Oct. 25, 1949. J. C. PLASTARAS 2,485,771

LATCH OPERATED CLUTCH FOR TYPOGRAPHICAL CASTING MACHINES

Original Filed Sept. 24, 1941 2 Sheets-Sheet 1

Fig. 1.

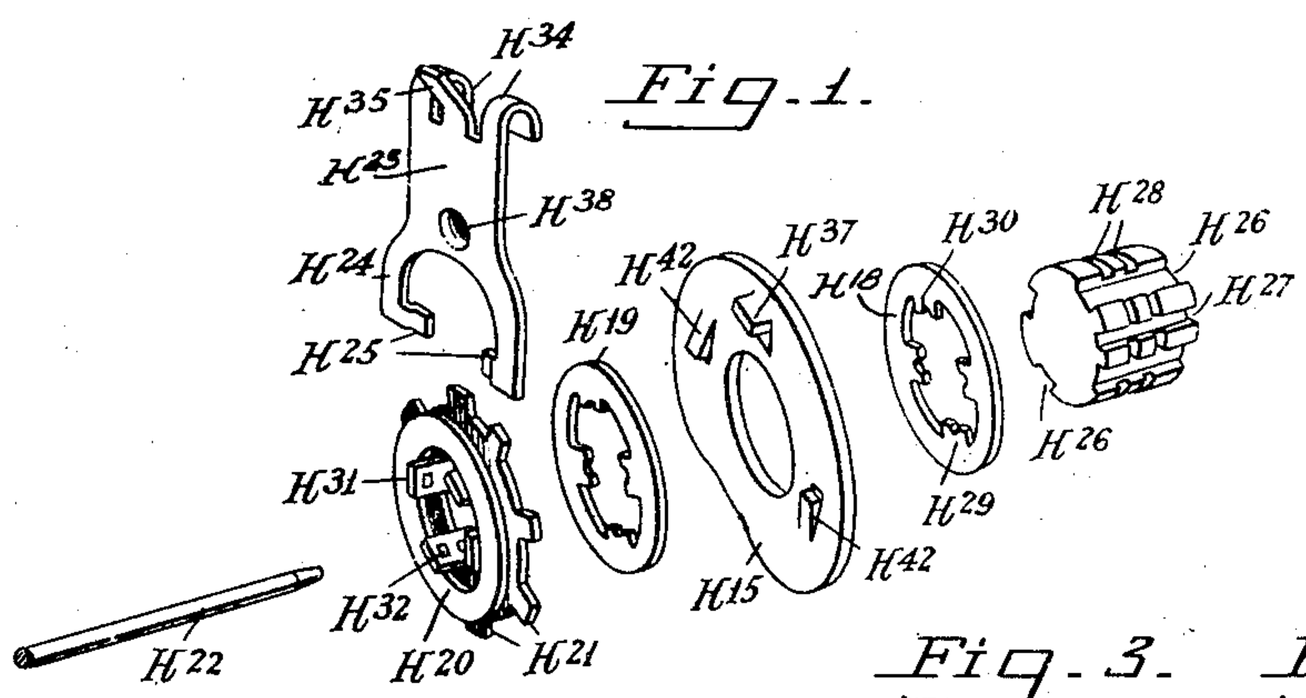


Fig. 2.

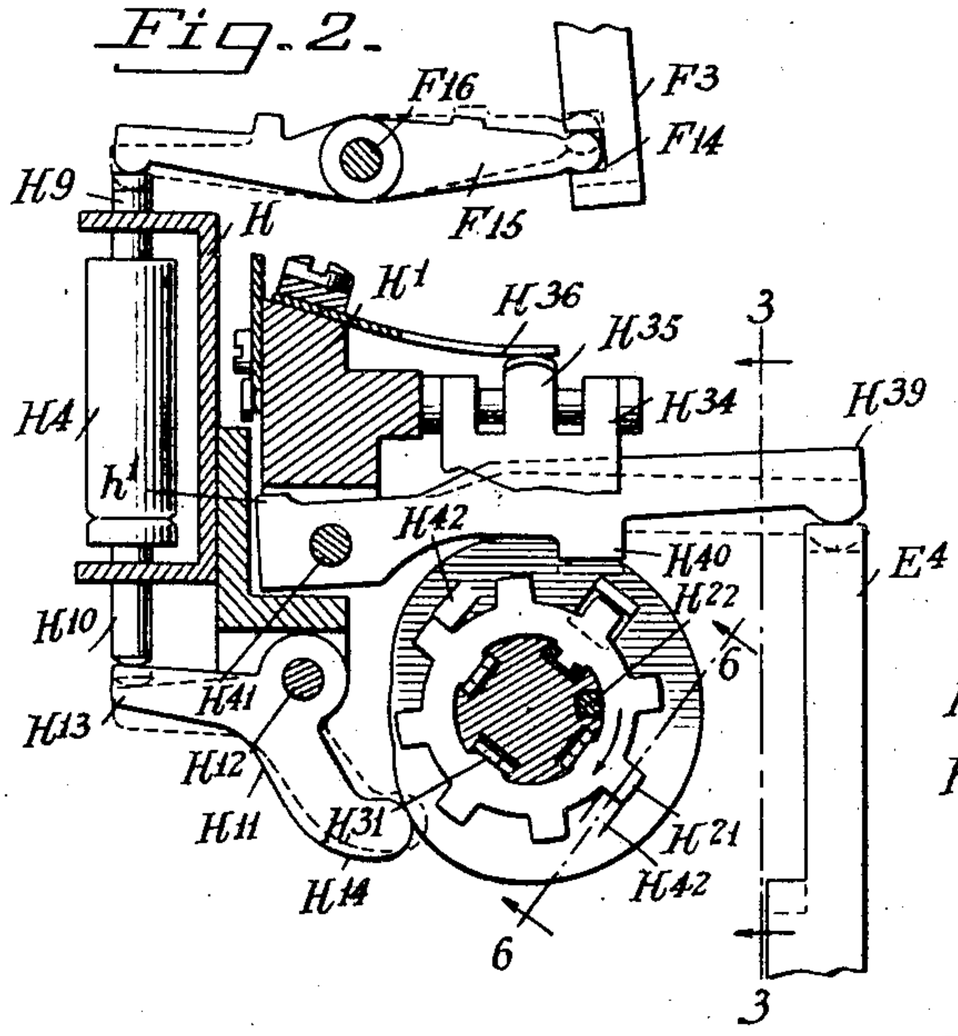


Fig. 3.

