Oct. 17, 1967 J. A. ALTONJI ET AL 3,347,159

ADJUSTABLE QUICK-RELEASE MECHANISM FOR PRINT DRUM

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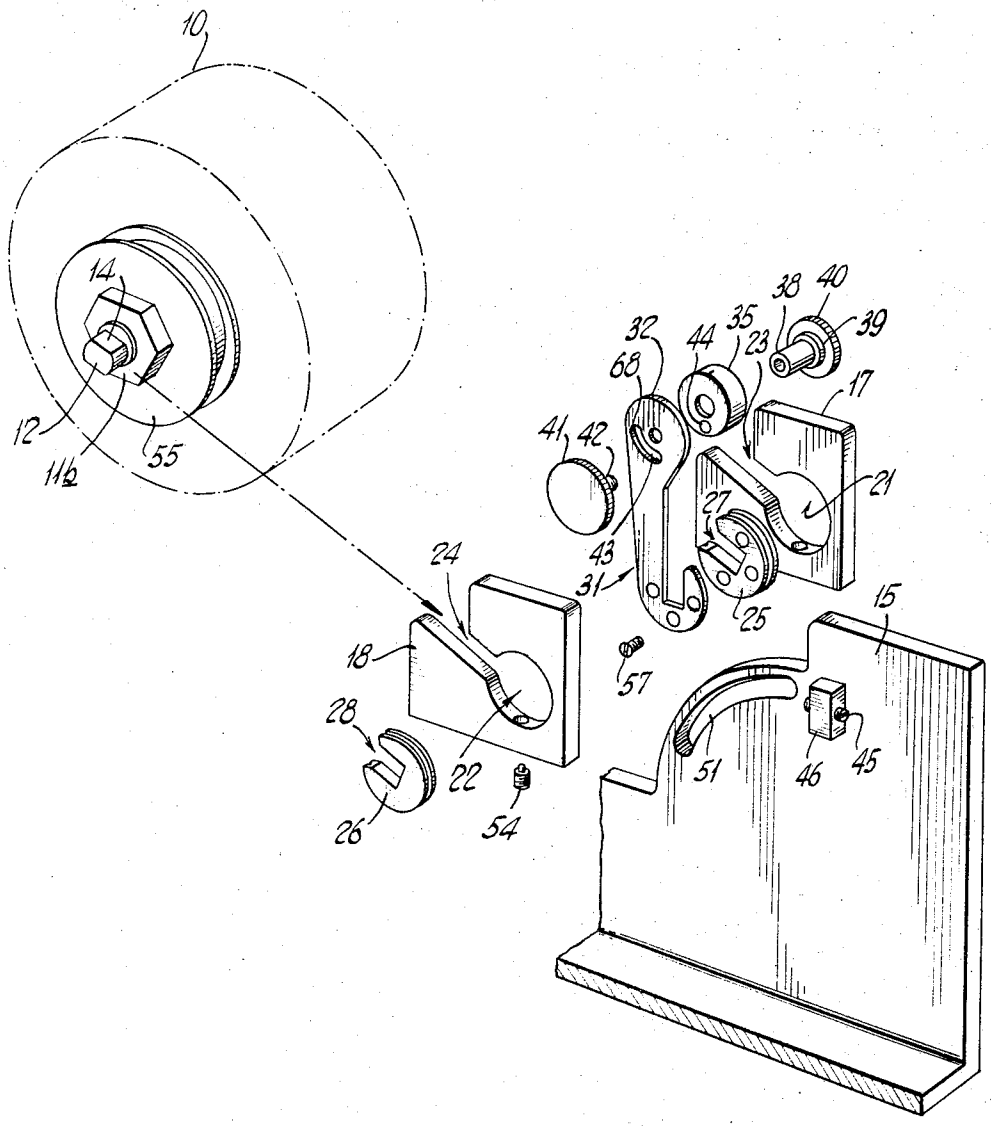


Fig. 1.

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Fig. 2.

