Dec. 14, 1954 J. E. JOHNSON 2,696,782

DAMPENER FOR PRINTING HAMMERS

Filed Jan. 12, 1951

FIG. 1

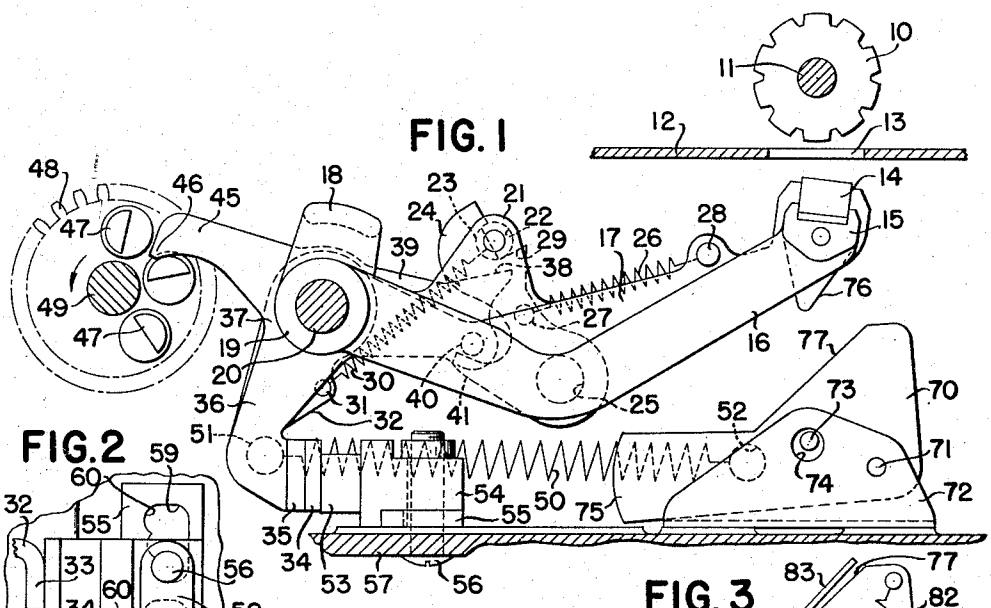


FIG. 2

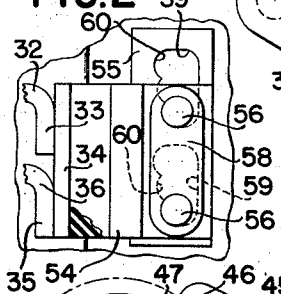


FIG. 3

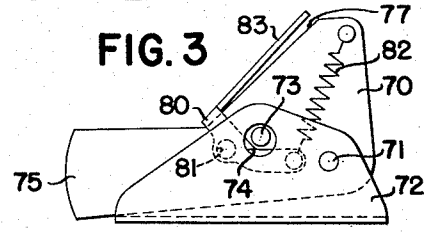


FIG. 4

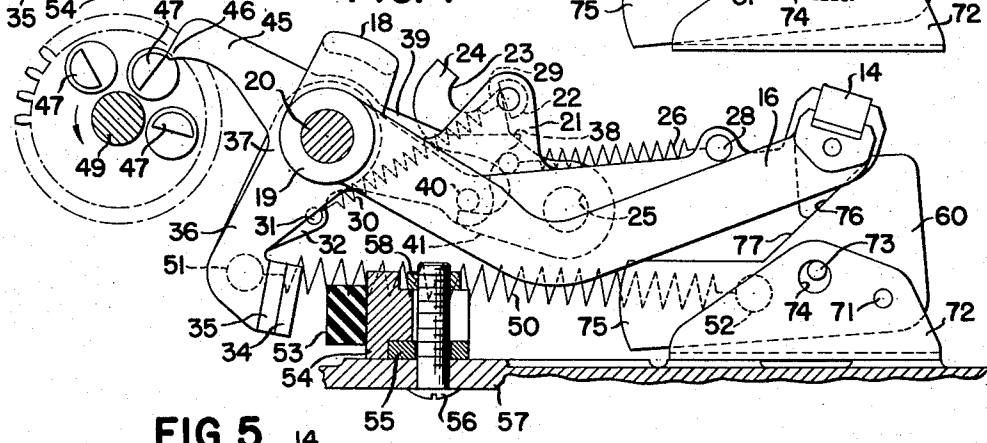
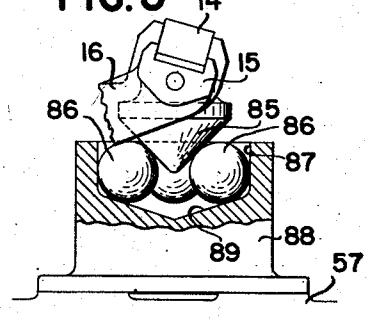


