United States Patent

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[54] DYNAMIC HAMMER AND METHODS OF STRIKING WORKPIECES

8 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** 173/1, 101/93, 173/100, 173/102
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[50] **Field of Search** 173/1, 100, 102, 118; 145/29; 101/93

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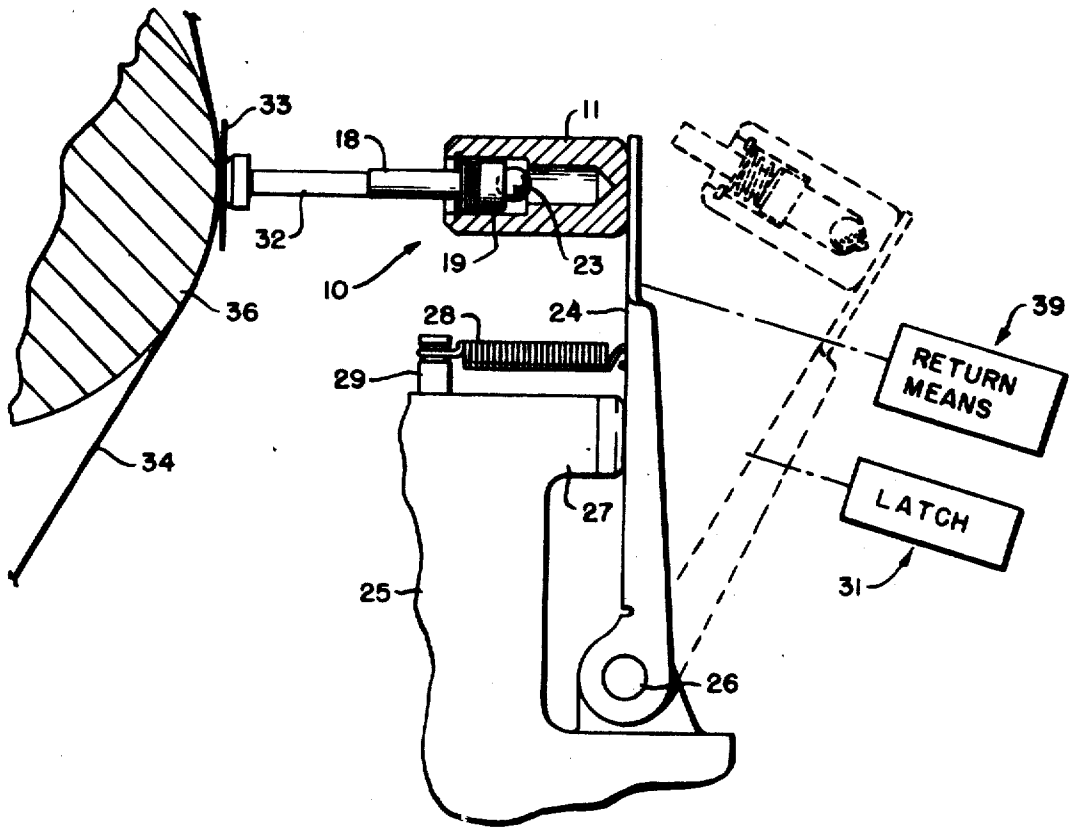
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ABSTRACT: A printing hammer includes a striker and a weight, both slidably mounted within a housing. To hammer a workpiece, the housing is moved to advance the striker toward the workpiece, and the motion of the housing is suddenly arrested. When motion of the housing is arrested, the momentum of the weight drives the striker, forward into engagement with a workpiece.