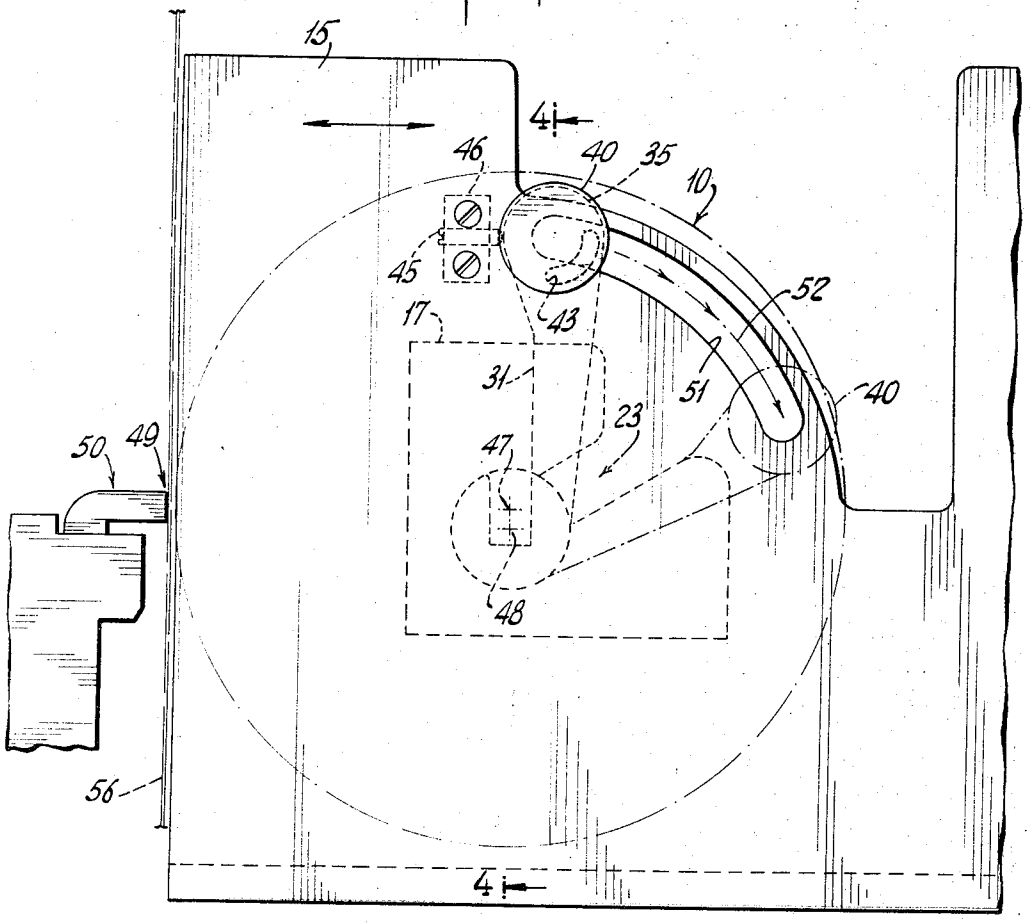
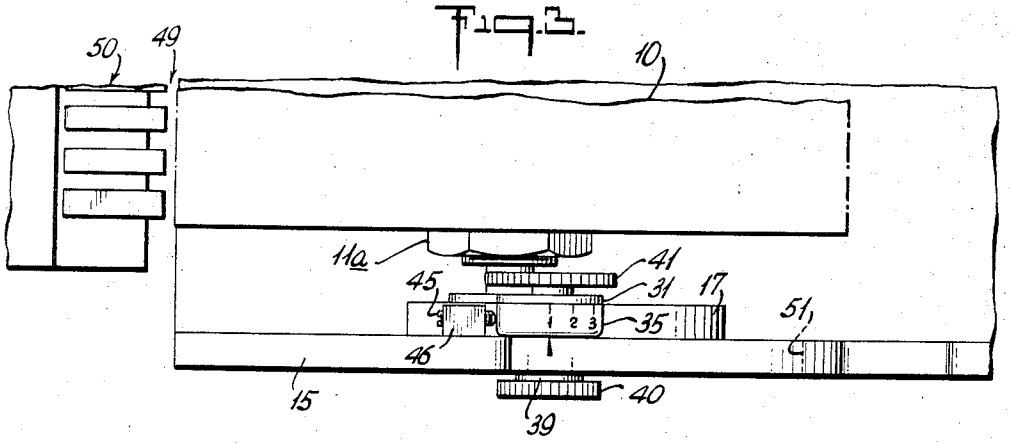


Fig. 3.



