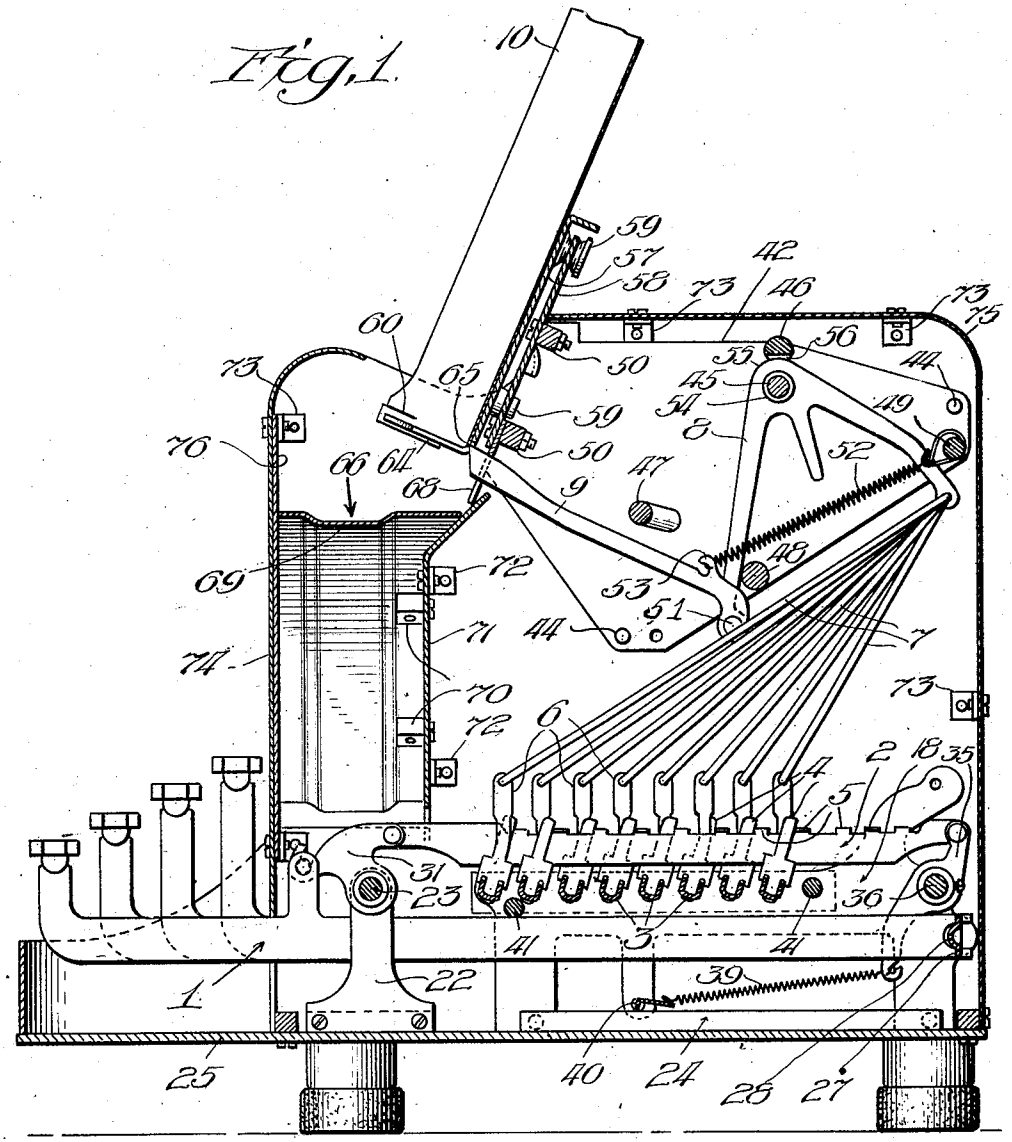
Aug. 19, 1930. L. E. DAUER ET AL 1,773,348

CHANGE MAKING MACHINE

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Fig. 1.



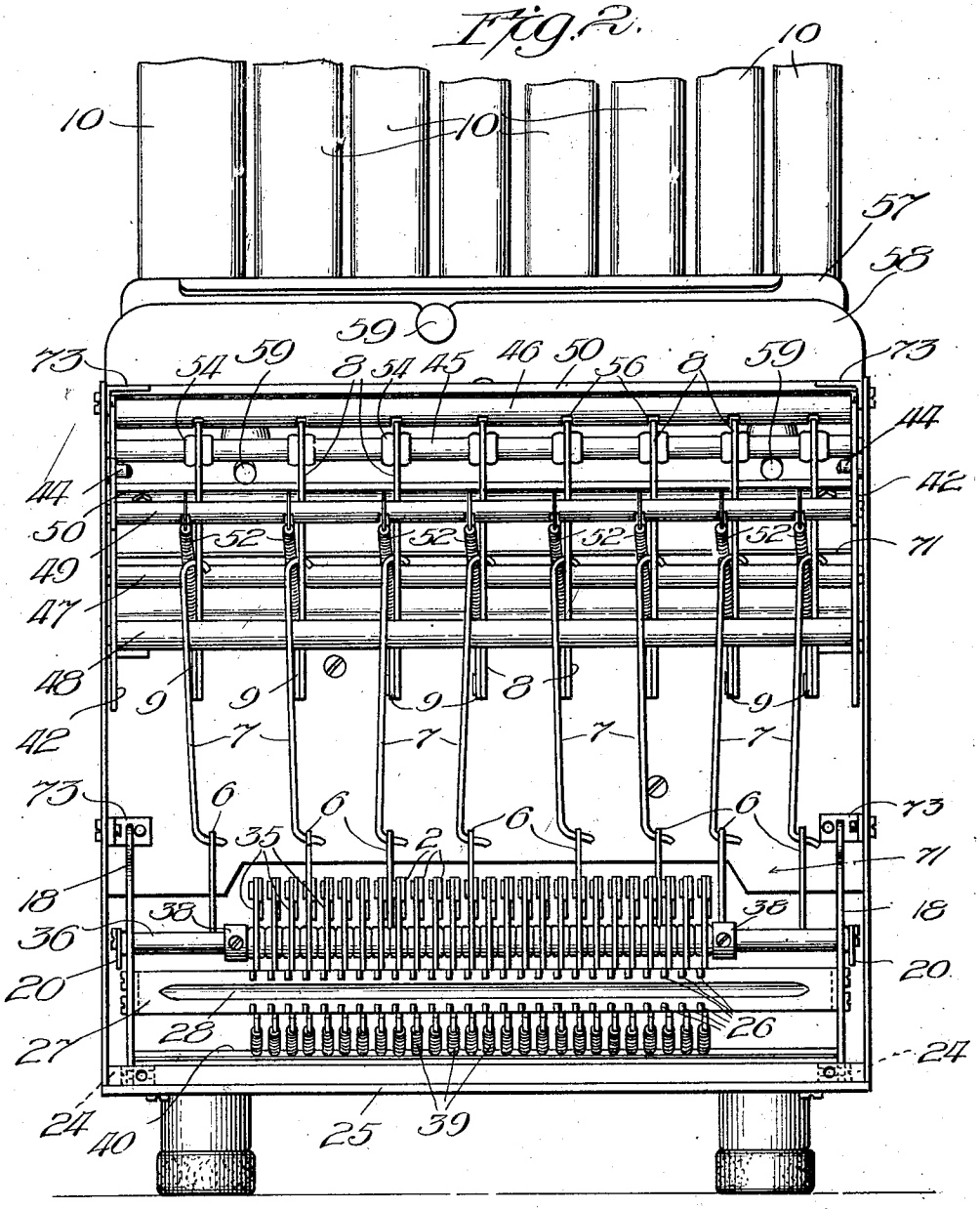
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CHANGE MAKING MACHINE

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Fig. 2.



