

July 16, 1940.

W. J. PASINSKI

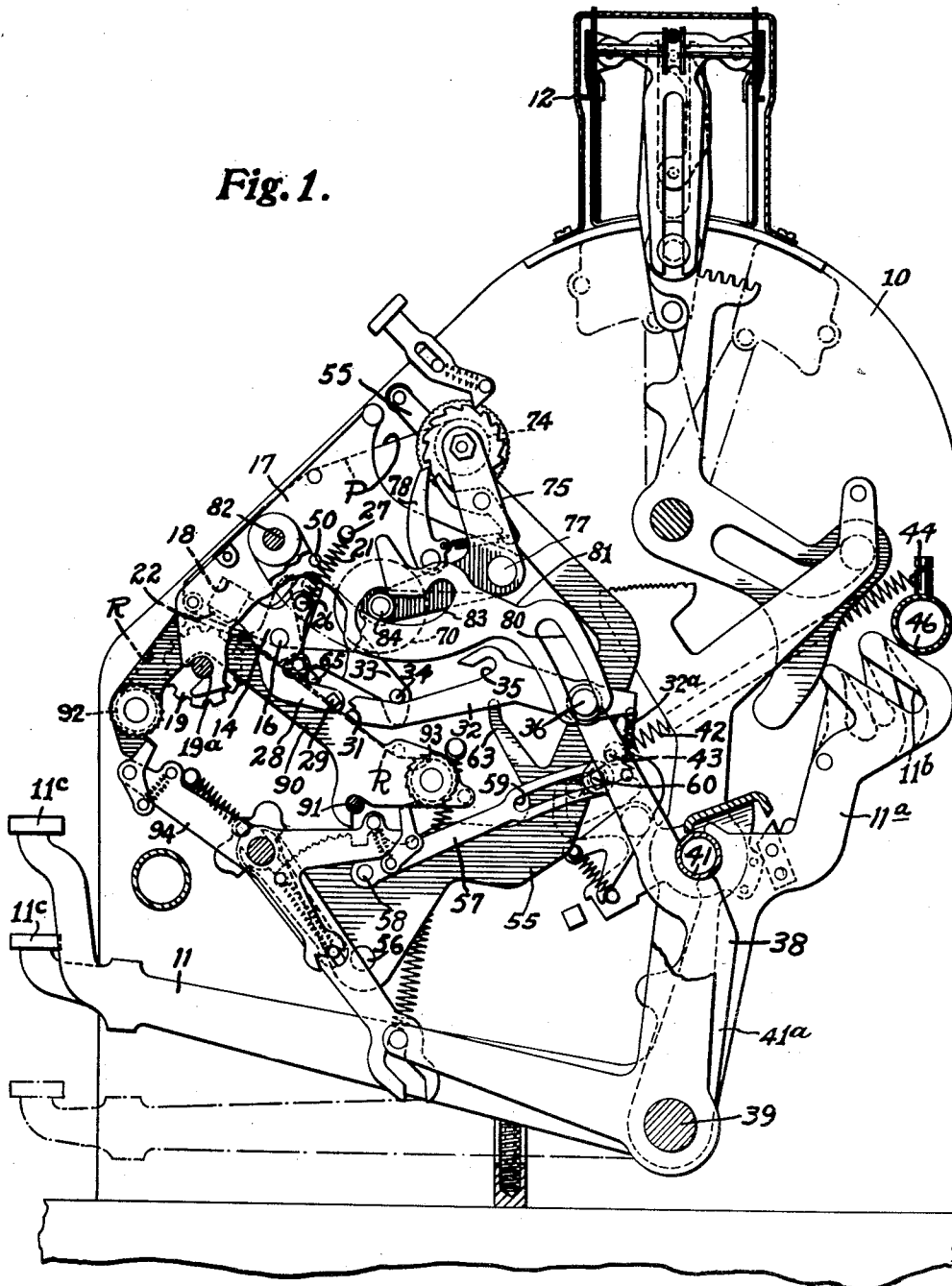
2,208,050

CASH REGISTER

Filed June 10, 1937

3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

Fig. 2.

