Aug. 27, 1957 L. E. BROUGHAM 2,804,015

PRINTING GAP ADJUSTING DEVICE FOR PRINTING MACHINES

Filed July 19, 1955 4 Sheets-Sheet 1

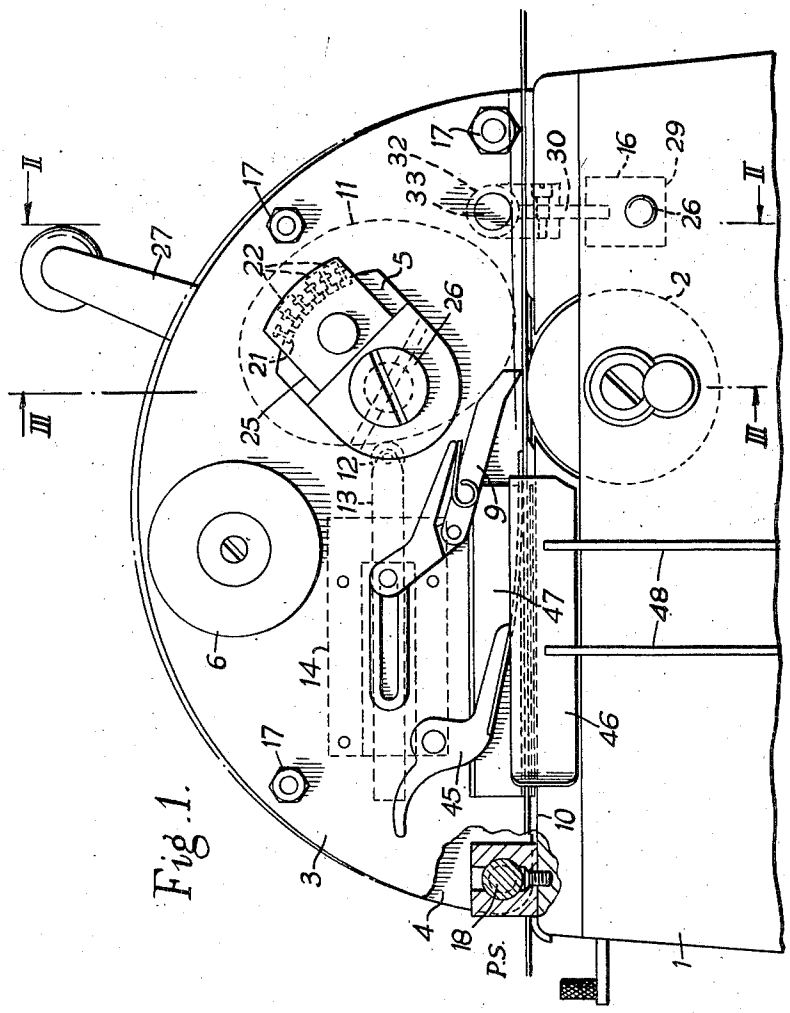


Fig. 1.

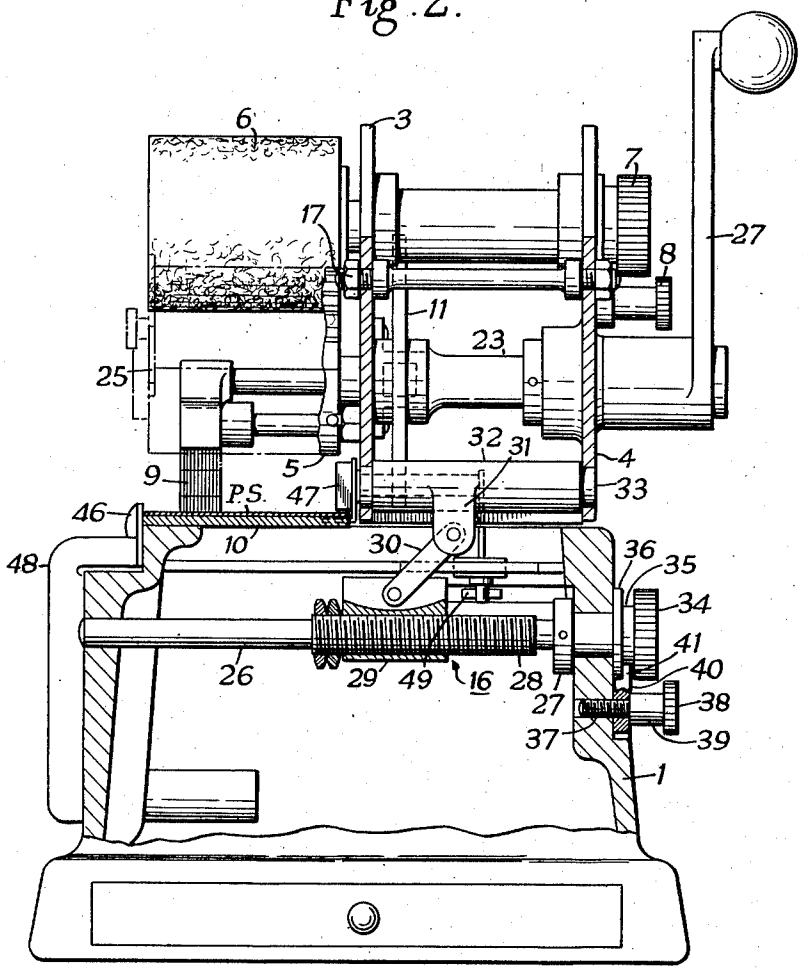
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Fig. 2.