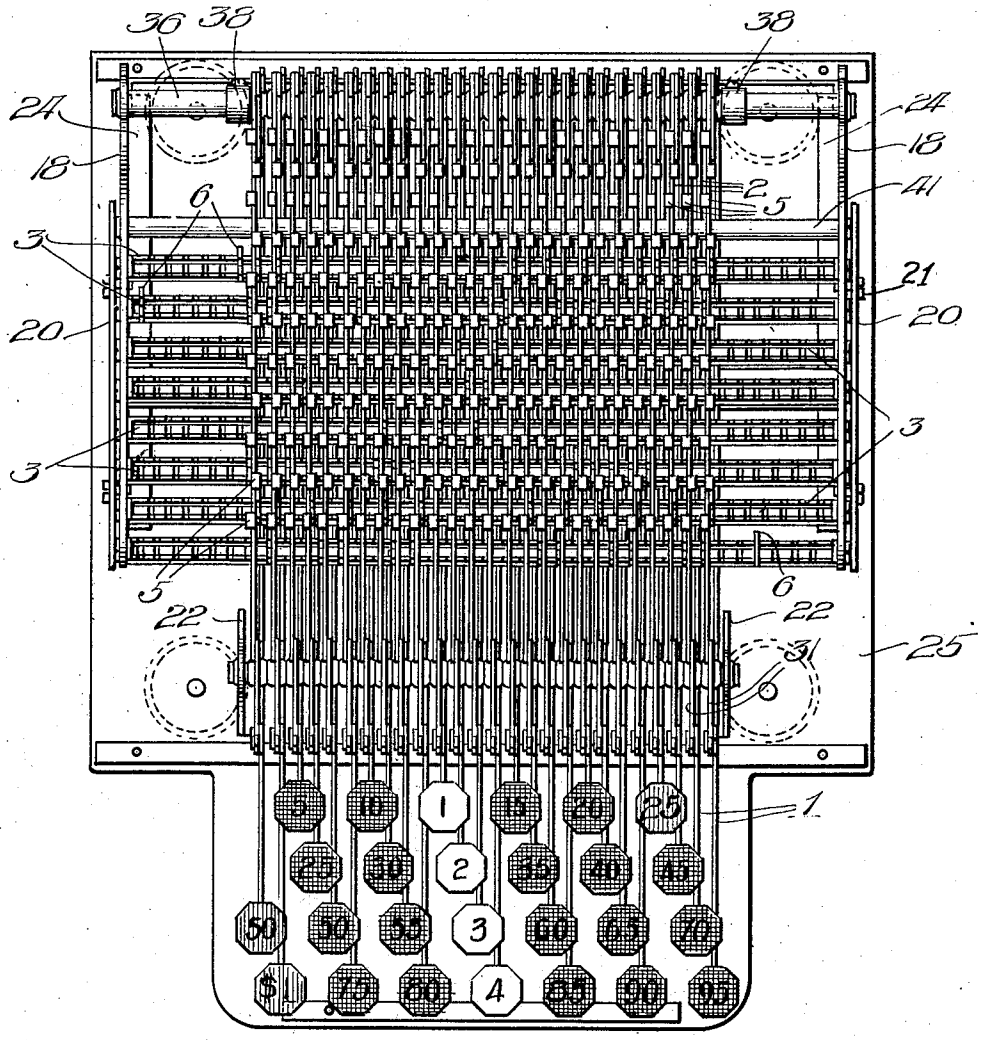
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CHANGE MAKING MACHINE

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Fig. 3.



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CHANGE MAKING MACHINE

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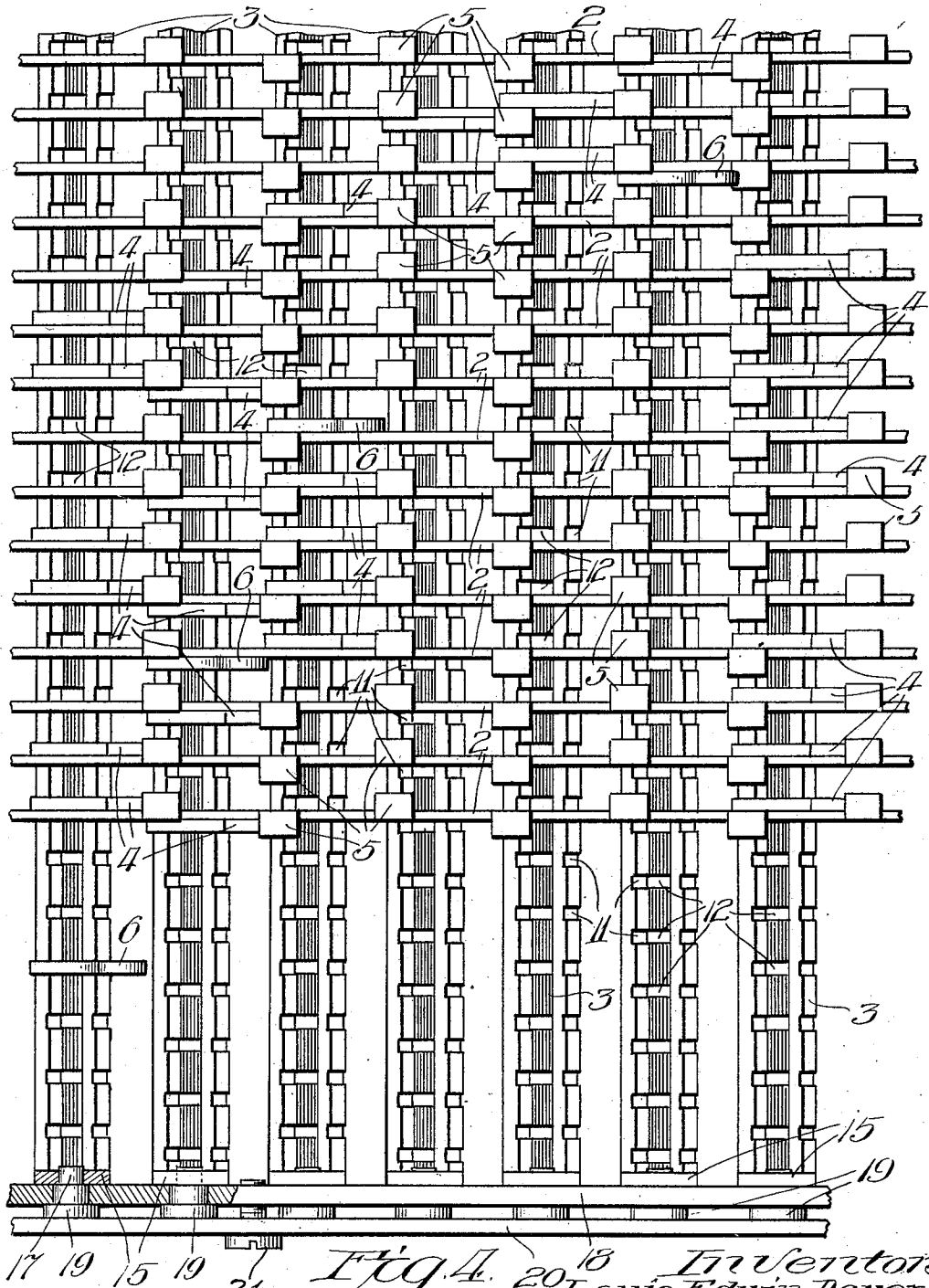


Fig. 4.