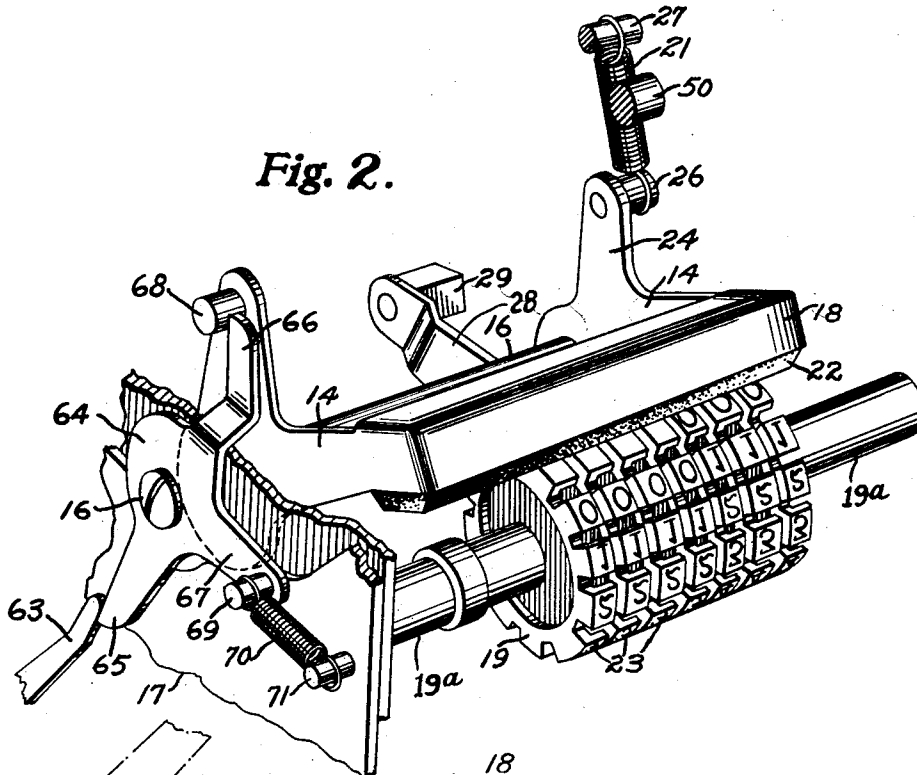
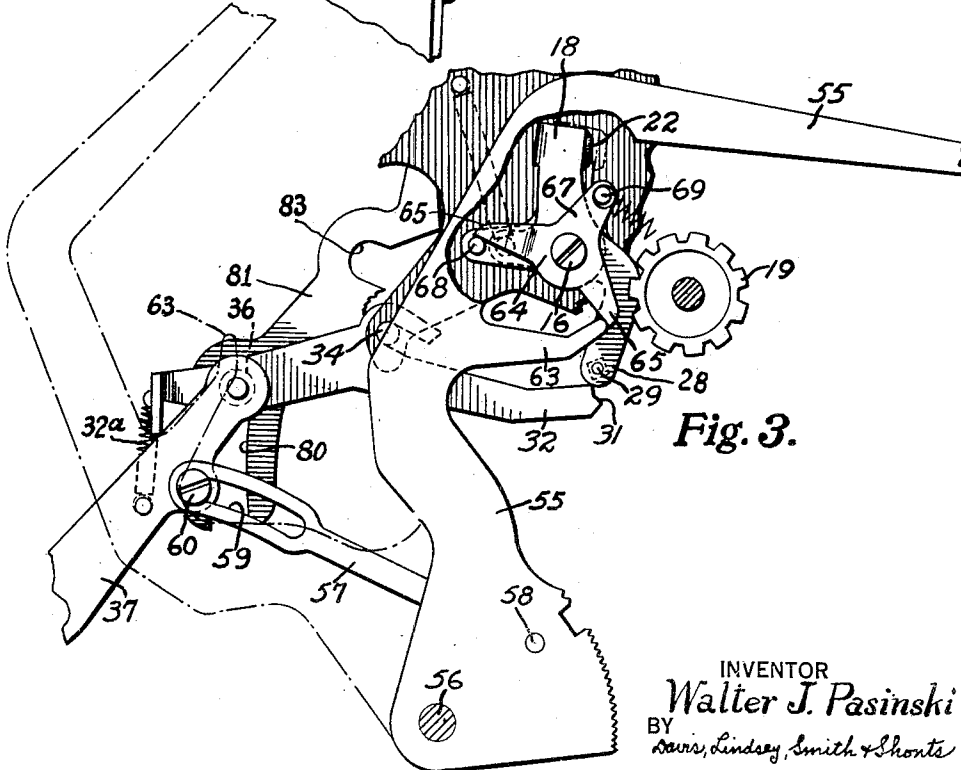


Fig. 3.