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Fig 4.

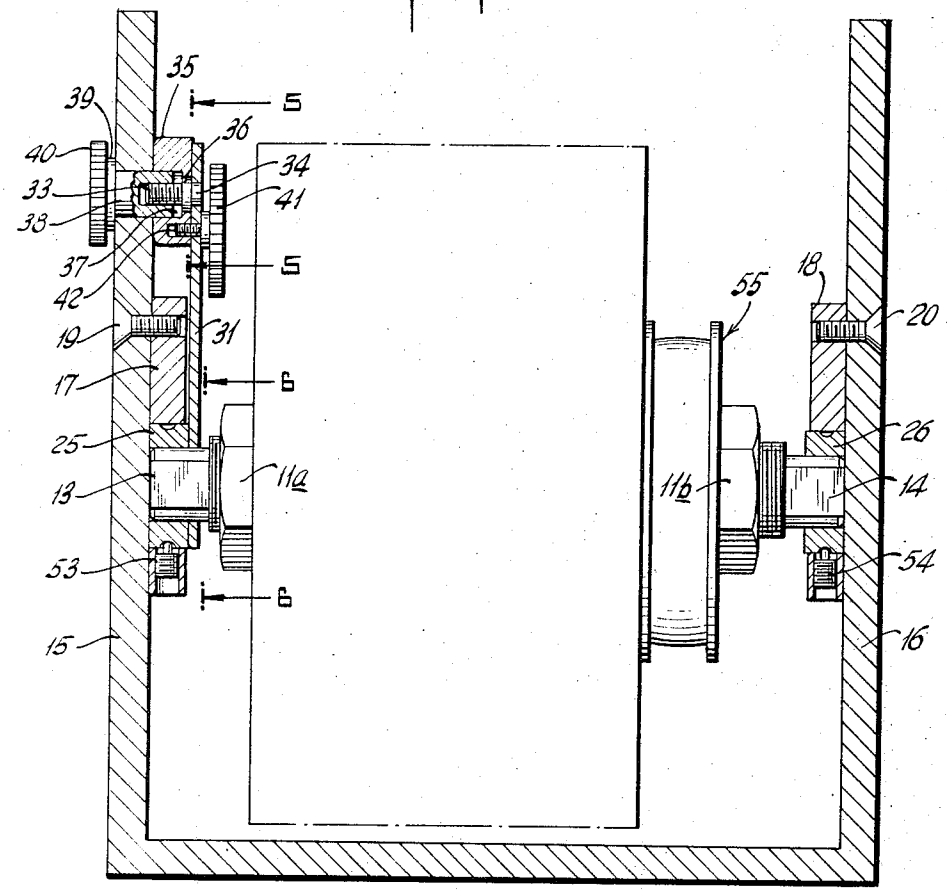


Fig 5.

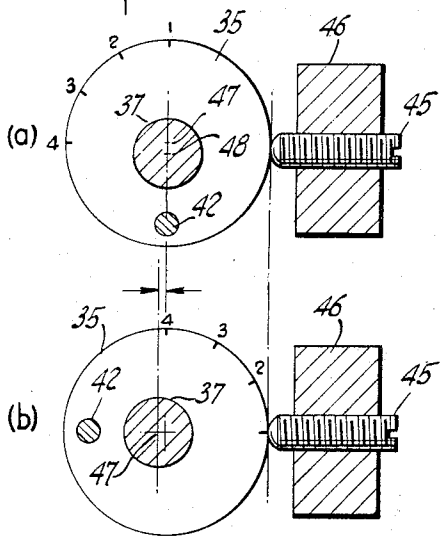
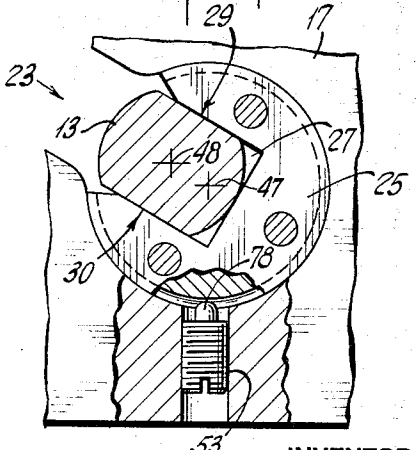