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CHANGE MAKING MACHINE

Filed Dec. 1, 1924 7 Sheets-Sheet 5

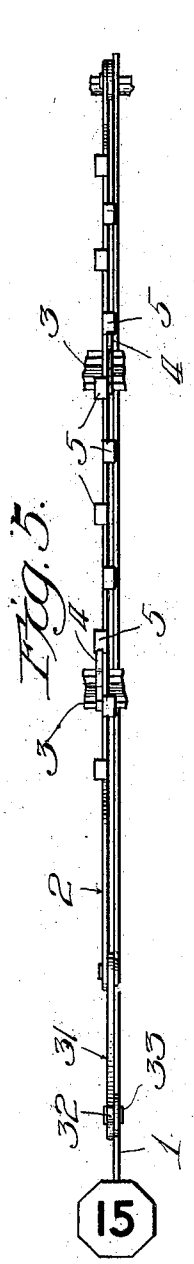


Fig. 5.

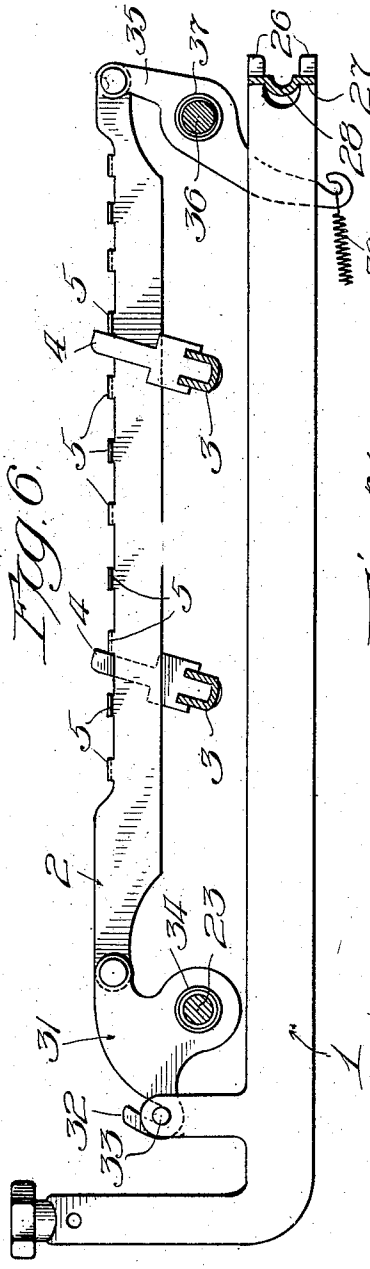


Fig. 6.

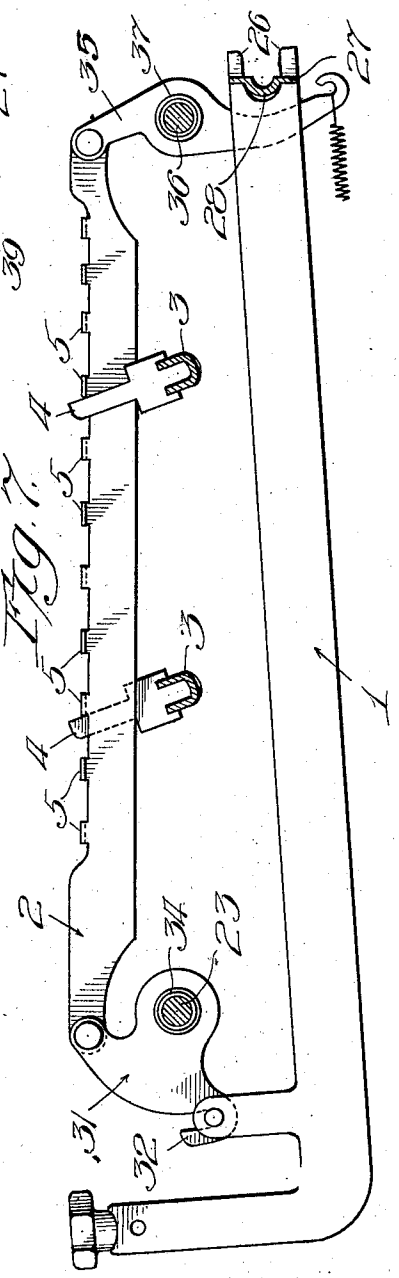


Fig. 7.

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CHANGE MAKING MACHINE

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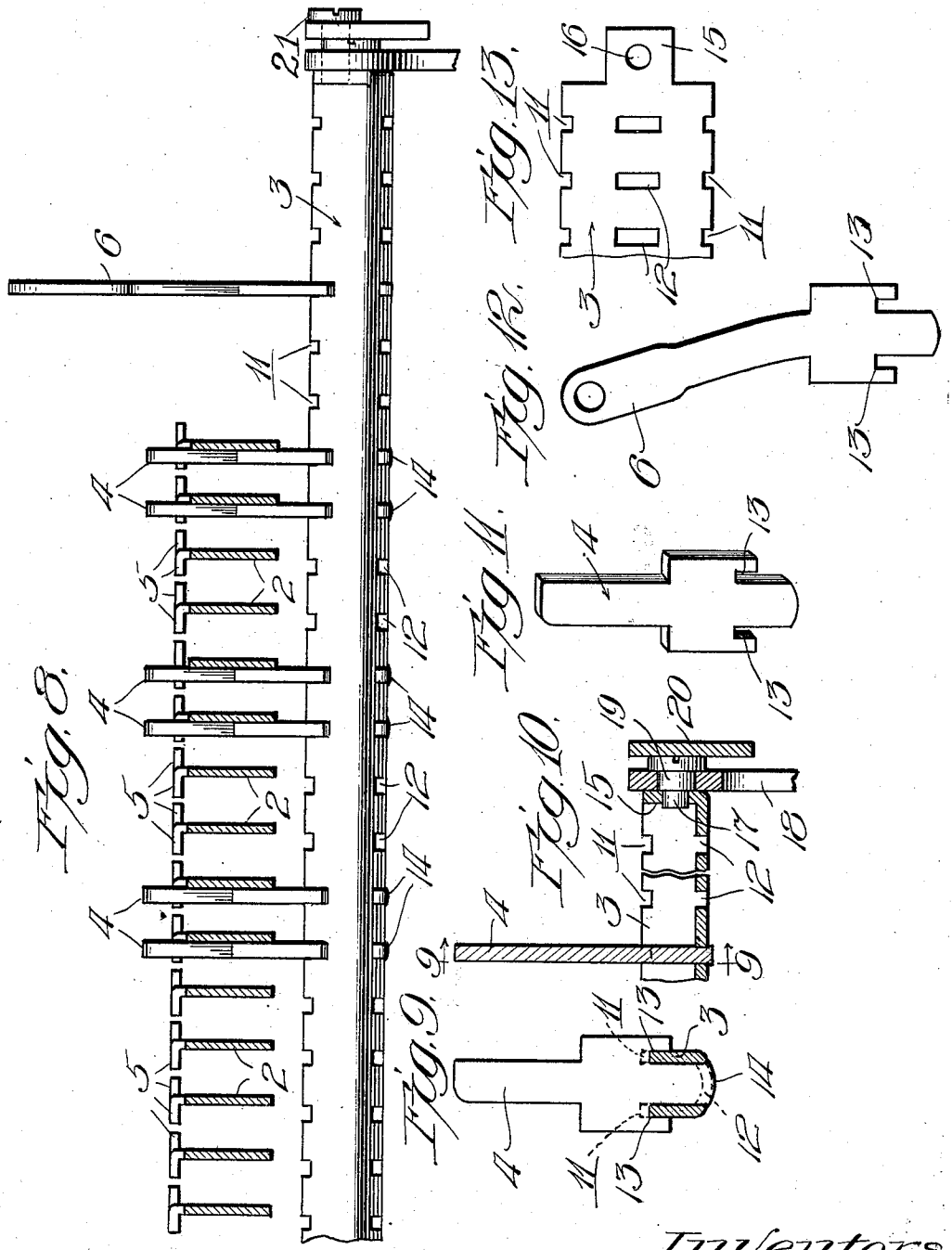