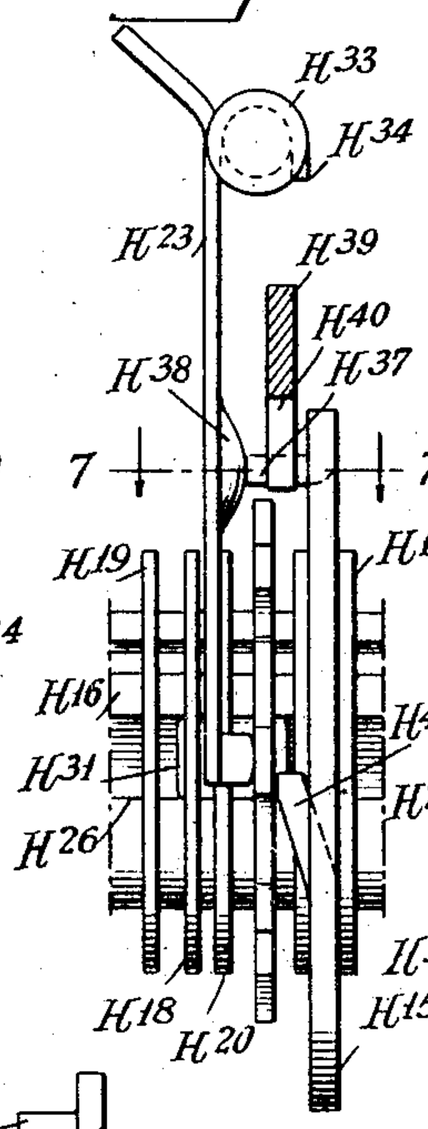


Fig. 4.

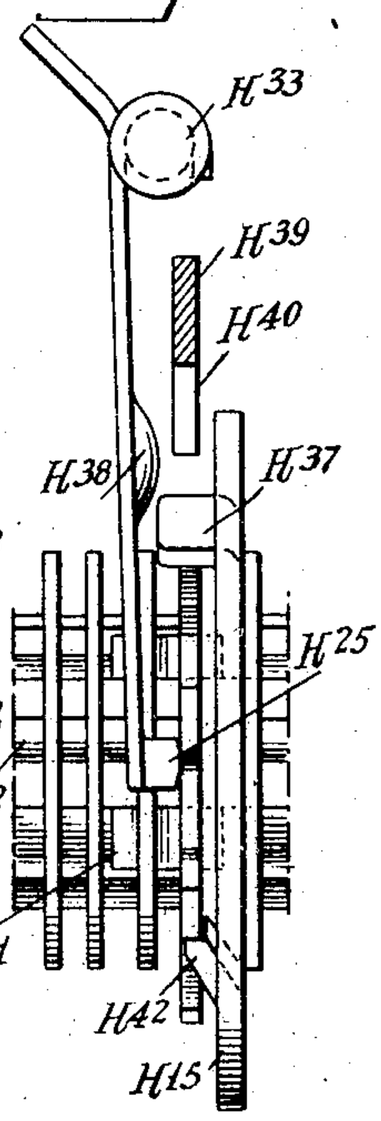


Fig. 5.

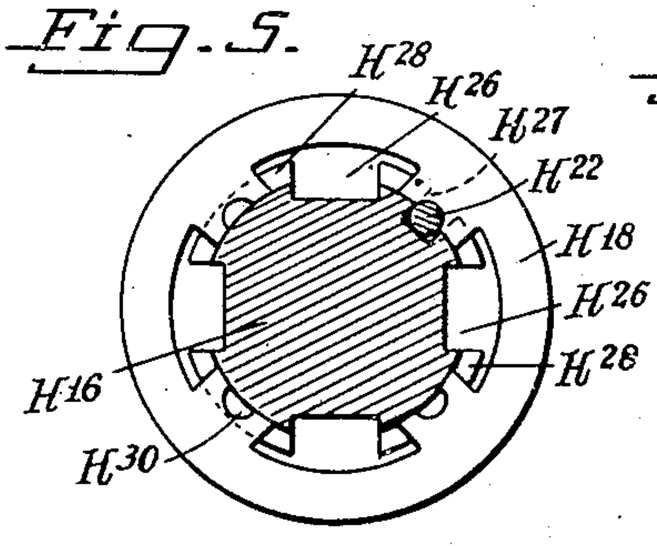


Fig. 6.

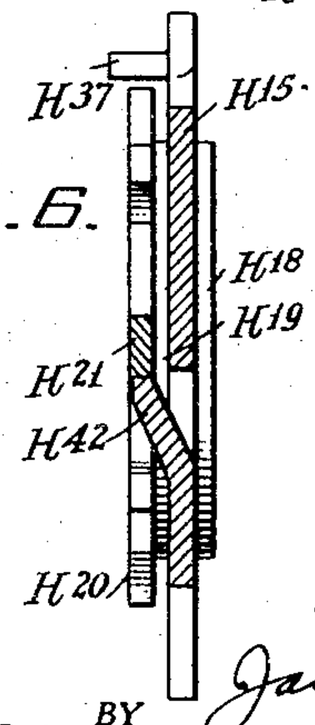
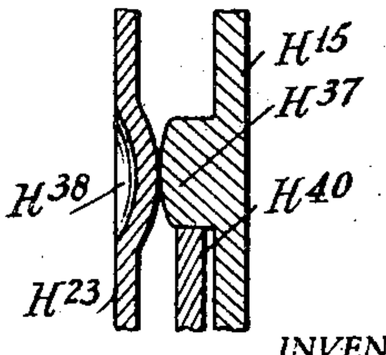


Fig. 7.



