.

It has already been mentioned that the supporting bar 6 of the unprinted cards is adjustable in the vertical direction. Such adjustment is to permit the cards to be printed on different lines, and it is accomplished by means of a rail 73, which can be adjusted by hand by means of a rack-and-pinion drive 74. The correct line adjustment is determined by a fixed scale 75, over which a pointer 76 on rail 73 moves.

According to the adjustment of bar 6, the grippers engage the cards at a greater or less distance from the edge. But since the swinging movement of the grippers is invariable, the cards, under certain conditions, would be stacked with their edges on the bottom of the box 64. Care must, therefore, be taken that, when necessary, the cards are blown from the grippers at an earlier stage; but since the blowing off takes place the sooner, the earlier the hollow grippers 22 come into register with the port 60ᵃ in the pressure chamber 60 of the hollow shaft 56, the desired regulation of the action can be obtained by an angular adjustment of said shaft. To make this rotary adjustment of the shaft depend upon the adjustment of the supporting bar 6, the rail 73 is connected to an arm 79 of said shaft through an angle lever 77 and a link 78, so that the movements of the rails are thus transmitted through the parts 77, 78 and 79 to said shaft to turn the same.

The turning of the cards by the pneumatic grippers has the result of piling the printed cards in reversed sequence in the delivery box, to that which they had when unprinted.

Second form of machine represented in Figs. 6–11:

Of the printing mechanism of the tabulating machine, there is again shown only the vertically reciprocating universal bar 101 for the type members 102. The control of the type members and the operating mechanism proper are omitted for the sake of simplicity.

The unprinted cards are stacked in a box 103 and are pressed against the front wall 107 thereof by a bar 104, to which are attached two cords 106 loaded with weights 105. A slide 108 (Fig. 8) is guided in a groove 107′ in wall 107 and is provided with a card-engaging member 108ᵃ in the form of an angle-piece or hook which is secured thereto and which draws the cards singly from the pile, said part 108ᵃ having its shorter leg projecting across the adjacent edge of the slide, as represented in Fig. 7ᵃ. To actuate said slide, a drum 109 is provided having a cam groove 110 to receive a stud or roller 108′ on the slide and which moves the latter once forward and back for each rotation of the drum. The drum is mounted on a shaft 111, connected to the shaft 113 of an electric motor 114 by a worm drive 112.

The cards are fed one at a time by the slide 108 to a pair of rollers 115, 115′, which deliver them across the platen 116 to a pair of rollers 117, 117′; but as soon as a card reaches the space between the two pairs of rollers, the latter are stopped, in order to permit the card to be printed by a type member 102. During printing, the cards are held by both pairs of rollers at the same time, because the distance between the shafts of the two pairs of rollers is slightly less than the length of the cards, and because the rollers are stopped just the instant before printing takes place; but after the printing they are fed away by the rollers 117, 117′, into the delivery box 118. The diameter of the rollers is such that they make one revolution and are then stopped each time, so that their periphery is equal, therefore, to the length of travel of the card.

The two pairs of rollers are driven from shaft 111, through bevel gears 119, 120, connected with the rollers 115 and 117, the rollers 115′ and 117′ being driven from the rollers 115 and 117 through pairs of intermeshing spur gears 121 and 122. The gears 121 are illustrated in Fig. 11, and one gear 121 and one gear 122 are also shown in Fig. 6; but these gears are omitted from Fig. 7 to avoid confusion.

The intermittent movement of the cards requires a similar intermittent rotation of the rollers; and to obtain this, the shaft 111 is driven through a friction clutch 123 on the motor shaft 113, and is stopped intermittently by a pawl-device or latch (Figs. 10 and 10ᵃ) controlled by the vertically-reciprocating universal bar 101 of the printing mechanism. The latch wheel 124 of this device is secured on shaft 111 and has a single notch 125 to receive the nose 127 provided on the end of one arm of the pawl 126 which, as in the first construction, takes the form of a two-armed lever or bell-crank, the other arm 126′ of which lies in the path of a spring-actuated trip 128 (Fig. 10ᵃ), pivotally mounted on a disk 129 in such a manner as to act in one direction only. The disk 129 is adjustably mounted on a square shaft 130 (see Fig. 7) which is connected by bevel gears 131 (Fig. 10) with a shaft 132 carrying a pinion 133 in mesh with a rack 134 that is pivotally connected to a lever 135. Said lever 135, in turn, is connected by a link 136 with the vertically-reciprocating universal bar 101 of the printing mechanism.