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

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CHANGE MAKING MACHINE

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Fig. 14.

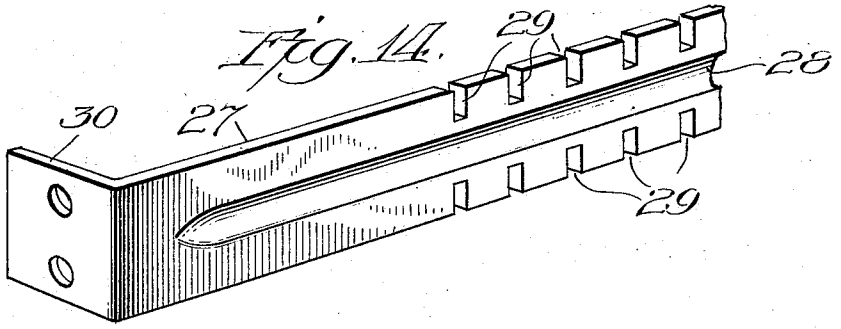


Fig. 15.

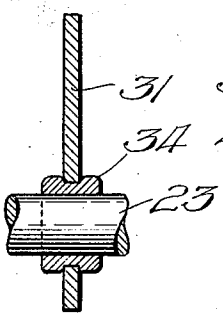


Fig. 16.

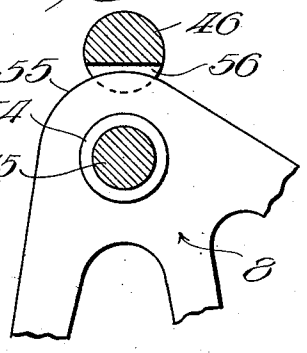


Fig. 17.

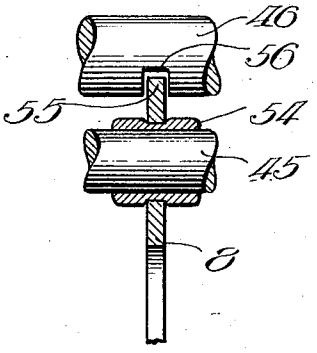


Fig. 18.

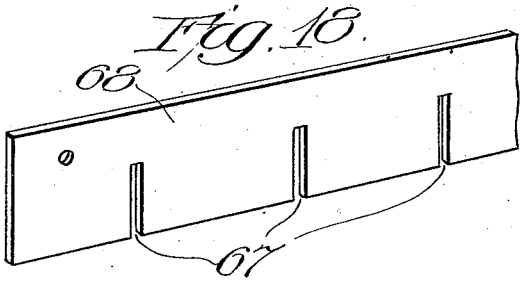


Fig. 19.

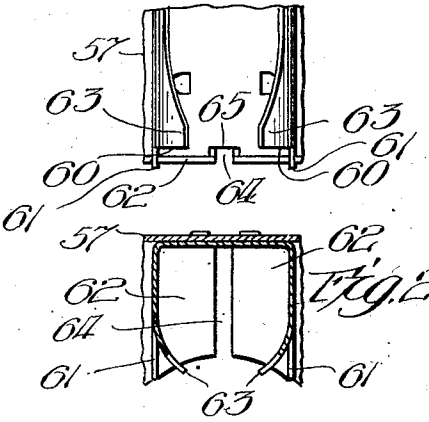


Fig. 20.

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Patented Aug. 19, 1930 1,773,348

UNITED STATES PATENT OFFICE

LOUIS EDWIN DAUER AND WILLIAM HERBERT N. SHIPMAN, OF CHICAGO, ILLINOIS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO HEDMAN MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

CHANGE-MAKING MACHINE

Application filed December 1, 1924. Serial No. 753,083.

The present invention relates to the class of machines used in making change and for other analogous purposes.

Among other objects, the invention is intended to provide a practicable and reliable change making machine, of light and compact construction, and one susceptible of economical manufacture and permitting advantageous standardization practices in the production of such machines on a commercial scale.

The invention will be clearly understood by reference to one illustrative machine containing an embodiment of the invention, which is shown in the annexed drawings.

In said drawings:

Fig. 1 is a vertical section of the illustrative machine taken on a line near one side wall of the machine casing and showing the operating mechanism in side elevation.

Fig. 2 is a rear elevation of said machine with the back wall of its casing removed.

Fig. 3 is a plan view of the lower mechanism of the machine, including the key-board and the base plate on which the mechanism shown is mounted.

Fig. 4 is an enlarged plan view of a portion of the mechanism shown in Fig. 3.

Fig. 5 is a plan view of an individual active unit, comprising a key lever, draw bar and devices operated thereby.

Fig. 6 is a side view of the subject-matter of Fig. 5, showing the key lever in normal position.

Fig. 7 is a similar view showing the key lever in operating position, or in other words showing the key lever depressed and its associated draw bar operating the devices associated therewith.

Fig. 8 is a sectional elevation taken in front of the set of transverse rocker shafts shown in Figs. 3 and 4 and showing the foremost of said rocker shafts in front elevation and a number of the draw bars in cross section. The key levers associated with these draw bars are omitted from this figure.

Fig. 9 shows a rocker shaft in cross section and one of its arms in side elevation, this view being taken on the line 9—9 of Fig. 10.

Fig. 10 is a longitudinal vertical section of a part of said rocker shaft and said arm.

Fig. 11 is a perspective view of a rocker shaft arm by which the rocker shaft is actuated by a draw bar.

Fig. 12 is a side view of a rocker shaft arm by which the rocker shaft transmits motion to a coin ejecting device.

Fig. 13 is a plan view of an end portion of a sheet metal blank from which a rocker shaft is made.

Fig. 14 is a perspective view of a portion of the key lever fulcrum bar.

Fig. 15 is a detail section through one of the bell crank levers connecting a key lever to a draw bar, and showing the manner of mounting said bell crank lever on its fulcrum shaft.