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LATCH OPERATED CLUTCH FOR TYPOGRAPHICAL CASTING MACHINES

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Fig. 8.

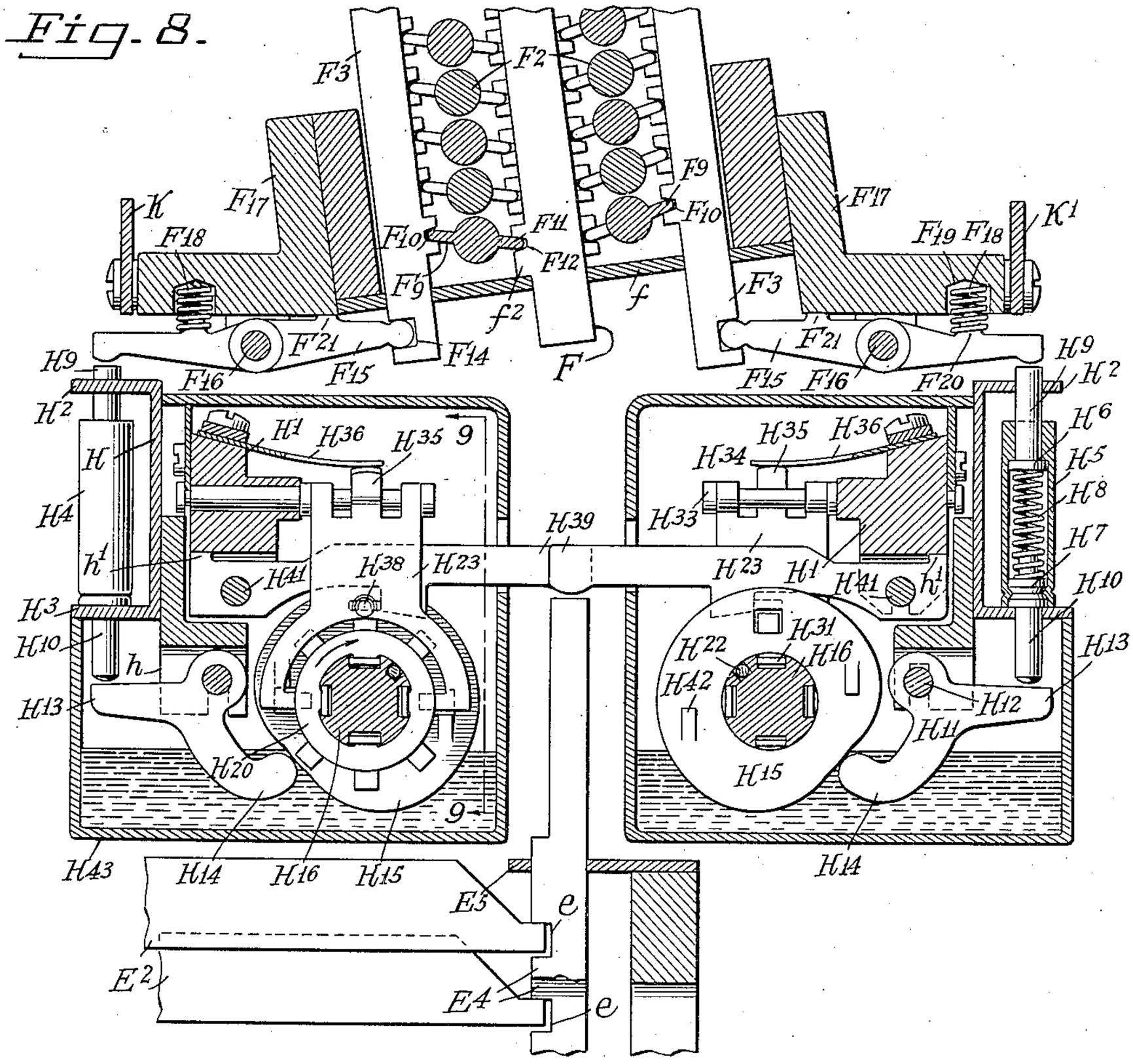
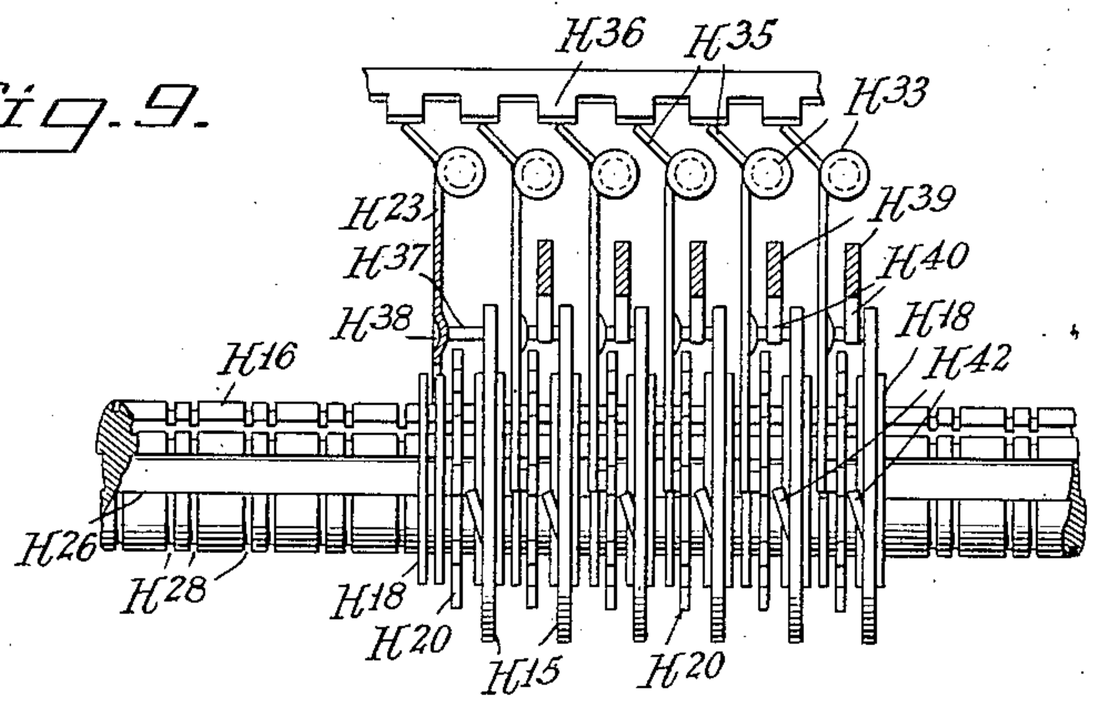


Fig. 9.