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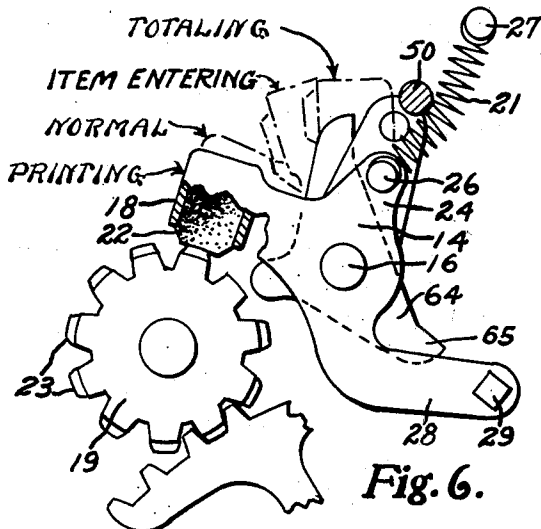
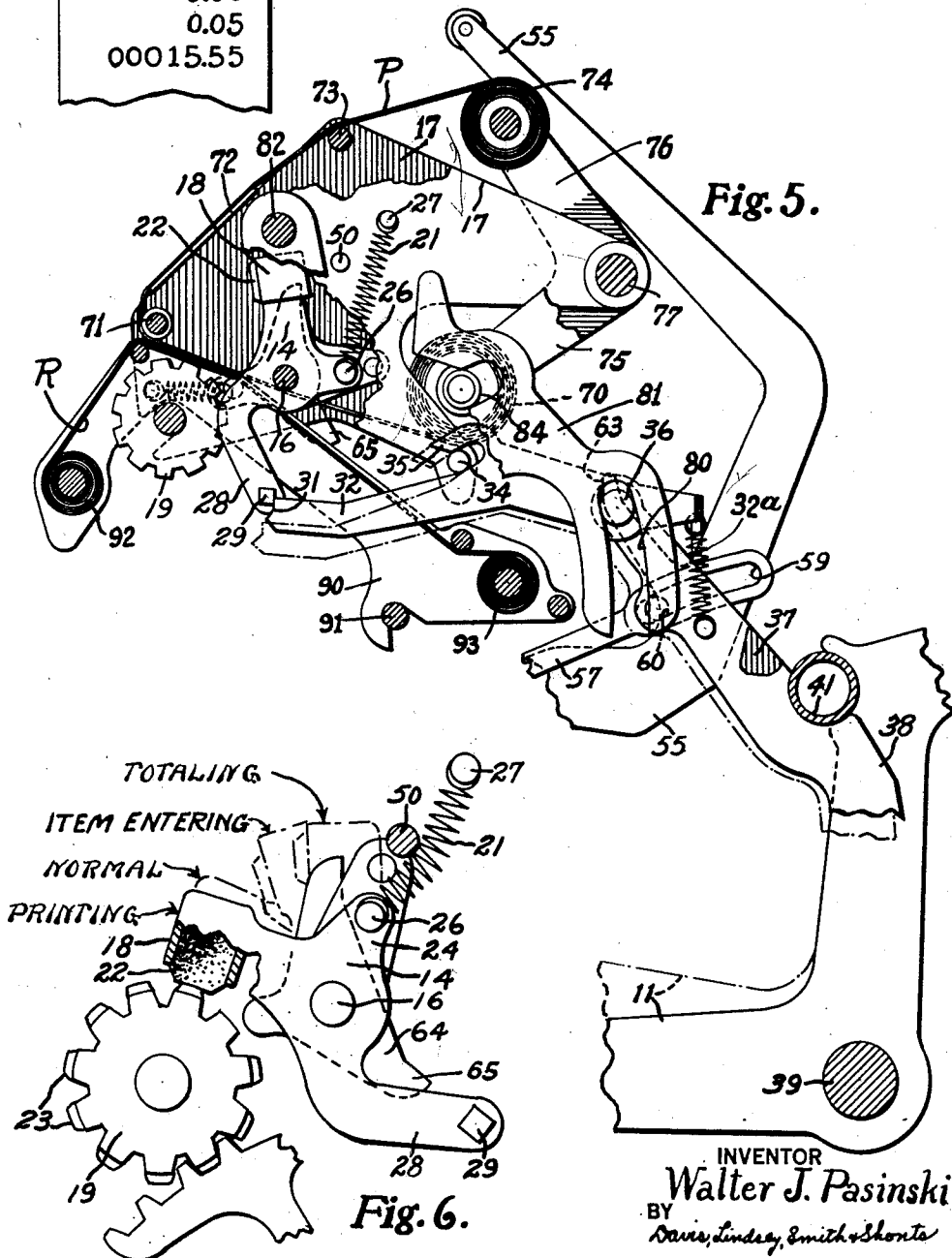
CASH REGISTER