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Fig. 3.

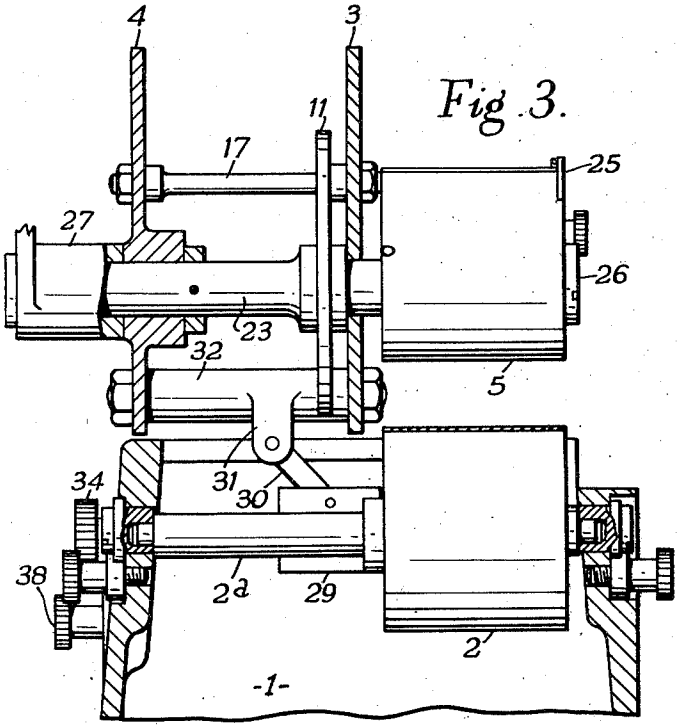


Fig. 5.

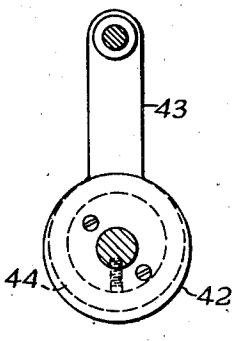
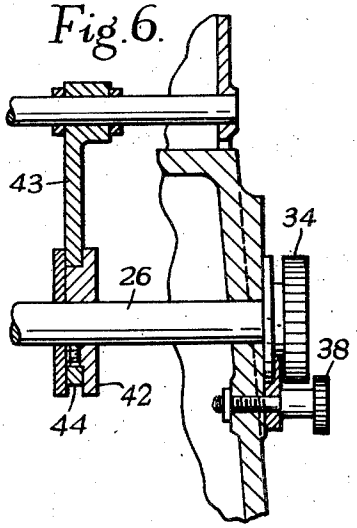


Fig. 6.