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Patented Oct. 25, 1949 2,485,771

UNITED STATES PATENT OFFICE

2,485,771

LATCH OPERATED CLUTCH FOR TYPOGRAPHICAL CASTING MACHINES

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Original application September 24, 1941, Serial No. 412,144. Divided and this application January 13, 1944, Serial No. 518,035

12 Claims. (Cl. 192—22)

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This application is a division of pending application Serial No. 412,144, filed September 24, 1941, which has since matured into Patent No. 2,383,158, dated August 21, 1945.

The parent application relates to a typographical composing and distributing machine such as "Linotype" machines of the general organization represented in Letters Patent of the United States No. 436,532 which has matured into Patent No. 2,404,741 to O. Mergenthaler, wherein circulating matrices are released from a magazine in the order in which their characters are to appear in print and then assembled in line, the composed line transferred to the face of a mold, the mold filled with molten metal to form a slug or linotype against the matrices which produce the type characters thereon, and the matrices thereafter elevated and returned through distributing mechanism to the magazine from which they started.

The instant application is directed to certain improvements in the keyboard mechanism employed in such machines.

The usual arrangement which included, for each key, a cam disposed in a pivotally mounted yoke adapted upon the operation of the key to be dropped into engagement with an underlying constantly rotating rubber-covered roll, and which was driven by the roll for one rotation to operate the associated escapement device, has been dispensed with, and instead the cams are freely mounted on a constantly driven metal shaft and normally held against rotation with the shaft by trip mechanism under the control of the finger keys. Upon the operation of a finger key, the corresponding trip mechanism acts to release its cam, whereupon mechanism automatically operates to couple the cam positively and directly to the constantly rotating drive shaft. The cam assemblies operate in oil which, incidentally, has a specific force transmitting function in the cam operation in addition to maintaining the parts quiet and free from wear. In addition to improving the life of the mechanism and eliminating the inconvenience occasioned by the rather frequent changing of rubber-covered rolls when such are used, the positive drive eliminates the transposition of matrices in the composed line which was occasionally brought about due to slippage that took place between the cams and the rubber-covered rolls during their driving engagement, especially when wear had occurred or in the presence of oil which frequently finds its way onto such rolls.

These and other improvements will fully appear in the detailed description to follow.

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Referring to the drawings:

Fig. 1 is an exploded perspective view of one of the individual keyboard cam assemblies;

Fig. 2 is a sectional view through one of the keyboard drive shafts and showing an assembly of one of the cam devices;

Fig. 3 is a sectional view on line 3—3 of Fig. 2, the parts being shown in their normal positions;

Fig. 4 is a sectional view similar to Fig. 3, the parts being shown, however, after a driving connection has been established between a cam and the drive shaft;

Fig. 5 is a cross section through one of the keyboard drive shafts showing certain details of construction of the cam assembly;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 2;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 3;

Fig. 8 is a sectional view on a fore-and-aft vertical plane through the keyboard mechanism; and

Fig. 9 is a partial sectional view on line 9—9 of Fig. 8, only one of the individual cam assemblies, however, being shown.

In the parent application Serial No. 412,144, above referred to, the machine illustrated is equipped with four main superposed magazines, two of which (the first or top one and the third from the top) are of standard form, being provided with ninety-one grooves or channels spaced apart in the usual manner, and the other two of which (the second and fourth), although of the same width as the other two, are provided each with only seventy-two grooves or channels spaced apart in a different manner. The matrices are released from the different magazines under the control of one and the same keyboard notwithstanding the difference in channel spacing as regards the different magazines. Hence, it follows that, when a ninety character matrix font is in use, the finger keys of the keyboard must be connected to control the operation of one group of magazine escapements; whereas, when a seventy-two character matrix one is in use, such keys will be connected to control the operation of a different group of magazine escapements.

The escapement reeds F associated with the main magazines are raised and lowered through the medium of two groups of transverse horizontally disposed rock bars F^2 arranged, one group in front of the escapement reeds, and the other group at the rear thereof (see Fig. 8). Each group of rock bars in turn is actuated by a group of power-operated actuating reeds F^3, those ac-

tuating the front group of rock bars being located at the front thereof, and those actuating the rear group of rock bars being located at the rear thereof. The rock bars are connected for operation by the actuating reeds F^3 by means of small rectangular lugs F^9 extending forwardly, in the case of the front rock bars, to engage in notches F^{10} presented in the rear edges of their associated actuating reeds, and extending rearwardly, in the case of the rear rock bars, to engage in similar notches presented in the front edges of their associated actuating reeds (see again Fig. 8). To be more specific, there is one actuating reed for each rock bar and, in order that they will be properly connected, the lugs F^9 on the different rock bars are located at different positions along their lengths according to the positions of the actuating reeds allocated respectively to them; and, for the same reason, the notches F^{10} in the actuating reeds are located at different levels according to the level of their associated rock bars. The rock bars F^2 are also formed with similar lugs F^{11} for connection with the escapement reeds F, the lugs on the front bank of rock bars extending rearwardly to engage notches F^{12} formed in the front edges of certain of the escapement reeds, and those on the rock bars in the rear bank extending forwardly to engage similar notches formed in the rear edges of the remainder of the escapement reeds. While there is but a single bank of escapement reeds F, actually they go to make up two groups, one group for releasing matrices from the ninety-character fonts and the other for releasing matrices from the seventy-two-character fonts.

In order that the rock bars may be connected selectively to either group according to whether a ninety-character font or a seventy-two-character font is in operative position, they are arranged to be shifted from a normal position endwise to the left for a limited distance, but the manner in which this is done forms no part of the present invention, which is concerned only with the power-driven keyboard proper, immediately to be described.