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3 Sheets-Sheet 3

0.50
5.00
5.00
5.00
0.05
00015.55

Fig. 4.



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2,208,050

CASH REGISTER

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Application June 10, 1937, Serial No. 147,431

8 Claims. (Cl. 101—93)

This invention relates to cash registers. It is concerned with the printing mechanism of such machines and is primarily directed to an improved and simplified construction for preventing rebound of the printing hammer mechanism.

The printing mechanism of cash registers and calculating machines ordinarily includes a printing hammer that is cocked and fired to make printing impressions. Normally, this hammer is some distance away from the paper so as to enable the paper to be line spaced, or otherwise moved or removed without interference from the printing hammer. When the hammer is fired, it moves past its normal position to a printing position, from which it is immediately returned. In this operation there is a strong tendency for the hammer to rock or rebound so as to restrike the type with a resulting double print or smudge that is undesirable. The present invention is directed to overcoming this difficulty.

The object of the invention is to provide an improved printing mechanism for cash registers with a very simple and effective means for preventing rebound of the printing hammer.

Other and further objects of the invention will become apparent hereinafter by reference to the annexed specification and drawings.

In the drawings:

Figure 1 is a right side sectional elevation of a cash register showing the printing hammer and its associated mechanism;

Fig. 2 is an enlarged perspective view of the printing hammer mechanism associated with the printing wheels of the machine;

Fig. 3 is an enlarged left side elevational view of some of the essential elements of the printing hammer mechanism;

Fig. 4 is a portion of a paper strip illustrating samples of the work for both item and total printing;

Fig. 5 is an enlarged fragmentary detail section of the printing hammer mechanism with the printing hammer in raised position during the item printing operation; and

Fig. 6 is an enlarged right side elevational view of the printing wheels and the printing hammer showing the several positions of the printing hammer including printing, normal and raised for item printing and raised for total printing operations.

The invention is shown applied to a Burroughs cash register of the type illustrated in Pasinski No. 2,070,059, February 9, 1937, with a printing mechanism of the type disclosed in my copending applications Serial Nos. 147,429 and 147,430, both filed June 10, 1937. The general features of the cash register will be described only very briefly, as it is not necessary to understand all the details of the machine in order to understand the present invention. Likewise, the general fea-

tures of the printing mechanism will be described only sufficiently to enable the present invention to be understood, the several novel features of said printing mechanism being the subject matter of said copending applications.

The various mechanisms of the machine are housed within a casing 10 (Fig. 1) having an indicator housing 12 at its top. The machine is operated in item-entering operations by amount keys 11^a (Fig. 1) mounted on the ends of key levers 11 pivoted on a shaft 39. The rear ends of the key levers have upward extensions 11^b provided with differential slots 11^c that control the indexing of the indicator and registering mechanisms which have not been shown, these parts and their manner of operation being explained in detail in said Pasinski patent.