FIG. 5



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DAMPENER FOR PRINTING HAMMERS

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Application January 12, 1951, Serial No. 205,674

12 Claims. (Cl. 101—93)

This invention relates to improvements in dampeners for printing hammers.

The principal object of the invention is to stop the movement of a printing hammer at the end of the cocking stroke.

A specific object of the invention is to provide a friction device in the path of movement of a printing hammer to dissipate the energy thereof which normally tends to cause the hammer to rebound.

Another specific object of the invention is to provide a means to stop a printing hammer at the end of the cocking stroke to obtain better printing impressions and also to obtain uniform repeat print operations at shorter intervals during a machine cycle, thus making more prints per cycle feasible.

Another object of the invention is to provide a cam, actuated by the hammer when the hammer approaches the end of its cocking stroke, for arresting said hammer.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, a preferred form or embodiment of which is hereinafter described with reference to the drawing which accompanies and forms a part of this specification.

Of said drawing,

Fig. 1 is a side elevation of the hammer-operating mechanism, shown in normal position.

Fig. 2 is a detail view showing a means for adjusting the effective position of the hammer-actuating arm.

Fig. 3 is a detail showing a modified form of dampening means.

Fig. 4 is a side elevation of the mechanism shown in Fig. 1, shown with the hammer in retracted position.

Fig. 5 is a detail view of a modified form of dampening means.

General description

One of the problems inherent in spring-actuated mechanisms, such as printing hammers, is to dampen the vibrations of the hammer usually following a printing operation. In such mechanisms, the hammer, after being impelled against the type carriers, rebounds sharply and, when rebounding into its retracted position, again rebounds toward the type carrier. This rebounding sometimes repeats itself after a single printing operation. In the past, many rebound-preventing devices have been provided which by their nature take considerable time to become effective and for this reason are not satisfactory for use in machines where a number of printing operations are to be performed during a single machine operation. The reason why such prior mechanisms are unsatisfactory for such use is that the rebound has heretofore been prevented at or near the end of the rebound movement of the hammer. In such mechanisms, when rapid successive printing operations are to be made, the hammer-operating mechanism is operated before the rebound-preventing means has had time to become effective, and therefore the hammer is operated from a position less than its fully retracted position. This causes ununiform impressions to be made, since the time of effectiveness varies with the degree of rebound of the hammer.

The present invention overcomes these objections by temporarily stopping the hammer when it reaches its retracted position. Therefore the position of the hammer, when the impelling mechanism is operated, is always the same, resulting in uniform printing for each printing

stroke of the hammer. This is true because the hammer is always impelled toward the type carriers from the same position relative thereto and is always impelled with the same uniform force.

To illustrate the invention, it is shown herein as applied to a printing mechanism of the class shown in United States patents to Bernis M. Shipley, No. 1,908,068, and Everett H. Placke, No. 2,071,141.