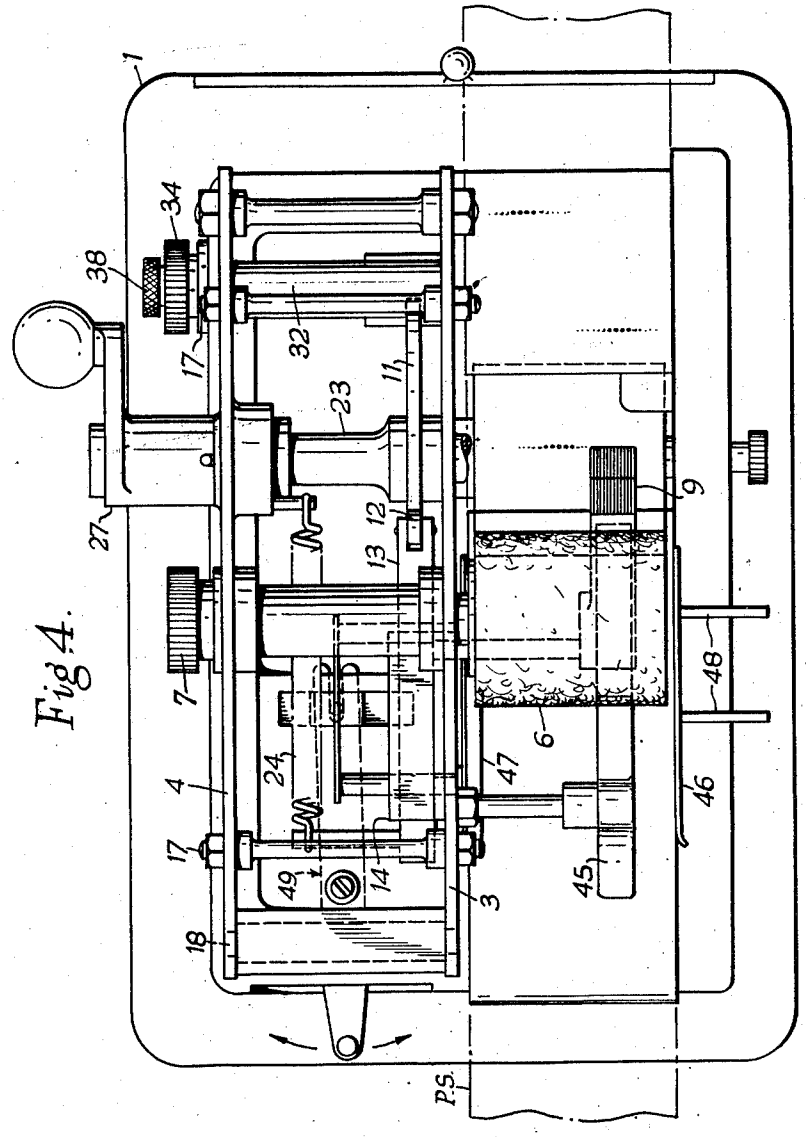
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Fig. 4.



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PRINTING GAP ADJUSTING DEVICE FOR PRINTING MACHINES

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Claims priority, application Great Britain July 22, 1954

6 Claims. (Cl. 101—247)

This invention relates to rotary printing and the like machines and more particularly, but not exclusively, to machines adapted to perform a repetition printing or similar operation upon perforated strip material to form, for example, sales tickets or labels.

In the Patent 2,694,974 of F. J. Briggs is described a rotary printing machine in which a continuous strip of perforated ticket- or label-forming material can be printed upon to form, for example, a sales ticket or label wherein the perforated strip material is intermittently fed over a feed table to a printing couple comprising a driven printing member and a freely-rotatable but non-driven counter-pressure roller, the said printing member comprising a cylindrical segment whose surface is provided with channels, for attachment thereto of readily replaceable type, whereby for each rotation of the printing member a printed impression is made upon the strip material. In such a machine the feeding of the strip material is effected partly by frictional feeding means attached to the printing member and operative during printing, and partly by positively acting feeding means comprising registering or rectifying claws which are reciprocated to pass underneath the part-cylindrical printing member so as to engage with the perforations of the strip material and to register each label or ticket accurately in the printing position.

In such machines very accurate adjustment is required of the feed gap between the printing member and the counter-pressure roller in order to provide for the accurate printing and feeding of perforated strip of various thicknesses and various kinds of surfaces. In known machines this adjustment has usually been effected by moving the counter-pressure roller, in which case the adjustment device comprises an adjusting shaft mounted in eccentric relation to the shaft of the counter-pressure roller and means for adjusting the eccentric shaft and for clamping it in any desired position. With such a device, it will be understood that the counter-pressure roller is raised or lowered so as to project to a greater or less degree above a gap provided in the feed table.

The object of the present invention is to provide an improved means for adjusting the feed gap between the printing couple, especially in machines adapted for printing on continuous strip material.

