April 13, 1965 C. J. ANTONUCCI 3,177,803

PRINT HAMMER MODULE AND CONTROL BLOCK THEREFOR

Filed Aug. 2, 1963

Fig. 1.

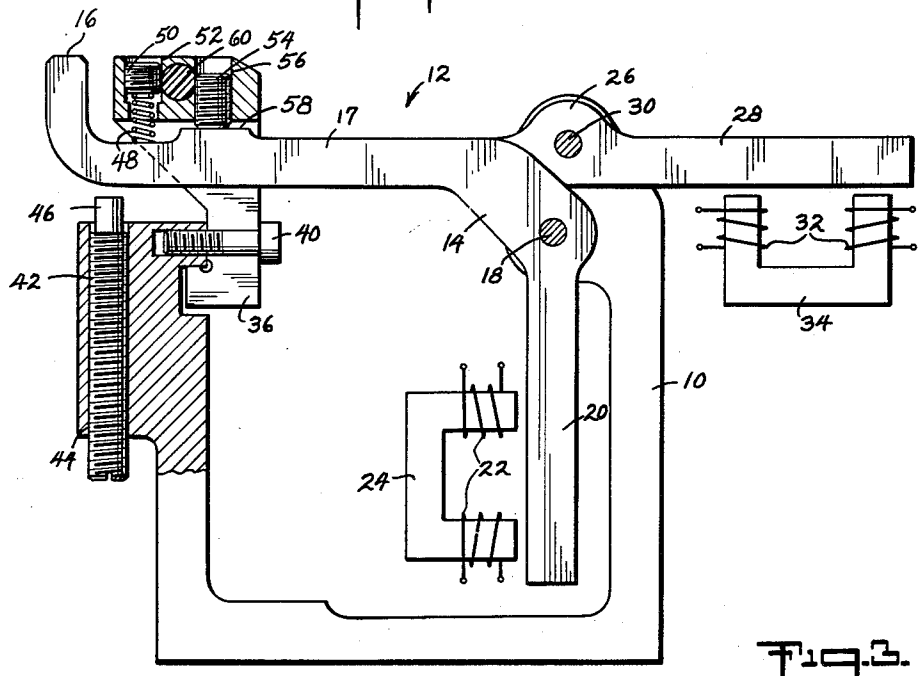
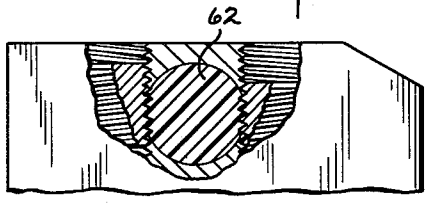


Fig. 3.



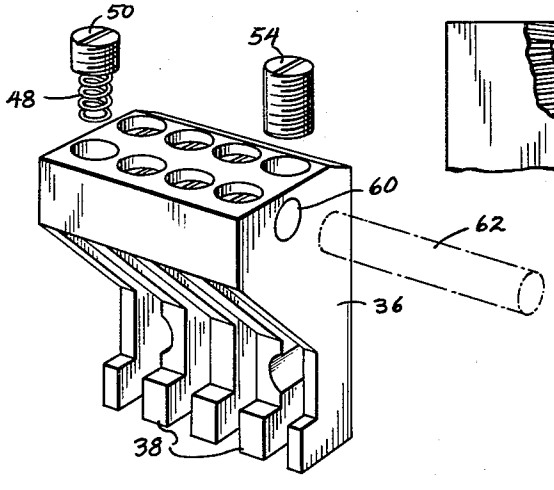


Fig. 2.

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PRINT HAMMER MODULE AND CONTROL BLOCK THEREFOR

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4 Claims. (Cl. 101—93)

This invention relates to printing hammer modules and, more particularly, relates to an improved module in which there is provided means for control of hammer timing, hammer penetration, and spring return of the hammer from the actuated to the rest position.

Printing hammer modules used for modern high speed printers are known to the art. The printing rates of such modules are extremely high, requiring increasingly fast actuation speeds, and, thus, precision of adjustment of the initial positions of the printing hammer assemblies.

Moreover, to control the hammer impact and to prevent excessive hammer dwell time on the recording medium, which might smudge the character being imprinted, and to return the hammer to the rest position as rapidly as possible, penetration stops and return springs of various nature have been used.

However, at present printing rates, obtaining the desired operating characteristics with fixed elements is difficult and expensive.

It is, therefore, the primary object of this invention to provide a hammer module in which the hammer flight time, the penetration limitation stop, and the spring return force characteristics can be adjustably determined for each hammer in the operating module.

Other objects and advantages of this application will be pointed out hereinafter in the following detailed description of the invention, which may best be understood by reference to the accompanying drawings, of which:

FIG. 1 is a partially sectioned side elevation of the hammer module constructed in accordance with the present invention;

FIG. 2 is a perspective view of the hammer control block shown in FIG. 1;

FIG. 3 is a partially sectioned view of a portion of the hammer control block shown in FIG. 2.

In the figures, there is shown a hammer module for a high speed printer, having a frame assembly 10 on which are mounted four hammer assemblies 12.