When said bar 101 descends, the trip 128 on disk 129 comes in contact with the arm 126′ of the detent lever 126 and withdraws its nose 127 from the notch 125 in disk 124. Shaft 111 is thus freed and begins to turn, and as

soon as the parts 127 and 128 slide off each other, the nose 127 rides along the periphery of the wheel 124 and, after one rotation of said wheel, falls back into the notch 125; shaft 111, therefore, making only one turn between each stoppage. When the bar 101 rises, the disk 129 turns backward, and the trip 128 is rocked or tilted by arm 126′ which passes idly over it without the detent lever being actuated.

The stacking of the printed cards in the box 118 is accomplished during the upward movement of the printing mechanism by means of a plunger rail 137 (Figs. 6 and 9), the movement of which is also derived from the bar 101. To this end, a rack 138 is secured on said bar and passes outwardly through a slot 139 in the housing, its end being guided in a bushing 140. The rack, at a certain point of the stroke of the printing mechanism, comes into mesh with a pinion 141, the rotation of which is transmitted through a crank 142, a connecting rod 143 and a second crank 144, to a shaft 145 at the rear end of the box 118. The shaft 145, in turn, is connected by cranks 146 and links 147 (Fig. 7) with the plunger 137, so that for each revolution of the pinion 141 by the upwardly-moving rack 138, the plunger 137 is moved towards the shaft 145, and the printed card, lying in front of said plunger, is thereby fed against a second rail 148, which is loaded on both sides by cords 149 carrying weights 149′, which cords tend to move it inwardly, only one such cord being shown, however. Between the two members 137 and 148 are placed spring fingers 150 (Figs. 7 and 9), which yield as the card is laid off by the rail 137 and then spring back in front of the card. The printed cards are, therefore, always firmly held between the slide or rail 148 and the springs 150, so that they cannot tip up or tilt.

The operation of this machine is as follows:

Assuming that the printing mechanism is in its highest position, and that a card has just been printed, then the shaft 111 is latched, the rollers 115, 115′, 117, 117′ are stationary and the hooked slide 108 is fully retracted and is ready to receive a fresh card. Now, as the printing mechanism makes its downward movement, the lever 135 swings downward and turns, through the intermediary of rack drive 134, 133 and bevel gears 131, the stop disk 129 in such direction that the detent 126 will be disengaged from the latch wheel 124 by the trip 128, thus freeing the shaft 111 which then drives the two sets of rollers 115, 115′ and 117, 117′ through the bevel gears 119 and 120. The printed card is fed from the platen 116 into the delivery box 118 and, at the same time, a fresh card is drawn out of the box 103 by the hooked slide 108 and cam drum 109 and fed in front of the platen 116. After one complete rotation of the rollers, the detent 126 enters the notch 125 in wheel 124 and stops the shaft 111 again. The rollers 115, 115′, 117, 117′ and the cam drum 109 come to rest and the card is in the correct position on the platen.

As the printing mechanism rises, the previously printed card is fed by the rack drive 138 (Fig. 9), the pinion 141 and the drive 142—147, against the movable stop rail 148 where it is firmly held by the springs 150. The stop disk 129, with the trip 128 that controls the detent 126, turns backwardly, and the trip 128 strikes said detent 126 and slides under its free end. At the end of the upward movement, a second card is printed, and the cycle of operations is thus complete.

The machine above described is likewise adapted to print the cards on lines of differents heights; and to this end, the platen, with the card receptacles for both the printed and unprinted cards, is guided on a column 151 of the frame of the printing mechanism, in which a screw-spindle 152 (Fig. 11) is journalled. The spindle nut 153 lies in a guide bushing 154 connected to the platen. In an adjustment of the platen, the stop disk 129 slides along the square shaft 130 (Fig. 10), since the drive of said shaft does not take part itself in the displacement. Also, the drive of the plunger bar or rail 137 for stacking the cards in the delivery box (Fig. 2) remains in its place during an adjustment of the platen, as far as the rack 138 and pinion 141 are concerned. However, no noticeable diminution of the stroke of the plunger 137 occurs when the platen is adjusted, because the link 143 is very long. The adjustment of the platen into the desired line level can be controlled by a fixed scale 155 (Fig. 9) over which moves a pointer 156 connected to plunger 137.

In this machine, the stacking of the printed cards takes place in the same sequence as that in which they were stacked before being printed.

The two constructions described above represent merely embodiments of the invention and can be varied as a whole or in details.