The improved keyboard is of standard form, consisting of ninety keys appropriately labeled and presented at the front ends of centrally pivoted key levers E^2. Broadly speaking, the operation is similar to that of the standard machine, i. e., upon the depression of a finger key, intermediate power mechanism, operating through a single cycle upon the appropriate actuating reed F^3, serves to raise the corresponding escapement reed F and release the matrix. The intermediate power mechanism, however, is substantially different from standard and will be described in detail.

As shown in Fig. 8, the actuating reeds F^3 in the front bank are formed at their lower ends with notches F^{14} to receive the rear ends of a series of rocker levers F^{15} disposed in a fore-and-aft direction and centrally fulcrummed upon a cross-rod F^{16} fixed at its opposite ends in lugs depending from a transverse angle member F^{17} constituting part of the fixed reed frame, there being one such rocker lever for each actuating reed in the bank. The rocker levers are held in their normal positions by compression springs F^{18} reacting downwardly against the upper edges of the rocker levers just in advance of their fulcrums. The springs seat in recesses F^{19} formed in the overlying angle member F^{17} and encircle small protrusions F^{20} presented on the upper

edges of the rocker levers and which serve to hold the springs in place. The springs tend to turn the rocker levers in a counterclockwise direction looking at the machine from the right, their normal positions being determined by upper bearing surfaces F^{21} which react against the bottom surface of the angle member support F^{17}. When the rocker levers are in their normal positions, the associated actuating reeds F^3 are held in their raised positions. As shown, the connections between the reeds F^3 and the rocker levers F^{15} are of a swivel type insuring positive action at all times.

The actuating reeds F^3 in the rear bank are operated by a series of rocker levers F^{15} identical in all respects with those operating the reeds of the front bank insofar as their construction, mounting and operation are concerned, but there is a front to rear reversal in their positions, the notches F^{14} in the rear actuating reeds facing rearwardly to receive the front ends of the rocker levers which normally are urged in a clockwise direction by their associated springs F^{18}. In other words, in releasing matrices, the rocker levers in the front bank are turned in a clockwise direction and those in the rear bank in a counterclockwise direction, against the reaction of their associated springs, to pull the corresponding actuating reeds downwardly and raise the escapement reeds F through the rock bars F^2. After each operation, the rocker levers are restored to their normal positions by their associated springs F^{18}, the levers in turn restoring the actuating reeds to their normal positions as well as the escapement reeds F through the rock bar connections just mentioned.

There is a power mechanism assembly for operating each series of rocker levers, which assemblies, except for a front to rear reversal, are identical. Each assembly includes, in part, a channel H mounted upon a transverse frame member H^1 located, one beneath each bank of rocker levers. The channels present, each, an upper and a lower flange H^2 and H^3, extending forwardly in the case of the front assembly, and rearwardly in the case of the rear assembly. The channel members H serve each to support a series of vertical thrust transmitting elements H^4, there being one such element for each rocker lever F^{15}, located in the case of the front series directly beneath the front ends of the rocker levers in the front bank, and in the case of the rear series directly beneath the rear ends of the rocker levers in the rear bank (Fig. 8).

Each thrust transmitting element H^4 consists of a vertically disposed cylinder H^5 supported at its lower end, when in normal position, on the lower channel flange H^3. The cylinder is closed at its lower end by a member H^7 having an enlarged cylindrical portion fitting within the cylinder and formed with an annular groove into which the cylinder wall is pinched to produce a permanent connection when the thrust transmitting element is assembled. The element H^7 is formed at the bottom with a reduced portion H^{10} extending through the lower channel flange H^3 on which the cylinders are supported and, at the top, with an upper reduced portion serving to center, in the cylinder, a coil spring H^8 arranged to react between the enlarged portion of the member H^7 and an enlarged portion H^6 of a slidable plunger which is pressed by the spring against the upper end wall of the cylinder. The upper end wall of the cylinder is drilled to accommodate a reduced plunger stem H^9 which

extends upwardly beyond the cylinder and through the upper channel flange H^2. The overlying and underlying flanges H^2 and H^3 serve to guide the thrust transmitting elements for limited vertical movement, there being sufficient clearance between the upper flange H^2 and the upper end of the cylinder H^5 when the latter is resting in its normal position on the flange H^3 to permit a degree of upward movement sufficient to rock the overlying lever F^{15} the extent required for releasing a matrix. The spring H^8 which reacts between the plunger and the member H^7 is strong enough to overcome the force exerted by the rocker lever spring F^{18} and also strong enough to overcome whatever friction and resistance is presented to the operation of the parts, so that normally the thrust transmitting element acts as if it were rigid and of constant length. However, in those cases where some obstruction is presented to the operation of the parts, and particularly when the rocker levers are rocked against operation in a manner described hereinafter, an attempted raising of the thrust transmitting element will result merely in the compression of the spring H^8 without injury to the parts.

Beneath each bank of the thrust transmitting elements H^4, there is located a corresponding bank of levers H^{11} fulcrummed centrally on a fixed rod H^{12} extending from one side of the keyboard to the other and equally spaced along the rod by a comb plate *h*, there being one rod for each series of levers, and one lever in a series for each thrust transmitting element. Each lever is provided with one arm H^{13}, extending forwardly or rearwardly according as it forms part of the assembly operating the front or rear series of rocker levers F^{15}, to a position underlying its associated thrust transmitting element H^4, and a second arm H^{14} extending in the opposite direction and also downwardly to engage the periphery of an edge cam H^{15}, the end of the arm H^{14} being rounded off to present a suitable bearing surface. In number, the edge cams H^{15} equal the levers H^{11} and are arranged in two banks, one behind the other.