The printing mechanism includes a plurality of type-carrying members in the form of type wheels 19 rotatably mounted on a shaft 19^a, as best shown in Fig. 2. The three lower order type wheels are used for item printing and will be called "item" type wheels for purposes of convenience in description. The four higher order type wheels are used in printing totals and these will be called "extra" type wheels. When the type wheels are in normal position as shown in Fig. 2, the "item" type wheels have their "0's" at the printing line while the "extra" type wheels have blank spaces at said printing line. The "item" type wheels only are indexed by the item keys during item-printing operations, but all the type wheels are indexed under the control of the registering mechanism in total taking, as described in said copending application Serial No. 147,429.

Printing occurs on a paper strip P (Figs. 1 and 5) which passes from a paper supply roll 70 (Fig. 5), under a shaft 16, about a stationary shaft 71, over a stationary paper table 72, and over a stationary shaft 73 to a storage roll 74. The supply and storage rolls are carried by a pair of bell cranks 75 and 76 (Fig. 5), pivoted on a shaft 77 carried by the side plates 17 of the paper section. Normally, these rolls occupy the position shown in Fig. 1, but, when the machine is operated, either in item entering or in total taking, the rolls are rocked counterclockwise in Fig. 1, to slide the paper strip P over the table 72 and the guides 71 and 73 from a position where the last entry is visible to a printing position, a line-spacing operation occurring automatically under the control of the pawl 78 (Fig. 1). As the machine operation is completed, the rolls are returned clockwise to normal to bring the currently printed figure to a visible position. The mechanism for moving the paper is as follows:

The rear upwardly extending ends 11^a of the amount key levers 11 are positioned immediately behind a universal ball 41 carried by arms 41^a on

pivoted on the shaft 39. When an item is depressed, as for example from the full to the dot-dash position of Fig. 1, the universal bail 41 is rocked forward. Positioned in front of said universal bail are a pair of arms 37 and 38 carrying a ball 36, the arm 37 being best shown in Fig. 3. The arms 37 and 38, together with the ball 36 are urged clockwise to normal by a spring 42 (Fig. 1) attached at one end to a stud 43 on the arm 38 and at its other end to a stud 44 on a stationary cross shaft 46. The ball 36 is positioned in a slot 80 in an operating arm 81 pivoted on a stud 82 carried by one of the side plates of the machine. The arm 81 has a cam slot 83 cooperating with a roller stud 84 on the bell crank 75. When an amount key is depressed and the universal bail 41 moved forward, the ball 36 is moved forward also. As the ball 36 moves forward, it rocks the arm 81 clockwise and the latter, in turn, rocks the bell cranks 75 and 76 counterclockwise to move the paper strip P to printing position. When the item key is released, the ball 36 is returned to normal by the springs 42, and the arm 81 is rocked counterclockwise to restore the bell cranks 75 and 76, together with the storage and supply rolls and the paper strip, to normal. The paper supporting and moving mechanism comprises a detachable unit carried by the side plates 17 which are detachably hooked over the shaft 19^a (Fig. 1). This unit is described in more detail in said copending application Serial No. 147,430.

For the purpose of taking totals, a total-taking lever 55 has been provided (Fig. 1). This lever is pivoted at 56 and, when it is pulled forward, the connection between the amount keys and the registering mechanism is disabled and all the type wheels are indexed under the control of said registering mechanism, as disclosed in said copending application Serial No. 147,429. Movement of the total-taking lever also shifts the paper strip through connections as follows:

Pivoted to the total lever 55 (Fig. 1) is a link 57 having a slot 59 in its rear end in which is positioned a stud 60 on the arm 37 (Fig. 3). This slot is of such a length that it does not interfere with the forward movement of the arm 37 when the latter is moved by depression of an amount key. When the total-taking lever 55 is pulled forward (Fig. 1), the link 57 is pulled forward with it and said link, acting on the stud 60, pulls the arm 37 forward to rock the ball 36 forward in the same manner as when an amount key is depressed. Consequently, when a total is taken, the operating lever 81 for the paper supply and storage rolls will be moved as heretofore explained and the paper will be shifted from visible to printing position and return.