We claim as our invention:—

1. In a combined printing and tabulating machine, printing mechanism, including a platen, printing members, and a single main operating element therefor; a receptacle to contain a pile of unprinted work pieces; mechanism for feeding the work pieces one at a time to printing position on the platen; a receptacle to receive the printed work pieces; mechanism for delivering the printed pieces from the platen to the second receptacle; and mechanism under the automatic control of said operating element for controlling the operation of both the feeding and the delivering mechanism.

2. In a combined printing and tabulating machine, printing mechanism including a

platen, printing members, and a single main operating element therefor; a receptacle to contain a pile of unprinted work pieces; a receptacle to receive the printed pieces; and mechanism under the automatic control of said operating element for feeding an unprinted work piece from the first receptacle to the platen and simultaneously delivering a printed piece from said platen to the second receptacle.

3. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a vertically-reciprocating main operating element therefor; a receptacle to contain a pile of unprinted work pieces; a receptacle to receive the printed work pieces; and mechanism controlled automatically by the vertical movements of said operating element for feeding an unprinted work piece from the first receptacle to the platen and simultaneously delivering a printed piece from said platen to the second receptacle.

4. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; a receptacle to contain a pile of unprinted work pieces; a receptacle to receive the printed pieces; mechanism under the automatic control of said operating element for feeding an unprinted work piece from the first receptacle to the platen and simultaneously delivering a printed piece from said platen to the second receptacle; and vertically-adjustable supporting means for the work pieces to enable printing to take place thereon at different line levels.

5. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; mechanism for feeding unprinted work pieces one at a time to printing position on the platen; a latch mechanism normally locking the feeding mechanism against operation; and means actuated automatically by the movement of said operating element for releasing said latch mechanism.

6. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; mechanism for feeding unprinted work pieces one at a time to printing position on the platen; a latch member connected to the feeding mechanism; a detent normally engaged therewith to lock the feeding mechanism against action; and means actuated automatically by the movement of said operating element for disengaging the detent from the latch member.

7. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; mechanism for feeding unprinted work pieces one at a time to printing position on the platen; a latch member connected to the feeding mechanism; a detent normally engaged therewith to lock the feeding mechanism against action; and a trip actuated automatically by the movement of said operating element for disengaging the detent from the latch member.

8. A combined printing and tabulating machine, according to claim 7, in which the main operating element of the printing mechanism comprises a vertically-reciprocatory member; and in which the trip is actuated by the movement of such member in one direction only and is ineffective during its movement in the opposite direction.

9. A combined printing and tabulating machine, according to claim 7, in which the main operating element of the printing mechanism comprises a vertically-reciprocatory member; and in which the trip comprises a pivotally-mounted, spring-pressed part that is actuated by the movement of such member in one direction only and is rocked idly about its pivot during the movement of said member in the opposite direction.

10. In a combined printing and tabulating machine, printing mechanism including a platen, printing members and a main operating element therefor; mechanism including a rotary shaft, and driving means for the same, for feeding unprinted work pieces one at a time to printing position on the platen; a notched latch wheel fixed to said shaft; a detent normally engaging the notch in said wheel to lock the feeding shaft against rotation; and means actuated automatically by the movement of said operating element for releasing said detent from said notch.

11. In a combined printing and tabulating machine, printing mechanism including a platen, printing members and a main operating element therefor; mechanism including a rotary shaft, and driving means for the same, for feeding unprinted work pieces one at a time to printing position on the platen; a notched latch wheel fixed to said shaft; a detent normally engaging the notch in said wheel to lock the feeding shaft against rotation; a trip carried by the detent; and a projection on said operating element to engage and actuate said trip so as to release the detent.

12. A machine according to claim 11, in which the operating element comprises a vertically-reciprocatory bar; and in which the detent comprises a pivotally-mounted part that is actuated by the projection on the operating bar during the movement of the latter in one direction only, and is rocked idly about its pivot when the bar moves in the opposite direction.

13. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; a receptacle to con-

tain a pile of unprinted work pieces; a receptacle to receive the printed work pieces; mechanism for feeding an unprinted piece from the first receptacle to the platen and delivering a printed piece from said platen to the second receptacle; a latch mechanism normally locking the feeding and delivering mechanism against action; and means under the control of said operating element for automatically releasing the latch mechanism when the operating element is actuated.

14. In a combined printing and tabulating machine, printing mechanism; mechanism for feeding loose work pieces one at a time thereto to be printed; a movable receptacle to receive the printed work pieces; weight-actuated means controlled by the feeding mechanism for moving said receptacle relatively to the printing mechanism; and means for delivering the printed pieces to the receptacle and stacking them therein.