Fig. 16 is a detail view showing the manner of mounting a bell crank lever which actuates a coin ejector, this view being a cross section through the fulcrum shaft and an adjacent spacing shaft and showing a portion of said bell crank lever in side elevation.

Fig. 17 is a rear view partly in section of the subject-matter of Fig. 16.

Fig. 18 is a perspective view of a portion of a comb which guides the coin ejectors.

Fig. 19 is a front elevation of the lower portion of a coin magazine.

Fig. 20 is a horizontal section and plan of the said coin magazine.

The illustrative machine is of the type adapted to contain a supply of coins and having means controlled from a key-board for discharging coins to supply desired amounts of change. In this instance the machine is organized to throw out change in any desired amount between one cent and one dollar.

The mechanism of the machine comprises a set of key-actuated instrumentalities, represented by key levers 1 and draw bars 2 operated thereby; together with a gang of devices selectively operable by said instrumentalities. Said selectively operable devices are represented by rocker shafts 3 arranged transversely of the draw bars and having arms 4 for engagement by shoulders 5 on the draw bars. By providing each rocker shaft with one or more such arms in the path of a

shoulder or shoulders on one or more draw bars, and by providing different rocker shafts with such arms for engagement by pluralities of shoulders on individual draw bars, the rocker shafts may be operated singly or in groups by the various key levers. In other words, certain individual key levers will operate certain individual rocker shafts, while certain other key levers will operate selected pluralities of such rocker shafts. Said rocker shafts are operatively connected, in this instance by arms 6, connecting rods 7 and bell crank levers 8, with a gang of devices 9 associated with and adapted for removing or ejecting coins from a corresponding number of coin magazines 10. Thus, by operation of a given lever, a coin or coins will be discharged from a selected magazine or group of magazines to supply the amount of change intended to be thrown by the particular key lever.

This type of mechanism may be used in a machine for subtracting sales amounts from amounts tendered by customers, or for delivering change in amounts designated by indicia on the respective keys of the key-board, or for other analogous purposes. In the illustrative machine said mechanism is organized for delivering amounts designated by the key indices. For instance, operation of the fifteen-cent key lever will effect discharge of coins to the amount of fifteen cents.

The number of action units and selectively operable devices of such a mechanism, and the number and disposition of rocker shaft arms 4 and coacting draw bar shoulders 5 or their equivalents, by which the selective action of the machine is determined, will depend upon the particular purpose and organization of the machine. Not only will individual action units and selectively operable devices of a particular machine differ from one another with respect to the number and arrangement of coacting elements involved in the selective action of the units, but also the organization will be affected by such conditions as the number of coin magazines, the denominations of coins therein, and the number of keys, amounts to be thrown thereby, and the denominations of coins intended to supply such amounts. For example, a different organization would be required for supplying certain amounts of change from two magazines for nickels and one magazine for dimes, from that required to supply the like amounts from two magazines for dimes and one magazine for nickels. Again, to throw any given amount in large coins from certain magazines of the machine would require a different organization than that required for throwing the same amount in a greater number of smaller coins from other magazines of the same machine.

It is desired to provide a construction by which the mechanism may be readily adapted or adjusted to suit the requirements of any particular organization; and one by which successive machines, either of identical organization or of varying organizations, may be manufactured expeditiously and economically by the use of standardized parts. It is furthermore desired to provide a construction permitting compact assembly of the elements, including close crowding of the rocker shaft arms 4 and draw bar shoulders 5 without interference. These and other results, including lightness of construction without sacrifice of durability and efficiency, are accomplished by a method of manufacture and features of construction such as for example hereinafter set forth.

The draw bars 2, shown arranged in a compact row above the equally compact bank of key levers 1, consist of sheet metal strips disposed in vertical planes and having their upper edges formed with short lugs or projections to provide the aforesaid shoulders 5. These lugs or shoulders 5 are arranged at uniform intervals corresponding to the spacing of the axes of the rocker shafts, but project alternately at opposite sides of the draw bars, so that the lugs or shoulders 5 on either side of a draw bar are disposed at intervals which are twice the distance between adjacent rocker shaft axes. Thus all of the draw bars may be identical, and they may be cheaply manufactured in quantities as thin sheet metal stampings.

The rocker shafts 3, all of which are likewise identical, are made as sheet metal stampings of channel form or U-shaped cross section. At uniform intervals, corresponding to the spacing of the draw bars, said rocker shafts are provided with rocker arm seats represented by notches 11 in opposite edges of the channel-shaped shafts and openings 12 in the bottom thereof; said openings 12, shown as slots, being in alignment with the notches 11. The rocker shaft arms 4, consisting of duplicate sheet metal pieces, are shaped at their lower ends to fit in the channel-shaped rocker shafts in engagement with the slots or openings 12 thereof, and are formed with shoulders 13 for engaging said notches 11. Said arms may be conveniently attached to the rocker shafts by swaging their lower extremities against the under sides of the rocker shafts, as indicated at 14 in Figs. 8, 9 and 10. The other rocker shaft arms 6, likewise consisting of identical sheet metal pieces, have their lower ends similarly formed, as shown in Fig. 12, and are similarly mounted upon and secured to the rocker shafts as shown in Figs. 2 and 8.

The terminal rocker arm seats of each rocker shaft are spaced unequally from the respective ends of the shaft, the difference in such spacing being substantially equal to one half of the distance between adjacent rocker arm seats or an odd multiple thereof. In the as-

sembled mechanism, the rocker shafts are arranged with their ends in alignment, but with alternate rocker shafts turned round about or end for end, or in other words so that alternate shafts will have their terminal rocker arm seats unequally spaced from the corresponding ends of said shafts. Thus, although all of the rocker shafts are identical in length and construction, the rocker arm seats of each shaft will be staggered in relation to the rocker arm seats of adjacent shafts, as clearly appears in Fig. 4. Consequently, rocker arms affixed on a group of seats of one shaft will be disposed for engagement by lugs or shoulders 5 on similar sides of a corresponding number of draw bars; while a like group of arms similarly affixed on an adjacent shaft will be disposed for engagement by lugs or shoulders on the opposite sides of the same draw bars. Moreover a group of rocker arms affixed on adjacent seats of a rocker shaft, being in staggered relation to a like group of arms on an adjacent rocker shaft, may operate without interference with the latter group or in other words a set of rocker arms on one rocker shaft may move between similar sets of rocker arms on adjacent rocker shafts. Thus the mechanism may be exceedingly compactly arranged, with the appropriate number and disposition of rocker arms required for a particular organization, the action of which may be determined by merely providing each rocker shaft with the requisite number of arms so seated as to dispose such arms, in the completed assembly, for actuation by such of the draw bars as are intended to operate that particular rocker shaft.

In some instances, the location of a long rocker shaft arm 6 may be such as to permit or render it desirable to utilize such an arm for the function of a short arm 4. In that event, such an arm 6 is merely the functional equivalent of an arm 4, with the additional function of serving for communicating motion from the rocker shaft to a connecting rod 7. It may also be necessary or desirable in some few instances to bend up or clip off one or more of the numerous draw bar lugs 5 in order to accommodate a long rocker shaft arm 6 without actuation thereof by a draw bar. In Fig. 4, for instance, two of the draw bars are shown having a lug removed to avoid interference with two of the arms 6. The remaining arms 6 in the illustrative machine are so situated as not to require this expedient.