Fig 6.



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United States Patent Office 3,347,159
Patented Oct. 17, 1967

3,347,159

ADJUSTABLE QUICK-RELEASE MECHANISM FOR PRINT DRUM

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Filed Dec. 31, 1964, Ser. No. 422,621
4 Claims. (Cl. 101—93)

This invention, generally, relates to high speed printers for computers and, more particularly, to an improved mechanism for detachably mounting the printing drum of a high speed printer in an adjustable and easily releasable manner.

High speed printers, of course, are known to the art. In such printers, a massive, rapidly rotating drum is utilized to carry type characters in a predetermined pattern around its surface. A printing hammer module, or modules, extend along a line parallel to the axis of the drum positioning a plurality of printing hammers close to the periphery of the drum. A web of paper and carbon paper is fed through a gap between the hammers and the drum so that upon actuation of a selected hammer, the web is driven against the particular type character on the drum that is opposite the hammer at that instant.

From time to time, it is necessary to remove the drum for various reasons, such as for cleaning or to exchange the drum for one with new or different characters. With the drums known to the art, such removal and replacement has been relatively complex and time consuming, disabling not only the printer, but associated equipment.

High speed printers of the type with which the present invention relates must achieve high speeds primarily because the input is supplied by computer apparatus at relatively high speeds. The high speeds which are attained require that the frame portions of the printer apparatus be substantially rugged, massive and arranged rigidly relative to component parts thereof to avoid the development of vibrations which would affect the printing operation.

In such printer apparatus, it is necessary to have one portion of the frame attached to pivot away from another frame portion for such purposes as access to inner component parts for repairs, inserting paper supplies, etc. It is essential, therefore, that a latch assembly for attaching any movable frame portion in a printing position be at least as rugged as the frame itself, and more importantly, it is essential that such a latch assembly return the movable frame portion to an accurately predetermined position.

Therefore, it is one object of this invention to provide a quick release mechanism to attach a print drum in a printing position on a high speed printer.

A further object of the invention is to provide a quick release mechanism for adjustably securing a print drum within a high speed printer in a positive, accurately predetermined relationship.

In many instances, variation in print density occurs with a change of paper thickness, and it is desirable to control the gap spacing to compensate for such variations.

Accordingly, it is another object of this invention to provide a print drum mounting mechanism capable of gap compensation control in simple and efficient manner.

In accordance with these objects, there is provided, in a preferred embodiment of this invention, a print drum mounted rotatably on a shaft. The ends of the shaft are flat for fitting in a quick release mounting mechanism in a high speed printer.

The mounting mechanism comprises two brackets each having a passageway terminating in a cylindrical, rotatable bearing block. Each of the bearing blocks has a slot

to receive the respective ends of the print drum shaft so that the center line of the shaft is offset from the center of rotation of the bearing blocks. An arm is coupled at one end to one bearing block, and the other end of the arm has a lock to retain the arm in a desired pivotal position.

Thus, for removal or insertion of the drum, the arm and the bearing blocks are rotated until the slots therein are aligned with the passageway in the mounting brackets, whereupon the drum can be removed by sliding the ends of the shaft through the respective passageways.

When the drum is mounted for use, the arm is pivoted so that the slots in the bearing blocks are displaced from the passageway in the mounting brackets to lock the drum shaft positively within the mounting brackets. The end of the arm is provided with an eccentric cam for engaging a fixed stop so that rotation of the cam provides precise pivotal positioning of the end of the arm, thereby to adjust gap clearance for variation in the printing web material.