Printing impressions are made on the paper strip P by the action of a printing hammer 18 (Fig. 1) having a platen face 22, which hammer is driven into engagement with the paper strip, whereupon the latter is driven against a ribbon R that, in turn, contacts the type faces of the indexed type wheels 19. The ribbon R is carried by a frame 90 detachably hooked over a shaft 91 carried by the side plates of the machine. The frame supports ribbon spools 92 and 93, and the ribbon is moved step by step by a lever 94 (Fig. 1), a suitable ribbon reverse being provided. The ribbon mounting and operation are described in more detail in said copending application Serial No. 147,429.

The printing hammer mechanism, with which the present invention is more particularly con-

cerned, is illustrated in its normal, inactive position in Fig. 1, said position being also shown in the dot-dash position of Fig. 6 marked "normal." It comprises the printing hammer 18 which is in the form of a ball carried by supporting arms 14 pivoted at 16 to the side plates 17 of the paper section. The platen face 22 is preferably made of rubber and it extends across all of the type wheels, said platen hammer being positioned to strike the type wheels along a line which is called the printing line. The right hammer arm 14 has an upwardly extending portion 24 (Fig. 2) at its rearward end carrying a stud 26 to which one end of a spring 21 is connected. The other end of spring 21 is connected under tension to a stud 27 on the side plate 17. The tension of the spring 21 is such that the face 22 of the hammer is maintained a slight distance above the type faces 23 of the printing wheel 19 when in normal or inactive position.

The printing hammer is cocked by tensioning the spring 21 and this is accomplished by the forward movement of the ball 36 (Figs. 1 and 5), which ball is moved forward, as previously explained, during each operation of the machine, no matter whether it is an item-entering or a totaling operation. The right-hand arm 14 of the hammer ball has a downwardly and rearwardly extending finger 28 (Fig. 1), from the side of which a square stud 29 projects into position to be engaged by the notched end 31 of an arm 32 pivoted on the ball 36 and urged clockwise by a spring 32^a against a limit stud 34 (Fig. 1) on one of the side plates 17 of the paper section.

In item-entering operations, depression of one of the amount keys rocks the corresponding key lever 11 counterclockwise, which moves the ball 41 forward and the latter, in turn, moves the ball 36 forward. The arm 32 is thereby moved forward so that its notched end engages stud 29 of the finger 28 of the right hammer arm 14. As the depression of the key 11 is continued, the arm lever 32 is moved farther forward to move the finger portion 28 of the hammer forward and clockwise. This causes the hammer arms 14 and the hammer 18 to be rocked clockwise about pivot 16 which raises the hammer 18 away from the printing wheels 19. Simultaneously the stud 26 is moved to a greater distance away from the stud 27 and tensions the spring 21 to a greater extent and causes the spring 21 to extend in a more nearly vertical position from that illustrated in Fig. 1 to that in Fig. 5. As the hammer 18 approaches its raised position as shown in Fig. 5, and as shown in dot-dash lines marked "Item entering" in Fig. 6, the stud 34 of the rearwardly extending arm 33 of the side plate 17 moves into a cam slot formed by a hooked portion 35 on the arm 32, which causes the arm to be rocked counterclockwise to disengage its notched end 31 from the stud 29.

Upon said disengagement, the hammer 18 is released from its raised position and it descends in a counterclockwise direction under the urge of spring 21 toward the paper strip P. As the printing hammer 18 descends counterclockwise to printing position, its momentum is such that it continues to move beyond or through its normal Fig. 1 position against the urge of the spring 21 to printing position until its rubber contact portion 22 engages the paper P which lies between the ribbon R and the type faces 23, and said hammer forces the paper against the type faces with a sharp hammer-like blow or impact. After

the hammer has struck its printing blow, the spring 21 pulls it backward a slight distance in a clockwise direction to its normal position of Figs. 1 and 6. As the hammer 18 must necessarily descend against the printing wheels 19 with a relatively high degree of force or momentum, which is gathered in a relatively short movement to provide for impact printing as distinguished from a pressure or squeeze action printing, it has the tendency to rebound and to restrike the paper, which would cause double printing and smudging. Means has been provided to prevent this but, before describing it, the operation of the printing hammer in total taking will be explained.