Detailed description

Machines of the class shown in the above-mentioned patents are provided with type carriers **10** rotatably mounted on a shaft **11**. The type carriers are adjusted to set data at the printing line by differential mechanisms, as is well known. A table **12** provides means for supporting the printing medium on which data is printed. A suitable opening **13** is provided in the table **12**, through which the platen **14** of a printing hammer **15** is impelled.

The hammer **15** includes two arms **16** and **17** connected by a yoke **18** terminating in hubs **19** pivotally supported on a shaft **20**. The hammer arm **17** has an extension **21** formed therein, which supports a stud **22**, normally resting in a notch **23** of a pawl **24** pivoted on a stud **25** carried in the framework of the machine. The pawl **24** is held in engagement with the stud **22** by a spring **26** stretched between a stud **27** on the pawl **24** and a stud **28** on the hammer arm **17**. A ledge **29**, formed as an extension of one wall of the notch **23**, provides support for the stud **22** to normally hold the hammer in the position shown in Fig. 1, against the action of a spring **30**, stretched between the stud **22** on the printing hammer and a stud **31** carried on an arm **32** pivoted on the shaft **20**.

The arm **32** is one member of a hammer-operating mechanism and is provided with a flange **33** (see Fig. 2), to which a plate **34** is secured. The plate **34** is also secured to a flange **35** of an arm **36**, the latter being one arm of a three-armed hammer-operating member **37** (Figs. 1 and 4), which is mounted on the shaft **20** adjacent the hammer **15** and in such location that a ledge **38** formed on an arm **39** of the member **37** lies in the plane of the stud **22**, so that, when the pawl **24** is withdrawn from engagement with the stud **22**, the stud is moved into engagement with the ledge **38** by spring **30**.

To withdraw the pawl **24** from engagement with the stud **22**, the arm **39** is provided with a stud **40**, projecting into the plane of a finger **41** on the pawl **24**. When the arm **39** is rocked in the manner described below, the stud **40**, contacting the finger **41**, rocks the pawl **24** to move the ledge **29** from beneath the stud **22**, whereupon the spring **30** rocks the hammer until the stud **22** rests on the ledge **38**. Thereafter, the hammer **15** is moved under control of the arm **39**.

The member **37** is provided with a third arm **45**, having a nose **46** projecting into the path of movement of one or more studs **47**, suitably carried by a rotating member, such as gear **48**, secured to an operating shaft **49** of the machine. The number of studs **47** provided is determined by the number of printing impressions which are to be made during a machine operation. As herein illustrated, three studs **47** are shown, so that the hammer **15** is operated three times for each machine operation, and therefore three printed impressions are made. It is to be understood that the shaft **49** makes one complete rotation during each machine operation.

As above described, the three-armed member **37** and the arm **32** are connected, to form a unitary operating member, by the plate **34**. A strong spring **50** is connected to a stud **51** on the arm **32** at one end, and to a stud **52**, in the framework of the machine, at its other end. The arms **32** and **36** are limited in their movements, under action of the spring **50**, by a resilient stop **53**, shown herein as made of rubber. The stop **53** is carried by an adjustable block **54**, so that the nose **46** can be adjusted in relation to the studs **47**. The block **54** is held in the adjusted position by a plate **55**, secured in position by two machine screws **56** in the base **57** of the machine. A plate **58** is suitably tapped to receive the ends of the machine screws **56** to provide means for clamping the block **54** in position.

The plate 55 (Fig. 2) is provided with slots 59, through which the machine screws 56 pass, and one wall of each slot is provided with notches 60, which may be selectively located in relation to the machine screws 56 to locate the plate 55 in a desired position laterally on the base 57. The block 54 is notched to engage the plate 55, as shown in Fig. 4, so that the location of the plate on the base 57 determines the location of the block 54 and the stop 53, thus determining the normal position of the nose 46 in relation to the studs 47. This adjustable feature provides a means for timing the effectiveness of the studs 47 in their operation of the hammer-operating means.