A simple and economical construction for journalling the rocker shafts, and permitting them to be assembled conveniently, is shown in Figs. 4, 8 10 and 13. According to this construction, the channel-shaped shafts have square set end walls 15 formed by struck-up end projections of the sheet metal blanks for the shaft stampings (Fig. 13). In said end walls are bearing openings 16 which receive appropriate bearing studs 17 projecting from a pair of supporting plates 18 between which the gang of shafts is mounted. In this instance said bearing studs 17 are provided by the reduced terminals of shouldered and headed stud-members 19 fitted in openings in said supporting plates 18 and secured in place by cover plates 20 engaging the heads of the stud members; said cover plates 20 being affixed to the supporting plates 18 by screws 21. Thus the rocker shafts may be easily assembled and mounted by arranging them between the supporting plates 18, inserting the bearing studs in said plates and into the openings in the ends of the rocker shafts, and securing all the studs at either side of the assembly by the cover plates 20; avoiding the necessity of constructing special bearings or employing screw-threaded bearing supports or the like.

Said supporting plates 18, together with a pair of supporting standards 22 for a shaft 23 (Fig. 1) support so much of the mechanism as comprises the key levers 1, draw bars 2 and rocker shafts 3, the latter being shown arranged in the space between the draw bars and key levers. These supporting members and cover plates 20 may consist of flat sheet metal parts; and said supporting members may be conveniently secured in place by fastening them to bars 24 secured on the machine base plate 25.

Each of the sheet metal supporting plates 18 may have a row of holes or bearing openings to accommodate any appropriate number of rocker shafts, and these plates, being duplicates of each other, may be cut out from sheet metal in quantities for use in the manufacture of machines having either the same or various numbers of rocker shafts, according to the number of coin magazines and ejectors, or according to other requirements, such for instance as the use of additional key levers and rocker shafts for effecting functions other than coin-ejection.

The key levers 1 are shown formed at their front ends with upstanding arms to support the keys, which are desirably arranged in stepped rows. The key levers for each row of keys may be identical, and may be manufactured economically in quantities by cutting them from sheet metal of appropriate thickness to form stiff bar-like levers. The rear ends of the key levers are cut out as shown to form fulcrum prongs 26.

All of the key levers are fulcrumed on a common fulcrum piece 27 (Figs. 2 and 14) comprising a sheet metal strip stiffened by a longitudinal rib or corrugation 28 and having vertical slots 29 cut in its upper and lower portions at intervals corresponding to the spacing of the draw bars. The upper and lower slots 29 are in alignment and receive the upper and lower fulcrum prongs 26 of the respective key levers. This simple

construction provides a convenient fulcruming method, contributing to rapidity of assembly, and further provides a convenient and accurate mode of spacing of the key levers and draw bars, the latter being operatively connected with the respective key levers. In other words the spacing of the action units of the machine is established by a single slotted sheet metal part, which may be cut with uniformly spaced slots of sufficient number to permit use of various numbers of key levers. Said fulcrum piece is shown having end flanges 30 by which it is attached to the sheet metal plates 18 supporting the lower assembly of the mechanism of the machine.

Operative connections between the key levers and the respective draw bars may be provided, for example, by bell crank levers 31 pivotally connected to the front ends of the draw bars and having hooked portions 32 engaging studs or pins 33 carried by arms on the key levers (Figs. 2, 6 and 7). These bell crank levers may consist of duplicate sheet metal pieces equipped with brass bushings 34 fitted in the fulcrum openings of the bell crank levers and secured thereto by swaging the bushings externally against the sides of the bell crank levers (Fig. 15). These bushings 34 are of uniform lengths appropriate for spacing the bell crank levers and providing adequate bearings therefor on the fulcrum shaft 23. Said shaft 23 is suitably mounted in the standards 22 between which the series of bell crank levers are arranged (Fig. 3).

The draw bars are shown pivotally connected at their rear ends to spring actuated levers 35, which retract the draw bars and their associated key levers to their normal positions. Said levers 35 are fulcrumed on a stationary shaft or rod 36 connecting the plates 18. Like the bell crank levers 31, they may consist of flat sheet metal pieces having bushings 37 secured therein to provide their bearings on the fulcrum shaft 36 and for spacing said levers, the entire collection of which is maintained in position by collars 38 affixed on said fulcrum shaft 36 adjacent the terminal levers of the series. The springs for actuating said levers 35, or in other words the retracting springs for the draw bars, are shown as retractile coil springs 39 attached at their rear ends to the lower arms of said levers 35 and attached at their front ends to a rod 40 supported between and connecting the plates 18. The plates 18 may be connected by one or more additional rods 41.

It will be observed that the key levers, draw bars and rocker shafts, with the key lever and draw bar connections, comprise a practically self-contained mechanism, which may be conveniently assembled exteriorly of the machine and then mounted therein by affixing the sheet metal side supports 18 and 22 to the bars 24 on the base plate.

In assembling such mechanism, the rocker shafts 3 arranged with the rocker shaft seats thereof in staggered relation, and equipped with the number and arrangement of arms 4 required by the particular organization of the machine, and with the arms 6, one on each rocker shaft, for connection with the respective coin-ejector actuating bell cranks 8, may be mounted in the supporting plates 18, together with the shafts 23, 40 and 41 by which said plates are connected. The draw bars 2, with their front and rear levers 31 and 35 connected thereto, may be assembled on the fulcrum shaft 36 before said shaft is connected between said plates; and the key levers may be assembled in engagement with the proper slots of the fulcrum piece 27, the latter being secured between said plates. The draw bars, being held up from the rocker shafts, may then be adjusted laterally to bring them in proper relation to the rocker shafts, whereupon said draw bars may be lowered into place and the bell crank levers 31 at the front ends of said draw bars may be hooked to the respective key levers. The fulcrum shaft 23 may then be inserted through said bell crank levers 31 and connected to its supporting standards 22. The collars 38 on the fulcrum shaft 36 may then be adjusted and secured to hold the series of draw bars in place; whereupon the assembled mechanism may be mounted on the base plate of the machine.

The upper mechanism of the machine, comprising the coin ejectors 9 and bell crank levers 8, may also be separately assembled and mounted, after which the long arms 6 on the rocker shafts 3 may be connected with the respective bell crank levers 8 by the rods 7. Said mechanism is mounted in a pair of sheet metal cheek plates 42 supported adjacent the sheet metal side walls 43 of the machine casing by pins 44 projecting from said walls through holes in the cheek plates (Figs. 1 and 2). The cheek plates 42 are connected by a stationary fulcrum shaft 45 for the bell crank levers 8, and by a spacer rod 46, stop rods 47 and 48, rear rod 49 and front bars 50.

The bell crank levers 8 are fulcrumed on the shaft 45, while the coin ejectors 9 are floatingly supported by their pivotal connections 51 with the front arms of the bell crank levers and by springs 52 yieldingly upholding said ejectors; the said springs 52, shown as coiled retractile springs of light wire, being attached at their front ends to hooks 53 provided on the ejectors and being attached at their rear ends to the rod 49. The front arms of the bell crank levers 8 work between the rods 47 and 48, which provide front and back stops for limiting the motion of said bell crank levers. The front stop rod 47 is shown disposed obliquely to

allow different ranges of throw of the different ejectors, so as to give each ejector a proper travel for ejecting the size of coin in the magazine with which such ejector is associated; the magazines for larger coins such as half dollars and quarters being in association with the ejectors having the longer throws, and the magazines for the smaller coins such as dimes being associated with the ejectors having the shorter throws. By the simple expedient of appropriately inclining the front stop shaft 47, the desirable variation in throws of the different ejectors may be accomplished without requiring any variation in the lengths of the bell crank lever arms or the arms 6 on the rocker shaft 3.