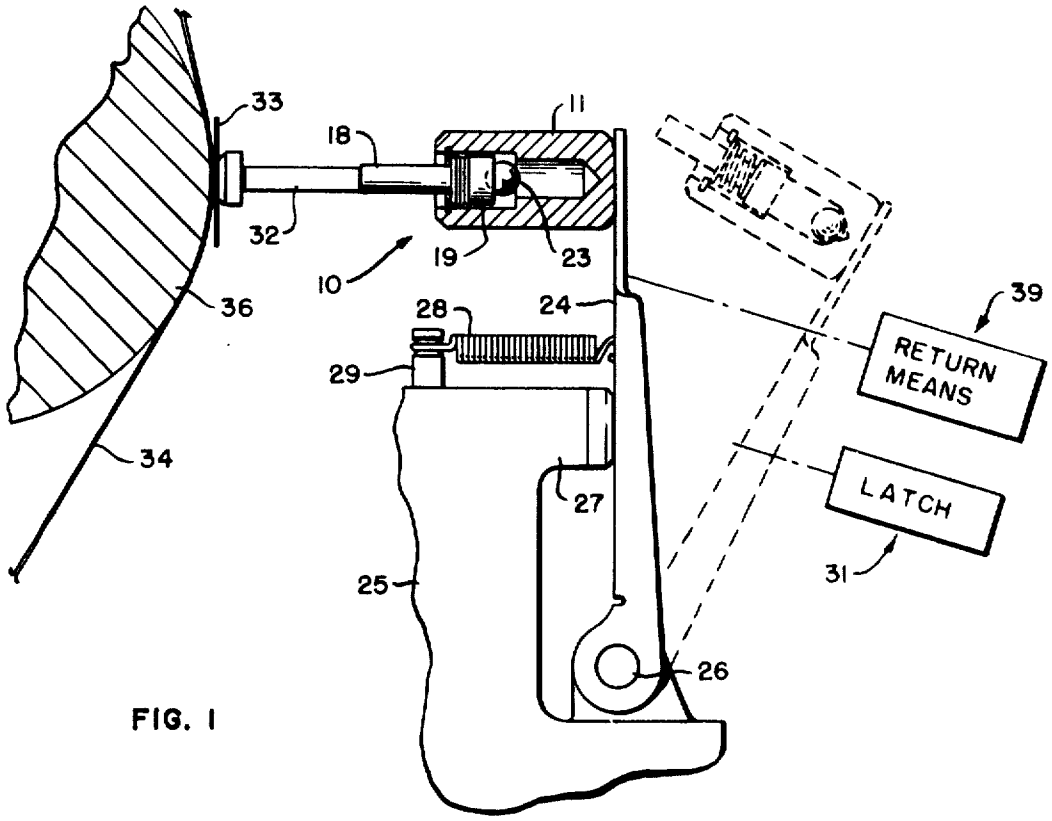


FIG. 1

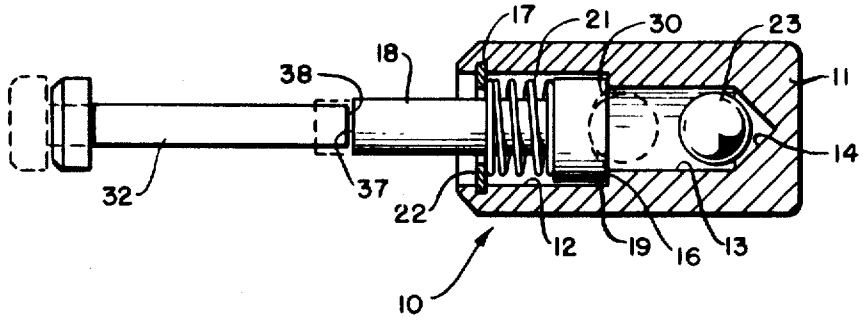


FIG. 2

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DYNAMIC HAMMER AND METHODS OF STRIKING WORKPIECES

BACKGROUND OF THE INVENTION

The present invention relates generally to hammers, and methods of striking workpieces, and in particular to a printing hammer of the type used in a teleprinter.

Generally, in printing characters on a sheet of paper with a teleprinter, a typebox, containing a plurality of type pallets, is positioned such that the type pallet having the character to be printed on the paper is adjacent the position on the paper onto which the characters is to be printed. The type pallet is then struck by a pivoted printing hammer and driven into engagement with an inked ribbon and paper, thereby effecting the printing operation. Typically, the printing hammer is traveling an arcuate trajectory at and during the time that it impacts with the type pallet. Therefore, a scrubbing action occurs between the type pallet and the printing hammer, resulting in uneven wear of the type pallet. Also, as a result of the high velocity of the printing hammer at the time it contacts the type pallet, a loud impact noise is produced.