There is a transverse driving shaft H^{16} for each bank of cams extending from one side of the keyboard to the other, and on which the cams are loosely or freely mounted (Fig. 8). The shafts H^{16} are disposed in parallel relation and are driven in opposite directions from a continuously operating source of power. Although the shafts H^{16} rotate continuously, the cams H^{15} are normally held stationary until the key lever E^2 is depressed (there being a corresponding finger key for each cam), whereupon means are rendered operative to effect a driving connection between the selected cam and the shaft on which it is mounted. The cam remains connected to the shaft until it completes one cycle of rotation, when the driving connection is broken and the cam brought to rest. The cam configuration is such that, during a cycle of rotation, the associated levers H^{11} will be rocked to raise the overlying thrust transmitting element H^4 and operate the overlying rocker lever F^{15}. The active rocker lever F^{15}, through the actuating reed connected thereto, will turn the corresponding rock bar F^2 to actuate the escapement reed which happens to be connected to the rock bar at the time.

In order to effect the driving connection between the cams H^{15} and the drive shafts H^{16}, there is provided, in association with each cam,

an individual clutch unit which is rendered active upon the depression of the corresponding finger key and which positively connects the cam for rotation by the shaft. At the completion of the cam cycle, the clutch is rendered inactive and the cam positively brought to rest in its normal position. The details of the cam and clutch mechanism are best shown in Figs. 1 to 7. Referring to Fig. 1, which shows an exploded view of the elements composing a cam and clutch assembly, it will be observed that in addition to the cam H^{15} proper, the assembly includes two washers H^{18} and H^{19} adapted to be located one on each side of the cam, a third element H^{20} comprising two spaced annular members, one of which is formed with teeth H^{21} in its outer periphery, a spline H^{22}, and a yoke member H^{23} formed with spaced legs H^{24} presenting at their lower ends, inwardly projecting opposed portions H^{25} adapted to enter radially between the spaced members of the element H^{20}. The shaft H^{16} is formed with four longitudinal grooves H^{26}, equally spaced around its otherwise cylindrical surface, with an additional smaller longitudinal groove H^{27} located midway between two of the other grooves. At regular intervals along the shaft, i. e., at each position corresponding to the location of a cam (Fig. 9), there are provided two parallel circular grooves H^{28} located in planes perpendicular to the shaft axis. Were it not for the interruptions in the cylindrical surface of the shaft resulting from the longitudinal grooves therein, these circular grooves would be continuous. The washers H^{18} are formed with four protrusions H^{29} equally spaced about their internal periphery so as to correspond with the spacing of the grooves H^{26} in the shaft. In addition, the internal protrusions on the washers are formed with recesses, one only of which is active, as will presently appear.

During assembly, one washer H^{18}, with its protrusions H^{29} entering the grooves H^{26} in the shaft, is slid along the shaft until it registers with the desired one of the circular grooves H^{28}, whereupon it is turned about the shaft through an angle of 45 or until the recess H^{30} in one of the protrusions registers with the smaller longitudinal groove H^{27} in the shaft. After the washer, the cam H^{15} is slid along the shaft, and after the cam, the second washer H^{19} is assembled on the shaft in the same manner as the first. Next comes the toothed element H^{20} which, as previously stated, consists of two spaced circular elements. These elements are held in proper spaced relation by four internal yoke members H^{31} equally spaced apart about the internal periphery and formed each with axially spaced apertures to accommodate correspondingly spaced lugs H^{32} on the internal edges of the spaced members. The lugs are press fitted into the spaced apertures to hold the yoke member in place. When the element H^{20} is in place on the shaft, the yoke members H^{31} fit into the longitudinal grooves H^{26} thereof and their lateral edges are machined to provide a sliding fit with the walls of said grooves. The element H^{20} and the washers H^{18} and H^{19} are constrained to rotate with the shaft, the former by reason of the engagement of the yoke members H^{31} in the groove H^{26} thereof, and the latter (the washers) because they are interlocked with the shaft by the spline H^{22}, which, when the cam assembly is complete, seats in the small longitudinal groove H^{27} in the shaft and also in the recesses in those protrusions of the washers that register with the

shaft groove H^{27} (Fig. 5). The washers are held against movement along the shaft H^{16} by reason of the engagement of their protrusions H^{29} in the circular recesses H^{28}, and since the cam is located between the washers, it too will be held against movement along the shaft. Relative movement between the shaft and the cam is permitted, however, since the cam is bored to fit upon the cylindrical portions of the shaft between the grooves. The toothed element H^{20} does have a limited movement along the shaft, although normally it is held in spaced relation with the cam by the yoke member H^{23}, which is supported by an overlying rod H^{33} extending in a fore-and-aft direction and which is mounted at one end in the transverse member H^1 of the keyboard frame (Figs. 8 and 9). The yoke H^{23} is formed at the top with two spaced hook portions H^{34} which seat upon the supporting rod and permit the yoke to pivot with respect thereto.

As shown in Fig. 9, each yoke H^{23} is also formed in its upper edge and between its hook portions with a small flange or tongue H^{35} extending upwardly at an angle away from the associated cam. The flanges H^{35} of all the yokes in each bank are engaged at the top by the teeth of a leaf spring H^{36} in the form of a comb plate secured to the fixed frame member H^1. The leaf spring tends to rotate the yoke member H^{23} in a direction to move its toothed element H^{20} along the shaft toward its associated cam, but normally, such movement is prevented by a lug H^{37} which projects from one face of the cam into engagement with a protrusion or blister H^{38} formed in the adjacent face of said yoke member (see Figs. 3 and 7).

It will now be seen that the only element of each individual cam assembly which normally does not rotate with the shaft is the cam itself, and that such conditions will be maintained so long as the cam is held in its normal position with its lug H^{37} in registry with the blister H^{38} on the yoke. The cam is maintained in its normal position by an overlying fore-and-aft lever H^{39} formed in its lower edge with a lug H^{40} which stands in the path of the lug H^{37} on the cam, the lug serving as an arresting abutment to locate the cam in its normal position. There is, of course, one such lever H^{39} for each cam, and those which are associated with the front cam assembly are pivotally mounted adjacent their front ends on a cross rod H^{41} supported at its opposite ends in lugs depending from the front frame member H^1, the latter member having a comb formation at the bottom properly to space the levers along the rod H^{41}. The levers H^{39} associated with the rear cam assembly are in all respects the same except for being reversed in position, i. e., they are pivotally mounted at their rear ends, in spaced relation, on a cross rod H^{41} supported at its opposite ends in lugs depending from the rear frame member H^1. The normal positions of the levers H^{39} are determined by banking surfaces h^1 presented by their upper edges and which engage the bottom surfaces of the frame members respectively supporting them (Fig. 8).