Thus the bell crank levers 8, as also the arms 6 and the coin ejectors 9, may consist of duplicate flat parts which may be manufactured in quantities by cutting them from sheet metal. To provide adequate bearings for the sheet metal bell crank levers 8, brass bushings 54 may be fitted in the fulcrum openings thereof and swaged against the sides of said bell crank levers; and the gang of said bell crank levers, which in the illustrative machine are considerably less in number than the key levers and draw bars, may be appropriately spaced on their fulcrum shaft 45 by the simple expedient of forming said bell crank levers with curved edges 55 concentric with the bushings 54 and engaging said edges in notches 56 in the under side of the adjacent spacer rod 46 (Figs. 1, 2, 16 and 17). Said rod 46 may be manufactured in desired lengths with uniformly spaced notches 56, which may be sawed or cut in the rod.

As a further advantageous manufacturing expedient, the rods 7 by which the arms 6 on the rocker shafts 3 are connected with the bell crank levers 8, may consist of pieces of stiff wire or the like cut to appropriate lengths and having their ends bent to engage holes in the rocker shaft arms 6 and the rear arms of the bell crank levers 8. Proper adjustment of the lengths of said connecting rods 7 may be made easily and speedily by appropriately bending their extremities as required.

The coin magazines 10 of the illustrative machine are constructed on and rigidly connected by a back plate 57, providing a unitary coin tray which is removably mounted in the machine. This coin tray, appearing at the upper part of the machine, is shown supported at an inclination by a back holding plate 58 to which the tray is detachably affixed by means of headed studs or knobs 59 on the back of the tray engaging suitable pockets or slotted supports in the holding plate 58 (Figs. 1 and 2). Said holding plate 58 is secured to the bars 50 connecting the cheek plates 42 in which the upper mechanism of the machine is mounted. Thus the tray may be quickly installed in correct relation to the operating mechanism by setting it over the holder plate 58 and engaging the knobs 59 in the supporting slots or pockets therefor.

The coin magazines may be of any appropriate construction for holding stacks of coins and permitting successive ejections of the coins. They are shown as substantially tubular coin stack holders, open at the front for displaying the coins, and constructed at their lower ends to provide coin-discharge slots 60 (Fig. 19). In this instance, said coin-discharging slots 60 are flanked by foot extensions 61 of the magazine side walls, and are defined by the vertical spacing of the magazine bottoms 62 from the lower edges of inwardly curving extensions 63 of the front retaining walls of the magazines (Figs. 1, 19 and 20).

To permit ejection of coins from the magazines by the narrow sheet metal ejectors 9, the magazine bottoms are bisected by slots 64 to accommodate said ejectors. These slots 64 extend through the lower ends of the back walls of the magazines, providing notches 65 (Fig. 19) which determine the elevations at which the ejectors may operate; said notches 65 being no higher than the width of the coin or coins to be ejected from the respective magazines. The front edges of the magazine bottoms are cut away as shown in Fig. 20 so that the coins being ejected need not be pushed any further than necessary before falling into the delivery chute 66 (Fig. 1).

As shown in Fig. 1, the coin ejectors 9 stand in registration with the passages therefor provided by the slots 64 and notches 65 in the lower ends of the coin magazines, and said ejectors are guided in vertical slots 67 in a comb 68 (Figs. 1 and 18) consisting of a thin sheet metal strip attached to the back holding plate 58 for the coin tray. The front ends of the ejectors protrude through said guiding means into the notches 65, being yieldingly upheld therein by the springs 52. Thus the ejectors stand always in position to be pushed through the ejector slots 64, whether the tray is in place or otherwise; so that removal of the coin tray does not involve the slightest disturbance of relationship, and replacement of the coin tray after removal brings the ejector slots 64 and notches 65 into registration with the ejectors.

It will be understood that when an ejector is thrust forward by operation of one of the bell crank levers 8 connected therewith, the front end of the ejector engages the rear edge of the bottom-most coin in the corresponding magazine and pushes the coin through the discharge slot 60 into the delivery chute 66. The swinging of the bell crank lever 8 imparts an arcuate movement to the rear end of the ejector, tending to depress its front end, which however is yieldingly upheld by the spring 52. Thus the front end of the ejector has an advantageous forward

and downward movement, adapting it to ride easily under the coins superposed upon the one being ejected. The front end of the ejector is desirably inclined rearwardly and downwardly as shown for maintaining effective engagement with the rear edge of the coin until it is discharged.

Ordinarily a single coin may be discharged at a time from each magazine, but any magazine may be arranged to discharge two or more coins at a time by forming the discharge slot 60 thereof of appropriate dimension to permit such discharge and by forming its notch 65 and the corresponding guide slot 67 in the comb 68 of sufficient height to permit the ejector to engage the rear edges of the two or more coins to be ejected.

Referring to Fig. 1, the ejected coins fall upon and slide down the inclined bottom member 69 of the discharge chute 66, and are discharged through an opening (not shown) in one of the side walls of the machine casing. Said bottom member 69 is shown as a channel-shaped sheet metal strip secured to lugs 70 on a sheet metal wall 71 which in turn is secured to lugs 72 attached to the sheet metal sides 43 of the machine casing. To other similar lugs 73 are attached the sheet metal front wall 74, and a sheet metal combined top and back wall 75.

The sheet metal front wall 74 is utilized as the front of the discharge chute 66. To deaden the sound of coins striking against said wall, as the coins are being rapidly ejected, said front wall is provided on its inner side with a pad 76 of leather or other suitable material.

Reference will now be made, for example, to a specific machine organization whereby desired amounts of change under one dollar may be discharged in coins of convenient denominations from a comparatively small number of coin magazines and by the use of a simple and convenient key-board.

As shown in Fig. 2, the illustrative machine has eight coin magazines. The three larger magazines appearing at the left hand side in Fig. 2 are adapted to contain half-dollars, quarters and nickels respectively. The two smaller magazines at the opposite side are adapted to contain dimes. The three intermediate magazines are adapted to contain cents. Of these three magazines, two of them are each adapted for discharging two cents at a time. They may be referred to as two-cent magazines. All the other magazines are adapted for discharging only one coin at a time.

The ejectors for the half-dollar, quarter and nickel magazines are operated respectively from the first three of the gang of rocker shafts 3. The ejectors for the two two-cent magazines and the one one-cent magazine are operated from the next three rocker shafts; and the ejectors for the two dime magazines are operated from the last two rocker shafts. The rocker shafts may be conveniently referred to as half-dollar, quarter, nickel, two-cent, one-cent and dime shafts, according to the magazines and ejectors with which they are associated.

The key-board (Fig. 3) comprises four keys for throwing odd cents, and other keys for throwing five cents and multiples thereof up to one dollar. The keys bear indicia signifying the amounts to be thrown; the four cent keys bearing the numerals "1," "2," "3," "4," and the other keys bearing the numerals "5," "10," "15" and so on.