In total printing, the forward movement of the total lever 55 rocks the bail 36 forward as in item-printing operations, and the printing hammer is cocked as heretofore explained. However, in total printing, provision has been made for operating the hammer with greater force because, in this operation, the platen strikes the type faces of all seven type wheels, whereas, in item printing, only the type faces of the three "item" type wheels are struck. The different impressions are shown on the sample of work illustrated in Fig. 4. In order that the printing force per unit area of each type may be the same in both item and total printing, the hammer must be fired with a greater force in total printing than in item printing.

Referring to Fig. 1, the total lever 55 is provided with a forwardly extending finger 63 which, when the total lever is rocked forward, engages an arm 65 of a three-armed lever 64 pivoted on the shaft 16. This three-armed lever is shown most clearly in Figs. 2, 3 and 6, the lever being viewed from the opposite side in Figs. 2 and 3 from what it is in Figs. 1, 4, 5 and 6. The three-armed lever 64 has an upwardly extending arm 66 positioned to engage a stud 68 on one of the arms 14 of the printing hammer bail 18. The third arm 67 carries a stud 69 to which is attached the spring 70 whose other end is attached to a stud 71 on one of the plates 17 of the paper section. The spring 70 maintains the three-armed lever in its normal position with the arm 66 engaging the stud 68.

As the total-taking lever 55 is moved forward, the bail 36 is moved forward and the arm 32 cocks the printing hammer as previously explained. However, before the arm 32 is disengaged from the stud 29 to release the hammer, the projection 63 on the total lever 55 engages the arm 65 of the three-armed lever 64 and rocks it clockwise as viewed in Figs. 1, 5 and 6, which would be counterclockwise in Figs. 2 and 3. The three-armed member 64, engaging the stud 68, picks up the printing hammer and rocks it farther clockwise to the dot-dash position marked "Totaling" in Fig. 6. As the printing hammer reaches this position, the projection 63 passes off the arm 65, thereby releasing the printing hammer which is fired to printing position with an increased force as against the force with which it is fired in item-printing operations.

In both item and total-printing operations, the printing hammer 18 moves quickly to printing position to give printing impressions by impact printing as distinguished from pressure or squeeze operations, after which it is pulled backward a slight distance toward its normal position. The momentum of the hammer tends to make it rebound to cause double printing or smudging and the present invention provides a very simple and

effective means to overcome this for both item and total printing, even though the force of printing impression is different in the two cases.

Located at the forward side of the spring 21 intermediate its ends and adapted to engage the same is a stud 50 carried by the right side plate 17. This stud 50 is so positioned in relation to the spring 21 as to engage the spring 21 on its forward side when the hammer 18 in its descent to printing position is at approximately its normal Fig. 1 position, i. e. with the hammer face slightly removed from the type faces. This stud 50 affects the spring action in the following manner to prevent rebound of the hammer.

As the printing hammer 18 moves counterclockwise toward printing position from its cocked position of Fig. 5, the full length and amount of tension of the spring 21 is utilized to pull the hammer downwardly in a counterclockwise direction toward printing position. When the hammer, in its descent, reaches its normal position (Fig. 1) the spring 21, which is simultaneously swinging about the upper stud 27 to its normal Fig. 1 position from its nearly vertical position of Fig. 5, contacts the stud 50 intermediate its end portions. This stud 50 engaging the side of the spring 21 acts as a dampener or snubber because the angular swing of the spring 21 is restricted by its engagement with the stud 50. That is, placing the stud in the path of the spring increases the distance the spring must stretch between its two ends which are secured to the studs 50 and 26 and thereby increases the tension of the spring over what it would be without the stud during the final portion of hammer movement. The hammer by this time, however, has attained sufficient momentum during its counterclockwise descent so as to continue the remaining distance, against the now clockwise urge of the spring 21, to the type wheels and to strike the same with sufficient force. After the printing blow has been struck, the hammer 18 is pulled upwardly to normal position by the spring particularly because of the increased tension of the spring caused by the stud 50.