Having briefly described this invention, it will be described in greater detail in the following portions of the specification, which may best be understood by reference to the accompanying figures, in which:

FIG. 1 is an exploded perspective view obliquely from the rear of a print drum mounting mehanism in accordance with the present invention;

FIG. 2 is an elevation view of a printer constructed in accordance with the present invention;

FIG. 3 is a partial top view of the printer shown in FIG. 2;

FIG. 4 is a cross sectional view taken along the line 4—4 of FIG. 2;

FIG. 5 is a cross sectional view taken along the line 5—5 of FIG. 4; and

FIG. 6 is a cross sectional view taken along the line 6—6 of FIG. 4.

In the drawings, a print drum **10**, indicated in phantom lines, is mounted rotatably by suitable bearings **11***a* and **11***b* on a shaft **12**, the opposite ends **13** and **14** of which are flattened to form blade-like sections. This is best seen in FIGS. 1 and 6.

The numerals **15** and **16** identify, respectively, sides of a printer frame, and mounting brackets **17** and **18** are fixedly attached to the sides **15** and **16** by any suitable means such as, for example, a plurality of screws similar to the single screws **19** and **20** in FIG. 4. Each mounting bracket **17** and **18** has a cylindrical bore **21** and **22**, respectively, and a passageway **23** and **24** communicates externally of the mounting brackets from each respective bore **21** and **22**.

Two cylindrical bearing blocks **25** and **26** fit slidably and pivotally within the respective bores **21** and **22**, and a radially extending slot **27** and **28** in each block **25** and **26** communicates with the respective passageways **23** and **24** when the bearing blocks are in one pivotal position. The depth of each slot **27** and **28** is determined precisely so that the axial center line of the shaft **12** will be offset from the axial center line of the bearing blocks **25** and **26** when the blade-line ends **13** and **14** are inserted fully. The width of each slot **27** and **28** must be formed to receive the blade-line ends **13** and **14** of the shaft **12** in close fitting, sliding relationship, as illustrated by the numerals **29** and **30** in FIG. 6.

The print drum **10** may be removed simply and quickly when the bearing blocks **25** and **26** are pivoted to align the slots **27** and **28** with the passageways **23** and **24**. A more detailed description of this type of bearing block support for a high speed printer is set forth in U.S. Patent No. 3,118,369 of Carmine J. Antonucci, which is assigned to the assignee of this invention.

The present invention provides a single lever that also permits adjustment of the gap between the hammers and the drum to accommodate paper of various thicknesses. In accordance with the invention, an arm **31** is affixed to the block **25** by any suitable means such as, for example, three screws similar to the screw **57** in FIG. 1.

The end **32** of the arm **31** has an outwardly projecting, threaded pin **33**, which is shown clearly in greater detail in FIG. 4. This pin **33** is fixedly attached, as by brazing, to the end **32** of the arm **31**.

A disc **35** is rotatably mounted over the shoulder **36** of the pin **33** and has an enlarged opening **37** permitting rotation about a shaft **38** extending from a shoulder **39** on a knurled knob **40**. The shaft **38** is rotatable within an opening in the side **15** of the printer frame so that when the knob **40** is tightened by screwing it onto the pin **33**, the shoulder **39** locks the disc **35** firmly in place.

Another knurled knob **41** has a threaded part **42** for sliding readily through an arcuate slot **43** in the end **32** of the arm **31** for threading into an opening **44** in the disc **35**.

It is important that the opening in the disc **35** for receiving the shoulder **36** be off-center so that the periphery of the disc **35** will act as a cam when it is pivoted.

A set screw stop **45** is threaded into a shoulder **46** on the side **15** of the frame against which the disc **35** will bear, as best seen in FIG. 2, when the print drum **10** is in operating position. In this operating position, the axial center line, in FIG. 2, of the print drum is indicated by the point **47**, and the axial center line for both of the bearing blocks **25** and **26** is indicated by the point **48**.