A specific object of the invention is to provide a printing hammer in which the striking member of the hammer describes a linear path coaxial with the type pallet at and during the time of impact with the type pallet to prevent scrubbing between the printing hammer and the type pallet.

Another object of the invention is to provide a printing hammer in which the striking member of the hammer may be made to lightly abut against the type pallet immediately prior to driving the type pallet into engagement with an inked ribbon and paper to minimize impact noise between the printing hammer and the type pallet.

SUMMARY OF THE INVENTION

The foregoing and other objects of the invention are accomplished by providing a striker which is carried by a mounting member for movement toward and away from a workpiece to be operated upon. The striker is slidably carried on a mounting member for linear movement between a retracted position and an extended position, and is normally positioned in the retracted position. To operate upon the workpiece, the mounting member is advanced toward the workpiece until the striker is aligned with the workpiece, at which time motion of the mounting member is arrested to allow the striker to be impelled linearly forward to the extended position to hammer the workpiece.

Preferably, the mounting member is a housing having an outer cylindrical chamber opening externally of the housing and an inner cylindrical chamber of smaller diameter, coaxially disposed with respect to the outer chamber so as to define a shoulder at the juncture between the chambers, and having a closed inner end. The striker, in the form of a cylinder, is slidably mounted within the outer chamber, and is normally urged to its retracted position, against the shoulder defined by the outer and inner chambers, by a coil spring. Momentum of a weight, freely mounted in the inner chamber for movement between the closed end of that chamber and the inner end of the striker, operates to impel the striker to its extended position, against the bias of the coil spring, when motion of the housing in the direction of the external opening of the outer chamber is arrested, to allow the striker to operate upon the workpiece.

Other objects, advantages and features of the invention will be apparent from the following detailed description of specific embodiments thereof, when taken in conjunction with the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 of the drawings is a cross-sectional view, partially schematic, illustrating a telegraph-printing system including a printing hammer in accordance with one embodiment of the invention; and

FIG. 2 is an enlarged cross-sectional view of the hammer head.

DETAILED DESCRIPTION

The specific embodiment of the printing hammer 10 shown in the drawings includes a housing 11 having a bore including an outer cylindrical chamber 12 which opens externally of the housing 11, and having an inner, smaller diameter cylindrical chamber 13 which connects with the chamber 12 and which terminates at its innermost end in a conical seat 14. The chambers 12 and 13 are coaxial and at their juncture form a shoulder 16. The housing 11 also includes a recess 17 circumferentially disposes around the wall of the chamber 12 between the external opening of that chamber and the shoulder 16.

The hammer 10 also includes a cylindrical striker 18, having an enlarged cylindrical end 19 which is slidably mounted within the outer chamber 12 such that the left end of the striker 18, as viewed in the drawings, extends from the external opening of the chamber 12. The diameter of the cylindrical end 19 is greater than the diameter of the inner chamber 13, so that the striker 18 cannot move past the shoulder 16. The striker 18 is normally urged to a retracted position, against the shoulder 16, by a coiled compression spring 21 which operates between the cylindrical end 19 and a blocking ring 22 which has been circumferentially disposed within the recess 17. The inside diameter of the blocking ring 22 is large enough to allow sliding movement of the striker 18, but small enough to confine the spring 21. A movable weight, in the form of a steel ball 23, is confined within the inner chamber 13, and is free to move between the conical seat 14 and the cylindrical end 19 of the striker 18.

The housing 11 is supported on one end of an arm 24, which in turn is pivotally supported at its other end upon a frame 25 through the agency of a pivot 26. The frame 25 has an extension 27 which engages and stops the arm 24, as illustrated in FIG. 1, as the arm 24 is pulled against the extension 27 by a spring 28 which operates between the arm 24 and a post 29.