The levers H^{39} at their free ends (i. e., the rear ends as regards the levers in the front cam assembly and the front ends as regards the levers in the rear cam assembly) overlie a bank of vertically disposed key rods E^4 which are guided for limited vertical movement, at the top, in slots formed in an upper comb plate E^5 fixed to a keyboard frame member and, at the bottom, in a

lower comb plate (not shown). There are ninety-one key rods (one for the space-bands) in this bank, every other one being arranged to cooperate with the levers H^{39} of the front cam assembly, and the remaining ones with the levers H^{39} in the rear cam assembly. Each key rod is provided with a notch *e* to receive the reduced rear end portion of one of the key levers, it being recalled, that the invention contemplates the use of the standard "Linotype" keyboard which is provided with ninety keys.

The operation is as follows: When the operator depresses a finger key, the corresponding key rod E^4 is raised, causing the overlying lever H^{39} to turn from the dotted to the solid line position shown in Fig. 2, it being understood that this figure represents the front cam assembly, although the same operation would occur as regards the rear cam assembly if the finger key depressed happened to be asociated with one of the cams of that group. As the lever H^{39} is tilted upwardly, the stop lug H^{40} thereon lifts clear of the lug H^{37} projecting from the associated cam H^{15}, thus freeing the cam for rotation. As will be made clear presently, there is sufficient drag between the washers H^{18} and H^{19} (which rotate with the shaft) and the cam itself (which is otherwise freely mounted on the shaft) to turn the cam until the lug H^{37} thereon moves clear of the blister H^{38} with which the associated yoke H^{23} is provided. Thereupon, the reaction of the overlying leaf spring H^{36} turns the yoke in a direction to move the associated toothed clutch member H^{20} shaftwise toward the cam, that is, from its inactive position shown in Fig. 3 to its active position shown in Fig. 4. It should be noted that the spacing of the elements comprising the clutch member H^{20} in effect constitutes a groove or track to receive the inwardly projecting portions H^{25} of the yoke member H^{23}, enabling the latter to shift the clutch member shaftwise without interfering with its rotation by the shaft H^{16}. Furthermore, since the portions H^{25} are diametrically opposed, there will be no tendency for the clutch member to cant out of its proper position or bind upon the shaft during its shifting movement. In its active position, the teeth H^{21} of the clutch member are located in a plane permitting two of them to engage a pair of diametrically opposed protrusions H^{42} struck up or offset from the adjacent face of the cam H^{15} and, as the shaft H^{16} continues to rotate, the clutch member which is keyed thereto will positively drive the cam through one rotation or until the lug H^{37} on the cam again arrives adjacent the blister H^{38} on the yoke member H^{23} to restore the latter to its normal position. The restoration of the yoke member shifts the clutch member shaftwise away from the cam to destroy the driving connection. In the meantime, the overlying lever H^{39}, having dropped back to its normal position as the operator released the finger key, will have located its depending lug H^{40} in the path of the lug H^{37} to arrest the cam in its normal position. Here again, the drag between the washers H^{18} and H^{19} and the cam H^{15} will be sufficient to continue the cam's rotation, after the clutch has been released, to insure that it will be restored to its normal position as determined by the lug H^{40} on the lever H^{39}. During the rotation of the cam, the lever H^{11}, which tracks along the edge thereof, will be rocked from the dotted to the solid line position shown in Fig. 2 to raise the overlying thrust transmitting element H^4 and, through the related rocker lever F^{15} and the associated actuating reed and rock

bar, operate the escapement reed connected at the time to the rock bar, thus releasing from the appropriate magazine the matrix corresponding to the key depressed.

At this point, it may be appropriate to mention the cause of the drag between the washers H^{18} and H^{19} and the cam H^{15} which results first in displacing the cam sufficiently to render the clutch active and which, later on, at the end of the cycle, restores the cam to its normal position after the clutch has been rendered inactive. Referring to Fig. 8, it will be observed that the cam assemblies are encased in housings H^{43} which contain oil in which the cam assemblies operate at all times. Not only does this reduce the wear upon the parts, but in addition keeps them free from dust and dirt since, should dust accumulate in the housings H^{43}, it will merely drop to the bottom thereof where it can be removed when the oil is replaced. The arrangement insures a film of oil at all times between the cams and the adjacent washers, thereby creating the drag which will have a rather definite value suitable for the purpose intended, assuming an oil of a given viscosity and the design of the parts with that viscosity as a consideration. In other words, by selecting an oil of the proper viscosity, the drag developed by it, or what is the same thing, the force capable of being transmitted by it, is so definitely ascertainable that the operation is substantially as positive as if the connections were mechanical in the narrower sense.

The keyboard may be locked against operation (automatically as in the parent application Serial No. 412,144, above referred to, or manually) by means of a pair of transverse plates K and K^1 mounted on the keyboard frame, one overlying the forward ends of the rocker levers F^{15} operating the front bank of actuating reeds F^3, and the other overlying the rear ends of the rocker levers F^{15} operating the rear bank of actuating reeds F^3 (see Fig. 8). The two plates are arranged for parallel movement from an upper position, as shown in Fig. 3, clear of the rocker levers F^{15} (in which position of the plates, the rocker levers are free to perform in the usual way) to a lower position into engagement with the upper edges of the rocker levers to lock them against operation. It will now be clear how the thrust transmitting members H^4, by which the rocker levers F^{15} are actuated, serve as a safety measure to prevent breakage of the parts in the event the operator inadvertently touches a key of the keyboard during the period in which the locking plates are active. In other words, even though the cam elements H^{15} are always free to operate in response to the actuation of the finger keys, the operation will be ineffective unless the locking plates K and K^1 occupy their upper or inactive position as shown in Fig. 8.