The printing hammer is actuated in the following manner:

When the shaft 49 rotates in the direction of the arrow, the studs 47 successively engage the nose 46 on the arm 45 and rock the member 37 and, through the plate 34, rock the arm 32 clockwise from the position shown in Fig. 1 to the position shown in Fig. 4. In so doing, the stud 40 on the arm 39, engaging the finger 41, rocks the pawl 24 to withdraw the notch 23 and the ledge 29 from engagement with the stud 22 on the hammer. This permits the hammer to be drawn downwardly by gravity assisted by the spring 30. When the stud 47 passes beyond the nose 46, the spring 50 rapidly rotates the member 37 counter-clockwise, during which movement the ledge 38, engaging the stud 22, impels the printing hammer 15 in the printing direction. The member 37 is arrested by the plate 34 coming into contact with the stop 53. However, the momentum of the hammer 15 is sufficient to impel the platen 14 against the type carriers to cause an impression to be made on the printing medium previously placed in position on the table 12. The hammer then drops back toward its normal position. When the member 37 is rocked by the spring 50, the stud 40, moving with the member 37, releases the pawl 24 to the action of the spring 26, whereupon the pawl is rocked clockwise to again engage the stud 22, to arrest the hammer in normal position. The pawl 24, therefore, acts as a means to prevent the hammer from rebounding against the type carriers to cause a second impression to be made.

The above mechanism is well adapted for printing in machines when successive operations do not follow too rapidly. It has been found that, when it is attempted to operate the printing hammer immediately after one impression has been made, the successive impressions are not uniform. This is due to the fact that, when the hammer drops upon being retracted by the spring 30, it rebounds upwardly toward the type carriers before the ledge 38 has time to effectively strike the stud. The speed of this rebound varies with different operations and conditions, with the result that the effective throw of the hammer varies with the extent of rebound of the hammer. In some instances, the hammer rebounds a small extent, and in extreme cases the hammer rebounds far enough that the ledge 38 has little or no effect in its impelling stroke. This results in the hammer blow against the type carriers varying with the force applied to the hammer by the operating member 37, and the clearness of the impression varies to the same extent. To overcome the objectionable variation in non-uniform impressions, a novel means is provided to stop the hammer in its lower, or cocked, position, so that the effectiveness of the operating member 37 in impelling the hammer against the type carriers is always the same.

To attain this result, a means is provided to arrest the hammer at the end of its cocking movement to give the impelling means time to operate, so that the hammer is always impelled from the same position relative to the type carriers. The result is uniform printing for each printing stroke of the hammer. As heretofore mentioned, this result is particularly desirable in machines where the hammer is operated in rapid succession.

The timing of the successive operations is controlled in the present machine by the spacing of the studs 47 on the gear 48. In machines to which the present invention is shown applied and which are illustrated in the above-mentioned patents, many functions are obtained, so that the time allotted for the plurality of printing operations during a machine operation is limited. For this reason, the present invention is particularly desirable in such machines.

The preferred form of the means for attaining the novel result includes a pivoted cam 70 (Figs. 1 and 4), mounted on a stud 71 in a bracket 72 secured to the base 57. The cam 70 has a stud 73 mounted thereon, which stud projects laterally into an opening 74 in the bracket 72, which opening is somewhat larger in diameter than the stud 73. The cam 70 is provided with a counterweight 75 to normally maintain the cam 70 in the position shown in Fig. 1. This position is maintained by the lower edge of the counterweight 75 engaging the bracket 72, as shown, or by any other desired stop. The hammer 15 is provided with a cam edge 76 in the same vertical plane as a cam edge 77 of the cam 70.