In use, the hammer 10 and the arm 24 are normally held in a cocked position, away from the extension 27 as shown in phantom lines in FIG. 1, and against the bias of the spring 28, through the agency of a generally conventional latch 31 which operates upon the arm 24. One example of a suitable latch 31 is disclosed in B. F. Madsen U.S. Pat. No. 2,963,547 herein incorporated by reference. When it is desired to print a character, the latch 31 releases the arm 24, allowing the arm 24 to be pivoted to the solid-line position in FIG. 1, into engagement with the extension 27 of the frame 25 as the arm is acted upon by the spring 28. While the housing 11 is being accelerated with the arm 24 under the urging of spring 28, the steel ball 23 is forced into, and remains within, the conical seat 14 at the right end of the inner chamber 13. When the motion of the arm 24, and thereby the motion of the housing 11, is arrested as the arm 24 comes into engagement with the extension 27, momentum causes the steel ball 23 to leave the conical seat 14, travel the length of the inner chamber 13 and strike the inner end 19 of the striker 18. As illustrated in FIG. 2, the inner, or right-hand, surface of the striker end 19 is formed with a generally hemispherical recess 30 for receiving the ball 23.

The action of the ball 23 hitting the striker 18 impels the striker in an outward direction from the outer chamber 12, against the bias of the spring 21, until the spring 21 has been sufficiently compressed that its resulting bias overcomes the momentum of the striker 18 and the ball 23, and operates to return the striker 18 into engagement with the shoulder 16. The outward motion of the striker 18 is used in the specific embodiment of the invention shown in FIG. 1 to drive a conventional type pallet 32 into engagement with an inked ribbon 33, thereby causing the character on the type pallet 32 to be printed on a sheet of paper 34 which is backed by a platen 36. The type pallet 32 and the printing hammer 10 are positioned relative to each other such that, when the striker 18 is in a

striking position, the striker 18 and the type pallet 32 are coaxial with each other.

While the arm 24 was pivoted into engagement with the extension 27 of the frame 25, the working end 37 of the striker 18 was describing an arcuate trajectory. If the end 37 were describing an arcuate trajectory at the time it impacted with the type pallet 32, uneven wear of the type pallet would occur as a result of a scrubbing action between the end of the striker and the struck end 38 of the type pallet 32. However, when the arcuate motion of the hammer 10 is arrested, the trajectory assumed by the working end 37, as the striker 18 is driven forward by the momentum of the steel ball 23, is linear and tangential to the arc previously described. Therefore, since the type pallet 32 and the striker 18 are coaxial with each other when the striker 18 is in a striking position, the work end 37 of the striker 18 impacts the end 38 of the type pallet 32 with a force parallel to and coincident with the axis of the type pallet 32, thereby resulting in even wear at the struck end 38 of the type pallet 32.

Preferably, the relative positions of the printing hammer 10 and any particular type pallet 32 are adjusted so that the work end 37 of the striker 18 abuts lightly upon the type pallet 32 when the striker 18 is in a striking position, and immediately prior to the time that the striker 18 is driven forward by the momentum of the steel ball 23. With this arrangement, wear and noise due to the impact of the striker 18 with the type pallet 32 will be minimized.

On completion of the printing operation, the hammer 10 is repositioned in a latched condition for the next printing operation by a suitable return means 39 which withdraws the arm 23, against the bias of the spring 28, to the cocked position where it is held by the latch 31. A suitable return means is also disclosed in the Madsen patent previously mentioned. FIG. 1 illustrates a simplified, partially schematic system for mounting and actuating the hammer 10, whereas a preferred embodiment of hammer mounting and actuating mechanisms is disclosed in the Madsen patent. Except for the construction of the hammer 10 in this invention, the construction and arrangement of the printing apparatus may be exactly as shown in that patent.

While one specific embodiment of the invention has been described in detail, it will be obvious that various modifications may be made from the specific details described without departing from the spirit and scope of the invention. For example, it is not necessary for the printing hammer 10 to be in a substantially horizontal position as shown in FIG. 1 for proper operation of the invention. The printing hammer 10 may also be mounted in an essentially vertical position with the end 37 of the striker 18 pointing downward. In this position, the steel ball 23 will normally be resting upon the cylindrical end 19 when the printing hammer 10 is a rest in a cocked position. When the latch 31 releases the arm 24 to effect a printing operation, the resulting acceleration of the housing 11 will operate upon the striker 18 through the shoulder 16 to accelerate the striker away from the ball 23, thereby allowing the ball to assume a position within the conical seat 14 wherein it will then be accelerated to the same velocity as the housing 11. When the motion of the housing 11 is arrested, the combination of gravity acting upon the ball 23, and the momentum of the ball will drive the ball into the cylindrical end 19 and effect a printing operation as described above.