As the hammer moves upward, it tends to move past its normal position and any movement upward past normal tends to tension the spring 21. When the momentum of the hammer in the upward direction has been overcome, the tension of the spring tends to again move the hammer downward toward the type wheels, the force being, of course, less than during the initial descent because the spring 21 has not been cocked to any great extent. But any movement of the hammer past its normal position must be against the short portion of the spring between the stud 50 and the stud 26, and the tensioning of this portion of the spring requires considerably more force than if the long spring simply had to be tensioned a small amount. Consequently, the tendency of the hammer to move past normal position toward printing position is resisted to an extent such that double printing or smudging is prevented and the hammer is quickly brought to normal position without any substantial rebound.

Although the foregoing description has set forth one form of printing mechanism, it will be understood that changes and modifications may be resorted to without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a machine of the class described compris-

ing a plurality of printing members, a movable printing hammer adapted to strike said printing members, a spring adapted when tensioned to urge said printing hammer toward said printing members, means for moving said hammer away from said printing members to tension said spring, means for releasing said latter means to permit the hammer to move under urge of said spring toward said printing members and to strike said printing members, and means for resisting rebound movements of said hammer to prevent said hammer from restriking said printing members.

2. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted when tensioned to urge said printing hammer toward said printing members, means for rocking said hammer away from said printing members to tension said spring, means for releasing said latter means to permit the hammer to rock under urge of said spring toward said printing members and to strike said printing members, and means acting upon said spring to resist rebound movements of said hammer to prevent the latter from restriking said printing members.

3. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted when tensioned to urge said printing hammer toward said printing members, means for rocking said hammer away from said printing members to tension said spring, means for releasing said latter means to permit the hammer to rock under urge of said spring toward said printing members and to strike said printing members, and means cooperating with said spring to increase its effect upon said printing hammer to resist rebound movements of said hammer to prevent the latter from restriking said printing members.

4. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted to maintain said hammer in normal position with respect to said printing members, means for rocking said hammer from normal position in a direction away from said printing members, means for releasing said latter means to permit said hammer to be rocked by said spring toward said printing members to printing position and to strike said printing members, and means adapted to engage said spring member intermediate its ends to increase the tension of said spring when said hammer is rocked to printing position, the increase in said tension being effective to retract said hammer from printing position and to prevent said hammer from restriking said printing members.

5. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted to maintain said hammer in normal position with respect to said printing members and to oppose rocking movements of said hammer in either direction from normal position, means for rocking said hammer from normal position in a direction away from said printing members, means for releasing said latter means to permit said hammer to be rocked by said spring toward said printing

members beyond normal position to printing position and to strike said printing members, and means adapted to engage said spring member intermediate its ends to increase the tension of said spring when said hammer is rocked from normal to printing position, said increased tension being effective to retract said hammer from printing to normal position and to prevent said hammer from restriking said printing members.

6. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted to maintain said hammer in normal position with respect to said printing members and to oppose rocking movements of said hammer from normal position, means for rocking said hammer from normal position in a direction away from said printing members, means for releasing said latter means to permit said hammer to be rocked by said spring toward said printing members and beyond normal position to printing position to strike said printing members, and deflecting means adapted to engage said spring intermediate its ends to increase the tension of said spring member when said hammer is rocked from normal to printing position, said increased tension being effective to return said hammer from printing to normal position and to prevent said hammer from restriking said printing members.

7. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted to maintain said hammer in normal position with respect to said printing members and to oppose rocking movements of said hammer from normal position, means for rocking said hammer from normal position in a direction away from said printing members, means for releasing said latter means to permit said hammer to be rocked by said spring toward said printing members and beyond normal position to printing position to strike said printing members, and a fixed stud adapted to be engaged by said spring intermediate the ends of said spring when said hammer is rocked from normal to printing position by said spring so as to prevent said hammer from restriking said printing members.

8. In a machine of the class described comprising a plurality of printing members, a pivotally supported printing hammer adapted to strike said printing members, a spring adapted to maintain said hammer in normal position with respect to said printing members and to oppose rocking movements of said hammer from normal position, means for rocking said hammer from normal position in a direction away from said printing members to tension said spring, means for releasing said latter means to permit said hammer to be rocked by said spring member toward said printing members and beyond normal position to printing position to strike said printing members, and a stud positioned to engage the side of said spring intermediate its ends and deflect said spring when said hammer is rocked from normal to printing position, said spring when deflected being adapted to retract said hammer from printing to normal position to prevent said hammer from restriking said printing members.

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