The cam edges 76 and 77 are so located relatively to each other that, when the hammer is lowered into its cocked position, the cam edge 76 engages the cam edge 77 and rocks the cam 70 clockwise until the stud engages the inner wall of the opening 74, as illustrated in Fig. 4. This engagement of the cam edge 76 with the cam edge 77 sets up a resistance to the movement of the hammer 15 and dissipates the force of the moving hammer to the extent that the hammer is arrested and therefore has no tendency to rebound upwardly. Thus the stud 22 is always in the same position when the ledge 38 of the arm 39 strikes it to impel the platen 14 against the type carriers, and each impression will be of the same uniform density.

A modified form of the invention is illustrated in Fig. 3. In this form, a member 80 is pivoted on a stud 81 carried by the cam 70. A spring 82 tends to rock the member 80 around the stud 81 to position a cam surface 83 thereon in the path of the cam edge 76 of the hammer 15. Therefore, when the cam edge 76 comes into contact with the cam surface 83, the movement of the hammer has the force of the spring 82 to overcome, and, when the pawl comes into engagement with the surface 77 of the member 70, the hammer is arrested as described above. Therefore, if a hammer of greater weight or speed is used, the modification shown in Fig. 3 can be used.

Fig. 5 illustrates another modified form of the invention. In this form, a cone 85 is formed on the hammer 15, which cone engages and spreads a plurality of balls 86 and crams them against the walls 87 of a well 88, in which the balls rest. The well 88 is supported on the base 57, at a location wherein the cone 85 maintains the balls 86 in the desired position. The bottom 89 of the well 88 is conically tapered toward the center thereof, so that the balls 86 roll toward the said center when the cone 85 is raised out of contact therewith. The balls 86, being forced against the inner wall of the well, are required to move up the inclined bottom of the well until they are crammed against said wall. The force required to so move the balls 86 dissipate the inertia of the hammer when moving downwardly, thus arresting the hammer in its cocked position.

While the form of the invention shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the forms or embodiments disclosed herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; and snubbing means to dissipate the energy of the hammer as it is being fully retracted by the said means so as to cause the hammer to remain in its fully retracted position until the hammer is impelled in printing direction by said means.

2. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; and snubbing

means to dissipate the energy of the hammer as it is being fully retracted by the said means so as to cause the hammer to remain in its fully retracted position between the retracting and impelling movements of the said means.

3. The combination of a printing hammer normally in a partially retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of said means when said means is arrested at the end of either direction of movement; a friction device located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position; and a friction means on the printing hammer frictionally engaging the friction device as the printing hammer approaches its fully retracted position to dissipate the energy of the moving printing hammer to cause the printing hammer to come to rest in the fully retracted position to thereby prevent rebounding movement of the printing hammer from said fully retracted position between the retracting and impelling movements of the said means.

4. The combination of a printing hammer normally in a partially retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of said means when said means is arrested at the end of either direction of movement; a snubbing device located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position, said snubbing device having an inclined surface located in the path of movement of the printing hammer when moving in retracting direction; and an inclined surface on the printing hammer movable into contact with the inclined surface of the snubbing device as the printing hammer approaches the fully retracted position to arrest rebound movement of the printing hammer between the end of the retracting movement and the beginning of the impelling movement of said means.

5. The combination of a printing hammer normally in a partially retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of said means when said means is arrested at the end of either direction of movement; yieldable dampening means located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position, said yieldable dampening means being gravitationally held in a normal position; and a surface on the printing hammer movable into contact with the yieldable means as the printing hammer reaches its fully retracted position, said surface engaging and moving the yieldable dampening means to enable the yieldable dampening means to arrest rebounding movement of the printing hammer between the end of the retracting and the beginning of the impelling movements of said means.

6. The combination of a printing hammer normally in a partially retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of said means when said means is arrested at the end of either direction of movement; a pivoted dampening device located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position; a counter-weight on the pivoted dampening device to gravitationally hold the dampening device in a normal position; an inclined surface on the printing hammer movable into contact with the dampening device as the printing device reaches the fully retracted position, said inclined surface engaging and moving the pivoted dampening device against the gravitational pull thereon to dampen the movement of the printing hammer when it reaches the fully retracted position to cause the printing hammer to remain in its fully retracted position until the said means impels the hammer in printing direction, and a stop to limit the gravitational movement of the dampening device.