In order to mount the four hammer assemblies in the module with the necessary close spacing therebetween and, at the same time, preventing the actuating field for each hammer assembly from moving an adjacent hammer, adjacent hammers are constructed in differing forms. Hammer 14, for example, is constructed having a printing hammer 16, mounted on arm 17 which is pivotally mounted about a pivot 18. The armature 20 of the hammer 14 extends at right angles to the hammer arm 17. An electromagnetic coil 22 is mounted on core 24 adjacent armature 20 to attract the armature thereto when the coil is momentarily energized thereby to trip the hammer 16 into the printing position shown.

The adjacent printing hammer assembly 26 is provided with a printing hammer mounted at the end of an arm. The armature portion 28, however, extends in a straight line continuation of the arm and the assembly is pivoted about a pivot 30. An electromagnetic coil 32 is provided on core 34 to trip the hammer 26 in selected fashion.

The other two hammers are respectively similar to hammers 14 and 26.

A hammer control block 36 is provided with a plurality of downwardly extending hammer guides 38 to guide the hammers during travel from a rest to an actuated position. The control block 36 is secured to the frame by means of bolt 40. The hammer rest position is defined by hammer flight control screw 42 threadably engaged within the bore 44 in the frame 10 and is provided with a bumper 46 mounted on the terminal end thereof. The position of the bumper determines the rest position of the individual printing hammers and determines the actuation time of the individual hammers by control of the gap between the respective coils and the associated armatures. Since this gap influences the magneto motive attractive forces and the rates of buildup thereof, variation of the gap distance will control the attractive force and, thus, the actuation time of individual hammers.

Since the hammer must strike the printing medium and rebound therefrom without excessive dwell time which would smear the character to be imprinted on the medium, a return spring 48 is provided. The return spring 48 is coupled to an adjusting screw 50 threadably engaged within bore 52 of the block 36. Thus, turning of the screw will advance the spring changing the return force applied to the hammer.

To stop the hammer travel and, thus, define the hammer penetration, a penetration stop comprising a set screw 54 threadably engaged within bore 56 in the block 36 is provided to engage the printing hammer penetration pad 58 at a selectable position of the hammer. Since screws 50 and 54 are adjustably positioned, control of the penetration of each hammer before striking the stop and control of the force provided by the return spring to return the hammer to its rest position is quickly and effectively controlled.

Thus, it can be seen that, with the apparatus of the present invention, each hammer can be individually adjusted for actuation time, return time, and penetration distance in the assembled module. Thus, the hammer module can be quickly and easily adjusted for optimum speed and operational balance.

In order to prevent the vibrational forces of operation from changing the set positions of the screw, a transverse bore 60 is provided in the block, the periphery of which intersects the bores 52, and 56. A deformable rod 62 as, for example, a nylon rod is inserted into bore 60. The periphery of the nylon rod, thus, engages the threads of screws 50 and 54 as shown specifically in FIG. 3, providing a frictional lock to prevent movement of the respective screws under vibrational forces of operation.

This invention may be variously modified and embodied within the scope of the subjoined claims.

What is claimed is:

1. A printing hammer module comprising printing hammers, a hammer control block having hammer guides positioned therein to guide said hammers during movement thereof, said block having penetration stop screws threadably engaged therein, each of said penetration stop screws being adjustably positioned to limit the travel of a respective hammer, return springs, return spring adjustment screws, each of said return springs being coupled to and carried by a return adjustment screw threadably engaged within said block and positioned to engage a respective hammer to apply a return spring load thereto, the magnitude of which is selected by adjustment of the position of said return spring adjustment screw, and means for frictionally holding penetration stop screws and said spring return spring adjustment screws in a selected position.

2. A printing hammer module in accordance with claim 1 in which said locking means comprises a bore in said hammer control block, a rod of deformable material positioned within said bore, the periphery of said rod extending into engagement with said penetration stop adjusting screw and said return spring adjusting screw thereby

to frictionally hold said screws in said predetermined positions.

3. A printing hammer module comprising a frame, a plurality of printing hammer assemblies pivotally mounted on said frame, each of said printing hammer assemblies comprising a printing hammer mounted on an arm on one side of said pivot point and an integral armature assembly mounted on the other side of said pivot point, electromagnetic coil means for each of said hammer assemblies to selectively attract the armature thereof thereby to pivotally move said hammer from a rest position to a printing position, a hammer flight control screw for each of said hammer assemblies, said flight control screw being threadably engaged within said frame and engaging the arm of the respective hammer assembly thereby to adjustably position said arm in a predetermined rest position and thereby to control the actuation time of said hammer assembly, a hammer control block coupled to said frame, said hammer control block comprising a penetration stop adjusting screw for each of said hammer assemblies, said screw being threadably engaged within said block and adjustable therein to engage said arm of said hammer assembly at the desired penetration position, a return spring for each of said hammer assemblies, a return spring adjusting screw threadably engaged within said control block, said return

spring being coupled to said return spring adjusting screw, said adjusting screw being adjustably positioned to control the position of engagement of said return spring with said hammer assembly arm thereby to control the force applied to the hammer in the energized position to return said hammer to the rest position, and means mounted in said control block for frictionally holding said adjusting screws in the predetermined positions.

4. A printing hammer module in accordance with claim 3 in which said last named means comprises a resilient rod mounted within a bore in said hammer control block, said resilient rod engaging the threads of said spring return and penetration stop adjusting screws thereby to frictionally lock said screws when in the predetermined positions.

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