Therefore, with the print drum **10** in operating position, a gap is formed at a point indicated by the numeral **49**, in FIG. 2, between the drum and a plurality of print hammers **50** to permit a web, indicated by the numeral **56**, to pass through. In the event multiple copies are desired to be printed, the thickness of the web **56** will vary. A rough adjustment for the gap **49** is provided by turning the set screw stop **45**, but a quicker and pre-calibrated adjustment is provided by the disc **35**, in accordance with the invention.

Referring to FIG. 5 particularly, two sketches are indicated by (*a*) and (*b*) depicting the disc **35** bearing against the set screw stop **45** in two different rotational positions for the disc **35**.

In FIG. 5(*a*), the axis **47** of the drum **10** lies in the same vertical plane as the axis **48** of the bearing blocks **25** and **26**. However, in FIG. 5(*b*), the disc **35** has been rotated 90° moving the axis **47** further from the set screw stop **45** due to the cam action of the disc **35**, and thus, the gap **49** between the drum **10** and the print hammers **50** is increased.

To adjust the gap **49** quickly, in accordance with the invention, the knurled knob **41** is loosened and the threaded part **42** is moved arcuately in the slot **43**. When the desired gap is obtained, the knob **41** is tightened. This may be calibrated, if desired, by a suitable index on the periphery of the disc **35**. For removing the drum **10**, the knurled knob **40** is loosened, and the shaft **38** is moved in an arcuate slot **51** in the side **15** in the direction of the arrows **52** in FIG. 2 to a point where the slot **27** lines up with the passageway **23**.

It may be seen that the bearing blocks **25** and **26** are retained in rotatable position by two set screws **53** and **54** each having a small knob to ride within a peripheral groove in each bearing block.

In operation, the drum **10** is rotated at high speeds by means of a suitable belt wrapped around a pulley **55** fixed to the drum **10**. In removing the drum **10** from the frame **15**, after the bearing blocks **25** and **26** are rotated by means of arm **31** to a position when the slots **27** and **28** in the bearing blocks **25** and **26** are aligned with the passageways **23** and **24**, respectively, the drum **10** may be grasped and removed by hand from the frame, for example.

In order to adjust the gap **49**, the arm **31** is moved a certain amount along the slot **51**, after the knob **41** has been loosened in the manner previously explained. As may be seen readily by an inspection of FIGS. 2 and 6, as the bearing blocks **25** and **26** rotate about their axes **48**, the drum axis **47** moves relative to the print hammer **50** owing to the fact that the axes **48** of the bearing blocks is off-set from the axis **47** of the drum **10**.

Inasmuch as the invention herein described is susceptible to many variations by one skilled in the art, all such variations are intended to be included within the scope of the invention as set forth in the claims appended hereto.

What is claimed is:

1. A high speed printer comprising:

a frame,

a printing hammer module mounted in said frame in a predetermined position,

a print drum mounted rotatably in said frame adjacent to said printing hammer module for rotation about a first axis,

said printing drum being rotatably mounted on a shaft extending along said first axis and extending from each end of said drum,

bearing blocks rotatably mounted in said frame about a second axis to receive respectively each end of said shaft, said bearing blocks holding said shaft with said first axis maintained displaced from said second axis within a predetermined range of rotation of said bearing blocks, and means to rotate said bearing blocks within said predetermined range to adjustably position said printing drum with respect to said printing hammer module.

2. A high speed printer in accordance with claim **1**, in which said bearing blocks include slots and said frame includes passageways which may be aligned with said slots in order to permit removal of said print drum.

3. A high speed printer in accordance with claim **2** in which said means for rotating said bearing blocks comprises a lever, one end of said lever being coupled to one of said bearing blocks, and the other end of said lever being movable along a predetermined arc for adjustment of the clearance between the drum and the printing hammer module.

4. A high speed printer in accordance with claim **3**, which includes an eccentric cam mounted on the other end of said lever, a stop fixedly positioned on said frame, and means for rotating said cam to move said end of said lever over a predetermined arc, for adjustment of the clearance between said drum and said hammer module.

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