7. The combination of a printing hammer normally in a partially retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of said means when said means is arrested at the end of either direction of movement; a pivoted dampening device located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position; a counter-weight on the pivoted dampening device to gravitationally hold the dampening device in a normal position; an inclined surface on the printing hammer movable into contact with the dampening device as the printing device reaches the fully retracted position, said inclined surface engaging and moving the pivoted dampening device against the gravitational pull thereon to dampen the movement of the printing hammer when it reaches the fully retracted position to cause the printing hammer to remain in its fully retracted position until the said means impels the hammer in printing direction, and means on the dampening device engageable with the framework of the machine to arrest movement of the dampening device when the dampening device is engaged by the inclined surface on the printing hammer.

8. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; a stationary support, a dampening means pivotally mounted on the stationary support, a spring actuated plate mounted on the dampening means, said plate located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position, and an inclined surface on the printing hammer engageable with the spring-actuated plate as the printing hammer nears its fully retracted position, said surface acting against the force of the spring and thereafter moving the dampening means on its pivot, said spring-actuated plate and the dampening means providing resistance to the retracting movement of the printing hammer to prevent rebounding of the printing hammer from its fully retracted position.

9. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; a stationary support, a dampening means pivotally mounted on the stationary support, a spring actuated plate mounted on the dampening means, said plate located in the path of movement of the printing hammer when the printing hammer is moving from its partially retracted position to its fully retracted position, and an inclined surface on the printing hammer engageable with the spring-actuated plate as the printing hammer nears its fully retracted position, said surface acting against the force of the spring and thereafter moving the dampening means on its pivot, said spring-actuated plate and the dampening means providing resistance to the retracting movement of the printing hammer to prevent rebounding of the printing hammer from its fully retracted position, and a stop to limit the pivoting movement of the dampening means.

10. The combination of a printing hammer normally

in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; a cone formed on said printing hammer, a cup mounted on the framework of the machine, the center of said cup lying in the path of movement of the apex of the cone, and a plurality of balls in said cup normally located in contact with each other, said cup being of a size to permit free spreading relative movement of the balls therein so that the cone, when coming into contact with the balls, moves the balls toward the outer wall of the cup, the balls being of sufficient weight that the energy of the retracting printing hammer is expended in spreading the balls, thus dampening the hammer when fully retracted to prevent rebounding of the printing hammer.

11. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; a cone formed on said printing hammer, a cup having a bottom inclined toward its center mounted on the framework of the machine and in the path of movement of the cone, and a plurality of balls in said cup normally located in contact with each other, said cup being of a size to permit free spreading relative movement of the balls therein so that the cone, when coming into contact with the balls, moves

the balls toward the outer wall of the cup, the balls being of sufficient weight that the energy of the retracting printing hammer is expended in spreading the balls, thus dampening the printing hammer when fully retracted to prevent rebounding of the printing hammer.

12. The combination of a printing hammer normally in a partially-retracted position; spring-actuated means movable in one direction to fully retract the printing hammer, and movable in the opposite direction to impel the printing hammer in printing direction; a spring to connect the printing hammer to said means, whereby the printing hammer is free to move in printing direction independently of the said means when said means is arrested at the end of either direction of movement; a cone formed on said hammer, a cup having a bottom inclined toward its center mounted on the framework of the machine and in the path of movement of the cone, and a plurality of balls in the cup, said inclined bottom causing the balls to normally rest on the bottom of the cup near the center thereof to position the center of the plurality of balls in the path of movement of the apex of the cone when the printing hammer is retracted, said cone engaging and camming the balls up the inclined bottom to dissipate the momentum of the printing hammer as it moves into fully retracted position to prevent rebounding of the printing hammer.

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