In accordance with the present invention, in a printing or the like machine adapted to operate upon copy material which is fed between a printing couple comprising an upper printing member and a lower counter-pressure roller, adjustment of the gap between the two members comprising the printing couple is effected by mounting the counter-pressure roller in bearings in a fixed base portion of the machine, and by mounting the printing member on a movable machine head above the base and arranging the machine head to be bodily adjustable with respect to the fixed base of the machine. The machine head will, in general, be pivoted about an axis parallel to the printing couple. Preferably the pivoting axis is remote from the feed gap between the printing couple whilst an adjusting device for raising or lowering the machine head is arranged in the fixed base of the machine at a point so chosen with respect to the printing axis and the feeding couple as to assist in giving the required fine degree of control of the feed gap whilst giving adequate support to the machine head. By properly choosing the length of the pivoting arm and the type of adjustment the feed gap and the printing pressure may be varied between any desired limits to obtain the correct adjustment for various thicknesses and types of paper surface.

In general an adjusting shaft arranged in the machine base is operatively connected to the end of the machine head at a point remote from the pivoting axis by means of a lifting link, this operative connection being such that the lifting motion of the link is very small compared with the angular motion of the adjusting shaft and also bears a non-linear relation to said angular motion.

A preferred form of adjusting device comprises a feed gap adjusting shaft journalled between back and front walls of the fixed base of the machine, and carrying a screw thread for traversing a nut carried in a lifting link for the machine head. Above the adjusting shaft there is provided a cross bar extending between back and front plates which form the main supporting members of the machine head. The lifting link is pivotally connected to the cross bar above referred to and its lower end carries the adjusting nut.

An example of the construction according to the invention will now be described in more detail as applied to a machine of the kind above referred to in which a continuous strip of perforated ticket material is fed from a supply roll to a printing couple and is there printed or over-printed to form a series of sales tickets or labels.

In the accompanying drawings:

Fig. 1 is a front elevation of a machine of the type above referred to provided with feed gap adjustment according to the invention;

Fig. 2 is a section taken on the line II—II of Fig. 1;

Fig. 3 is a section on the line III—III of Fig. 1;

Fig. 4 is a plan view.

Figs. 5 and 6 show an alternative adjusting means.

The general arrangement of the machine will first be described.

The framework of the machine comprises a box-like hollow base **1** the back and front walls of which house the plain journal bearings for the shaft *2a* of a counter-pressure roller **2**. Above the base is the machine head comprising two vertical side plates **3** and **4** of substantially semi-cylindrical shape secured together by stay bolts **17**, and which support the bearings for the rotary printing head **5** and an inking roller **6**, which latter is eccentrically mounted, for adjustment with respect to the printing head. The adjustment is provided by an adjusting knob **7** for rotating the bearing supports and a locking plate **8** for locking the adjusting knob in any desired position. The side plates **3** and **4** also enclose a cam driven mechanism for reciprocating a set of feed claws **9** in timed relation with the rotation of the printing head so that the perforated strip PS drawn from a supply spool (not shown) is fed over the feed table **10** of the machine in correct register with the printing head. The cam mechanism comprises a cam **11** rigidly secured to the rotary shaft **23** of the printing head and co-operating with a cam follower roller **12** carried at the end of a bar **13** which is slidably mounted in a box **14** and which is urged against the edge of the cam by a spring **24**. The printing head **5** is keyed to the operating shaft **23**, the front end of which is tapped to receive a retaining screw **26** and the rear end of which projects through the bearing plate **4** and carries a hand crank **27**. The cylindrical surface of the printing head **5** is slotted par-

allel to its rotation axis to receive type retaining bars **21**, between which a convenient number, say up to at least 5, rows of removable type elements **22**, some of which are shown in Fig. 1, are held in position by means of clips in the known manner. The printing head is also fitted with a friction feed plate **25** for feeding the strip forward during printing through a distance at least equal to the arc length of the type rows.

According to the invention the machine head is bodily movable with respect to the base **1** and for this purpose the machine head is pivoted about a pivot shaft **18** and the size of the feed gap is varied by an adjusting device indicated by the general reference **16**, which also serves to support the machine head during printing.