The one-cent rocker shaft, i. e. the rocker shaft for the magazine which discharges one cent at a time, may be operated by either the one-cent key lever or the three-cent key lever; said rocker shaft being equipped with two arms 4 located for engagement by lugs 5 on the draw bars operated by said key levers. One of the two-cent rocker shafts may be operated by the two-cent key lever; and the other two-cent rocker shaft may be operated by either the three-cent or four-cent key levers. Accordingly, the one-cent key lever will throw one cent from the one-cent magazine; the two-cent key lever will throw two cents from one of the two-cent magazines; the three-cent key lever will throw two cents from the other two-cent magazine and one cent from the one-cent magazine; and the four-cent key lever will throw two cents from each of the two two-cent magazines, or four cents in all. Thus one, two, three or four cents may be thrown by actuation of a single key lever, the amount being obtained from one or more of the magazines for cents.

It will be unnecessary to explain in detail the number and arrangement of rocker shaft arms on the half-dollar, quarter and nickel shafts and the two dime shafts. Suffice it to say, for example, that the nickel shaft may be operated by the five-cent key lever and by other key levers, for instance the fifteen-cent key lever; and thus one or both dime shafts may be operated by various key levers which also operate the nickel, quarter and half-dollar shafts. Thus the five-cent key lever will throw a nickel; the ten-cent key lever will throw a dime; the fifteen cent key lever will throw a dime and a nickel; the twenty-cent key lever will throw two dimes; the twenty-five cent key lever will throw a quarter; the thirty-cent key lever will throw a quarter and a nickel; and so on amounts which are successive multiples of five cents may be thrown; an amount between twenty-five cents and fifty cents being made up in part by a qurater; an amount between fifty cents and seventy-five cents being made up in part by a half-dollar; and an amount between seventy-five cents and one dollar being made up in part by a half-dollar and quarter.

Odd cents in any amount over a multiple

of five may be thrown by operating the appropriate cent key lever in addition to the key lever for throwing five cents or a multiple thereof. For instance, to obtain six cents, strike the five-cent and one-cent key levers. To obtain eighteen cents, strike the fifteen-cent and three-cent key levers. As the one-cent rocker shaft and the two two-cent rocker shafts are operated only by the key levers for throwing cents, it is obvious that any one of the four key levers for throwing cents may be operated simultaneously with any of the other key levers.

The key-board is shown having two twenty-five cent keys and two fifty-cent keys. One of the twenty-five cent keys will throw a quarter; the other will throw two dimes and a nickel. One of the fifty cent keys will throw a half-dollar; the other will throw a quarter, two dimes and a nickel.

It will be observed that the keys for throwing five cents and multiples thereof read progressively from left to right and downward of the key-board. These keys are of a common color, preferably black or other dark color. The four rows of said keys are intersected by the four cent keys, bearing the numerals "1," "2," "3," and "4," which are of a distinctive color, preferably white. The duplicate twenty-five cent and fifty-cent keys for throwing their amounts in small change instead of in single coins, and also the dollar key, which throws a half-dollar, quarter, two dimes and a nickel, are of another distinctive color, for instance bright red, and are desirably arranged as shown. This provides a simple and convenient key-board arrangement, having the four rows of common keys commencing respectively with the five, twenty-five, fifty and seventy-five-cent keys; having the key-board conveniently divided by the intersecting row of distinctively colored cent keys, and the latter conveniently disposed for striking with the other keys; and the extra keys being also conveniently disposed and the key-board as a whole well balanced.

From the foregoing description it will be seen that the mechanism disclosed is of simple, compact and light construction, and of practicable and reliable character; that the operative elements consist principally of flat sheet metal elements, the only operating elements other than flat being the rocker shafts and draw bars, which are made from sheet metal blanks by very simple upsetting operations; that all like-functioning elements are identical, permitting desirable standardization of parts for manufacturing such machines, and allowing the construction of machines more or less varying in organization from standard parts; and that the mechanism otherwise embodies a number of advantageous manufacturing expedients, and may be conveniently and expeditiously assembled.

Obviously the present invention is not restricted to the precise construction of the illustrative machine, since the details of form, construction and arrangement may be varied to meet different requirements. Moreover it is not indispensable that all of the features of the illustrative machine be used conjointly, since they may be used to advantage in various different combinations and sub-combinations.

Having described one embodiment of our invention, we claim:

1. A machine of the class described comprising, in combination, uniform draw bars having uniformly spaced and staggered shoulders; rocker shafts disposed transversely of said draw bars at intervals corresponding to the spacing of said shoulders; said rocker shafts having uniformly spaced rocker arm seats, and arranged with the seats of alternate shafts staggered in relation to the seats of the other alternate shafts; the said draw bars being arranged at intervals corresponding to the spacing of said seats; and arms affixed to selected seats to provide for a desired selective operation of said shafts by said draw bars.

2. A machine of the class described comprising, in combination, uniformly spaced draw bars comprising sheet metal strips having uniformly spaced shoulders bent alternately at opposite sides thereof; rocker shafts arranged transversely of said draw bars and spaced at intervals corresponding to the spacing of said shoulders; said rocker shafts consisting of channel shaped sheet metal stampings having uniformly spaced seats, and arranged with the seats of alternating shafts staggered in relation to those of the other shafts; and arms affixed to selected seats.

3. A machine of the class described comprising, in combination, a gang of uniform rocker shafts having uniformly spaced seats, the terminal seats of each shaft being unequally spaced from the respective ends of the shaft; and said shafts arranged side by side with their ends transversely aligned but with alternate shafts turned end for end, so that the seats of alternate shafts will be in staggered relation to those of the other shafts; arms affixed to selected seats; and a set of draw bars having devices for engaging said arms.

4. In a machine of the class described, sheet metal rocker shafts having end walls provided with bearing holes; supports between which the rocker shafts are mounted; headed bearing studs inserted through openings in said supports and into said holes in the ends of the rocker shafts; and holding plates affixed to said supports over the heads of said studs to prevent their removal.

5. The combination with the key levers and draw bars, of the levers 35 connected to

the rear ends of the draw bars, a shaft on which said levers are fulcrumed, said levers consisting of flat sheet metal pieces having bushings fitted in and swaged thereto, the said bushings extending beyond the side edges of said levers 35 and mounted in abutting relation on said shaft whereby the levers will be properly spaced apart; and collars affixed on said shaft adjacent the bushings of the terminal levers of the series for maintaining them in place.

6. In a machine of the class described, a plurality of identically formed sheet metal draw bars, each of said draw bars having similarly formed and spaced rocker arm engaging members bent alternately in opposite directions, a plurality of identically formed sheet metal rocker shafts each having spaced slots for the reception of rocker arms, the terminal slots in each shaft being unequally spaced from the respective ends of the shaft whereby, by reversal of alternate bars in assembling, the slots in any rocker shaft will assume a staggered relation with those in adjacent rocker shafts, each of said rocker shafts having an end provided with a hole for the reception of a pintle, spaced plates for said rocker shafts having holes therein for registration with those in said shafts, headed pintles mounted in said aligned holes, and plates overlying the heads of said pintles along each side of the assembly for preventing accidental removal of the pintles.

In testimony whereof, we have signed our names to this specification.

LOUIS E. DAUER.
WILLIAM HERBERT N. SHIPMAN.