The printing hammer 10 may similarly operate in a vertical position in which the end 37 of the hammer 18 is pointing upward. In this position, the steel ball 23 is normally held within the conical seat 14, while the printing hammer 10 is at rest in a cocked position, by the influence of gravity, and remains within the conical seat 14 as a result of both gravity and inertia as the printing hammer 10 is accelerated. However, when the motion of the housing 11 is arrested, the momentum of the ball 23 is sufficient to overcome the force of gravity and drive the ball 23 into engagement with the cylindrical end 19 of the striker 18, thereby effecting a printing operation as described above.

What is claimed is:

1. A hammer which comprises: a striker;
means for mounting the striker for linear movement between a retracted position and an extended position, the striker being normally positioned in the retracted position;
means for moving the mounting means in an arcuate path toward a workpiece to axially align the mounting means and the striker with the workpiece in a position tangential to the arcuate path;
means for arresting the movement of the axially aligned mounting means; and
means responsive to the arrest of movement of the mounting means, for impelling the striker linearly forward to the extended position to hammer the workpiece.

2. A hammer as recited in claim 1, wherein the impelling means comprises a weight aligned with the striker and movably mounted in the mounting means so that, when the motion of the mounting means is arrested, the weight moves into engagement with the striker to impel it to the extended position.

3. A hammer as recited in claim 1, wherein the mounting means comprises:
a housing for slidably mounting the striker; and
means in the housing for normally urging the striker to its retracted position with a force which may be overcome by the impelling means.

4. In a mechanism for linearly striking a type pallet mounted for linear movement toward a platen;
a housing having an axially extending bore;
a striker mounted for linear sliding movement in the bore;
means for urging the striker within the bore;
means for moving the housing toward the type pallet to position the striker in axial alignment with the type pallet;
means for abruptly stopping the moving housing with the striker axially aligned with the type pallet; and
a ball freely mounted within the bore and thrust forward by momentum upon abrupt stopping of the housing for abutting and moving the striker against the effect of the urging means to linearly move the type pallet toward the platen.

5. A method of linearly striking and moving a type pallet toward a platen, which comprises:
moving a striker toward and into axial alignment with the type pallet;
urging the striker away from the pallet;
abruptly stopping the moving striker with the striker urged away from the pallet; and
impelling a weight against the stopped striker to impart the momentum of the weight to the striker to thrust the striker against the type pallet to move the type pallet toward the platen.

6. A hammer mechanism for striking a workpiece, which comprises:
an arm mounted for pivotal movement toward a workpiece;
a housing mounted on the arm;
a striker slidably located in the housing for movement from a normally retracted position to an extended position;
stop means cooperating with the arm for positioning the housing and the striker in axial alignment with the workpiece;
means for pivoting the arm to engage the stop means; and
a weight movably located within the housing and having momentum imparted thereto by the pivoting of the arm for engaging and transferring momentum to the positioned striker to move the striker to the extended position to strikingly engage the workpiece.

7. A hammer mechanism as recited to claim 6 further comprising means for urging the striker into the retracted position, the effect of which is overcome by the momentum of the weight.

8. A hammer mechanism as recited in claim 7 wherein:
the housing has a bore comprising an outer cylindrical chamber having an external opening and an inner cylindrical chamber of smaller diameter coaxially disposed

with respect to the outer chamber and connecting therewith so as to define a shoulder at the juncture between the chambers, the inner chamber having a closed inner end;

the striker comprises a cylindrical member mounted for sliding movement in the outer chamber so as to abut the shoulder in the retracted position;

the urging means comprises a coil spring mounted in the outer chamber for normally urging the striker against the shoulder; and

the weight comprises a ball freely mounted in the inner chamber for movement between the closed end of the inner chamber and the inner end of the striker.