In the accompanying drawings, the invention has been shown merely in preferred form and by way of example, and obviously many changes and variations may be made therein without departing from its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or embodiment, except insofar as such limitations are specified in the appended claims.

Having thus described my invention, what I claim is:

1. In a keyboard mechanism, the combination of a rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, a trip member, an intermediate device mounted on the shaft for rotation therewith, means normally holding the driven element against rotation by the shaft and operable to release said element when the trip member is actuated, fluid means rendered operable upon the release of the driven element for moving the latter in the direction of shaft rotation, and instrumentalities rendered operable upon such movement of the driven element to effect, through the intermediate device, a positive driving connection between the driving shaft and said driven element.

2. In a keyboard mechanism, the combination of a rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, a trip member, an intermediate device mounted on the shaft for rotation therewith, means normally holding the driven element against rotation by the shaft and operable to release said element when the trip member is actuated, an impositive drive operating initially upon the release of the driven element to move the latter in the direction of shaft rotation, and instrumentalities rendered operable upon such movement of the driven element to effect, through the intermediate device, a positive driving connection between the driving shaft and said driven element.

3. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, trip means for normally holding the driven element against rotation by the driving shaft, a clutch member mounted on the shaft and constrained to rotate therewith, a key element operating through the trip means for releasing the driven element, means fixed on the shaft and operating through an oil film when the driven element is released to rotate the latter in the direction of shaft rotation, and means operative after movement of the driven element has been inaugurated to effect, through the clutch member, a positive driving connection between the driving shaft and the driven element.

4. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, means for locating the driven element in a normal position, a one-cycle clutch for effecting a positive driving connection between the drive shaft and the driven element, means for rendering the clutch operable after movement of the driven element has been inaugurated and inoperable prior to the conclusion of a cycle of operation, and independent means for inaugurating the movement of the driven element and for restoring it to normal position after the clutch has been rendered inoperative.

5. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, means for locating the driven element in a definite predetermined normal position of rest, a key controlled one-cycle clutch for effecting a positive driving connection between the drive shaft and the driven element, means for rendering the clutch inoperative prior to the conclusion of a cycle of operation, and means independent of the clutch and acting independently of the momentum of the driven element for restoring the driven element to its definite predetermined nor-

mal position of rest after the clutch has been rendered inoperative.

6. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, means for locating the driven element in a definite predetermined normal position of rest, a key controlled one-cycle clutch for effecting a positive driving connection between the drive shaft and the driven element, means for rendering the clutch inoperative prior to the conclusion of a cycle of operation, and means operating through an oil film and independently of the momentum of the driven element for restoring the driven element to its definite predetermined normal position of rest after the clutch has been rendered inoperative.

7. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, trip means for holding the driven element in a normal position against rotation with said shaft, a clutch element mounted on the shaft for rotation therewith and slidable shaftwise into and out of positive engagement with the driven element, spring-biased means urging the clutch member into engagement with the driven element, devices distinct from the trip means cooperating to hold the clutch member out of engagement with the driving element, and means acting upon operation of the trip means to render said devices inoperative whereby to establish a positive driving connection between the driving shaft and the driven element.

8. A combination according to claim 7, wherein the last mentioned means also serves upon the conclusion of one cycle of shaft rotation to render said devices operative whereby to disestablish the driving connection between the driving shaft and the driven element.

9. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, means tending constantly to impart the rotation of the driving shaft impositive to the driven element, trip means holding the driven element normally against rotation with the shaft but actuable when required to permit such impositive rotation, a clutch element mounted on the shaft for rotation therewith and slidable shaftwise into and out of positive engagement with the driven element, a clutch shifter pivotally mounted on a fixed support and tending constantly to couple the clutch element with the driven element, and cooperating devices on the clutch shifter and the driven element acting by their mutual engagement normally to prevent the coupling of the clutch element with the driven element, said cooperating devices being moved out of engagement to permit the coupling of the clutch element with the driven element when the impositive rotation of the driven element is inaugurated by the actuation of the trip means.

10. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft,

a rotary driven element mounted concentrically thereon in normally disconnected relation, means tending constantly to impart the rotation of the driving shaft impositive to the driven element, trip means holding the driven element normally against rotation with the shaft but actuable when required to permit such impositive rotation, a clutch element mounted on the shaft for rotation therewith and slidable shaftwise into and out of positive engagement with the driven element, a clutch shifter pivotally mounted on a fixed support and tending constantly to couple the clutch element with the driven element, and cooperating devices on the clutch shifter and the driven element acting by their mutual engagement normally to prevent the coupling of the clutch element with the driven element, said cooperating devices being moved out of engagement to permit the coupling of the clutch element with the driven element when the impositive rotation of the driven element is inaugurated by the actuation of the trip means and being moved back into engagement to uncouple the clutch element from the driven element before the rotation of the latter is later arrested by the trip means.

11. In a keyboard mechanism, the combination of a continuously operable rotary driving shaft, a rotary driven element mounted concentrically thereon in normally disconnected relation, a pair of washers fixed to the shaft on opposite sides of the driven element and forming an oil film driving connection between the shaft and said driven element, trip means holding the driven element normally against rotation with the shaft but actuable when required to permit such rotation, a clutch element mounted on the shaft for rotation therewith and slidable shaftwise into and out of positive engagement with the driven element, a clutch shifter tending constantly to couple the clutch element with the driven element, and cooperating devices on the clutch shifter and the driven element acting by their mutual engagement normally to prevent the coupling of the clutch element with the driven element, said cooperating devices being moved out of engagement to permit the coupling of the clutch element with the driven element when the rotation of the driven element is inaugurated by the actuation of the trip means.

12. A combination according to claim 11, wherein the clutch element and the washers are fixed to the shaft by means of radially extending lugs formed at their inner peripheries and engaged in longitudinal grooves formed in the driving shaft, whereby assembly of the parts is facilitated.

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

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Certificate of Correction

Patent No. 2,485,771 October 25, 1949

JAMES C. PLASTARAS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 1, lines 9 and 10, strike out "which has matured into Patent No. 2,404,741";

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of February, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.