15. In a combined printing and tabulating machine, a receptacle to contain unprinted work pieces; a movable follower therein to engage the work pieces and press them toward the delivery end of the receptacle; printing mechanism including a platen; mechanism for feeding the unprinted work pieces one at a time to printing position on the platen; a movable receptacle to receive the printed pieces; weight-actuated means connected with said follower for moving the receiving receptacle relatively to the platen; and means for delivering the printed pieces from said platen to said receiving receptacle and stacking them therein.

16. In a combined printing and tabulating machine, printing mechanism including a platen; means for feeding unprinted work pieces one at a time to the platen; means for holding a work piece against the platen; pneumatic grippers for removing a printed work piece from the platen by suction and transferring it to another point of the machine; and means for supplying compressed air to the grippers when such point is reached to blow the work piece therefrom.

17. In a combined printing and tabulating machine, printing mechanism including a platen; means for feeding unprinted work pieces one at a time to the platen; a pneumatic device for removing a printed work piece from the platen and transferring it to another point of the machine; and mechanism for initially connecting said device with suction to enable it to pick up and carry the work piece, and for subsequently connecting it with fluid under pressure to forcibly detach the work piece when such point is reached.

18. A machine according to claim 17, in which the printing mechanism additionally includes a main controller; and in which a valve system governed by the movements of said controller is provided for regulating the connection of the pneumatic device with suction and pressure.

19. In a combined printing and tabulating machine, printing mechanism including a platen; means for feeding unprinted work pieces one at a time to the platen; a chamber extending along the rear face of the platen and having an aperture which opens through said platen; a device for removing a printed work piece from the platen and transferring it to another point of the machine; and means for connecting said chamber alternately with suction and pressure to hold a work piece against the platen during printing and then detach it therefrom.

20. In a combined printing and tabulating machine, printing mechanism including a platen; means for feeding unprinted work pieces one at a time to the platen; a chamber extending along the rear face of the platen and having an aperture which opens through the same; a pneumatic device for removing a printed work piece from the platen and transferring it to another point of the machine; means for connecting said chamber alternately with suction and pressure to hold a work piece against the platen and then detach it therefrom; and means for initially connecting the pneumatic device with suction to enable it to pick up and carry the printed work piece, and for subsequently connecting it with pressure to detach said piece when such point is reached.

21. A machine according to claim 20, in which the printing mechanism additionally includes a main controller; and in which a valve system governed by the movements of said controller is provided for regulating the connection of the chamber and the pneumatic device with suction and pressure.

22. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; a receptacle to contain a pile of unprinted work pieces; a reciprocating slide connected to be controlled in its actuation by the movements of said operating element for feeding the work pieces one at a time from said receptacle to printing position on the platen; and means for removing the work pieces from the platen after printing, and stacking them at another point of the machine.

23. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a main operating element therefor; a receptacle to contain unprinted work pieces; a receptacle to receive the printed work pieces; and mechanism under the automatic control of said operating element for feeding an unprinted work piece from the first receptacle to the platen and simultaneously delivering a printed piece from said platen to the second re-

ceptacle; said platen and both receptacles being vertically adjustable together.

24. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a vertically-reciprocating main operating element therefor; and mechanism controlled automatically by the vertical movements of said operating element for feeding work pieces one at a time to the printing mechanism and then removing them from the printing mechanism and stacking them.

25. In a combined printing and tabulating machine, printing mechanism including a platen, printing members, and a vertically-reciprocating main operating element therefor; and mechanism controlled automatically by the vertical movements of said operating element for feeding work pieces one at a time to the printing mechanism and then removing them from the printing mechanism and stacking them; said automatically-controlled mechanism including pneumatic grippers for effecting the removal and stacking of the printed work pieces.

26. In a combined printing and tabulating machine, printing mechanism including a platen and a main controller; means for feeding unprinted work pieces one at a time to the platen; pneumatic grippers for removing a printed work piece from the platen and transferring it to another point of the machine; mechanism for initially connecting said grippers with suction to enable them to pick up and carry the work piece, and for subsequently connecting them with air under pressure to forcibly detach the work piece when such point is reached; and a valve system governed by the movements of the controller for regulating the connection of the grippers with suction and pressure.

27. A combined printing and tabulating machine, according to claim 26, in which the main controller for the printing mechanism consists of a vertically-reciprocating element, the vertical movements of which govern the operation of the valve system.

In testimony whereof we affix our signatures.

GEORG BRANDL.
WALTER BAENSCH.