The adjustment device comprises an adjusting shaft **26** journalled in the back and front walls of the base **1**, and axially locked by a locking collar **27**. The shaft is threaded at **28** over a portion of its length to receive a nut **29** consisting of a tapped block which is connected by a freely pivoted link **30** to a lug **31** formed on a sleeve **32** surrounding a stay rod **33** whose ends are spigoted into the plates **3** and **4**.

One end of the adjusting shaft **26** is extended through the wall of the fixed base of the machine and is formed with a knurled head **34** which is separated by a narrow neck **35** from a flange **36** which lies flush against the outside wall of the machine casing or against a suitably formed boss. A clamping device for locking the adjusting shaft in any desired position is arranged adjacent the knurled head of the adjusting shaft. The clamping device comprises a thumb screw **37** having a knurled head **38** and fitted in a tapped bore in the casing wall. Freely carried on the shank of the thumb screw and between a shoulder **39** thereof and the wall of the casing is a clamping segment **40** comprising a plate having a concave edge portion **41** of the same curvature as the neck of the adjusting shaft and lying against the flange **36** of shaft **26**. By turning the clamping screw the clamping segment is tightened against the fixed flange portion of the adjusting shaft whereby the adjusting shaft may be securely held in any desired position. When it is desired to adjust the gap between the printing couple the clamping screw is slackened off, thereby releasing the adjusting shaft, which is turned by its knurled head, thereby raising or lowering the machine head about the pivoting axis. The adjusting shaft is again clamped in the adjusted position by tightening the clamping screw. If desired a vernier type scale calibrated in thousandths of an inch of paper thickness may be provided partly on the flanged portion of the adjusting shaft and partly on a fixed boss or the casing wall so as to indicate the size of the gap between the printing couple.

By arranging that the machine head carrying the printing member is bodily movable with respect to the fixed base in the manner above described adjustment of the feed gap and of the printing pressure may be effected without disturbing the relative arrangement of the feed table and the counter-pressure roller, and these parts may be fixed so as to give the smoothest possible passage to the copy material under all conditions.

In the example shown in the drawings the adjusting device for the machine head has been described as comprising a screw shaft and nut operating a lifting link, this arrangement giving positive adjustment and firm support for the printing head. It will be understood however that an equivalent mechanism can be fitted. For example as shown in Figs. 5 and 6 the eccentric sheave **42** keyed to shaft **26** may work within the eye **44** of a lifting arm **43** to raise or lower the machine head.

In the operation of the machine, as the printing member is rotated the friction feed plate **25**, which is adjacent to and equal in length to the printing surface presented by the type rows, frictionally engages the margin of the strip material and feeds the strip forward by a distance substantially equal to the segment of arc corresponding to the printing surface, and, after the ticket has been printed and fed as above described the registering claws **9** advance into the printing position underneath the printing head **5** and feed the strip forward by the necessary distance to bring the next ticket into the printing position. During feeding and printing the strip PS is held flat on the feed table by the brake **45** and laterally guided by the lay guides **46** and **47** which are adjustable by adjusting means **45** and **49** respectively.

I claim:

1. In a printing machine adapted to operate upon perforated strip material, a rotary printing couple comprising an upper rotary printing member and a freely rotatable counter-pressure roller; a machine head carrying bearings for the rotary printing member, means for rotating the printing member and means for feeding the strip material in timed relation with the rotation of the printing member; a machine base carrying bearings for the counter-pressure roller, and means for adjusting the size of the printing gap between the printing member and the counter-pressure roller comprising a pivot for the machine head at that end thereof remote from the axis of the counter-pressure roller and an adjusting device at the other end of the machine head supporting the weight of the machine head and the strip feeding means, said adjusting device comprising a rotatable adjusting shaft extending in the machine base parallel to the printing couple, bearings in opposite walls of the machine base supporting the said adjusting shaft, a threaded portion on said adjusting shaft, a traversing nut running on the threaded portion of the shaft, a lug secured to a fixed portion of the machine head substantially in a vertical plane through the adjusting shaft, and a link pivotally connected to the traversing nut and to the said lug.

2. In a printing machine adapted to operate upon perforated strip material, a machine head comprising side plates rigidly connected together, a shaft journalled in said side plates, a printing member secured to the said shaft, a crank at one end of said shaft for rotating the printing member and means for feeding the strip material in timed relation with the rotation of the printing member; a machine base carrying bearings for a freely rotatable counter-pressure roller, a pivot shaft for the machine head at one end thereof remote from the printing couple, said pivot shaft being parallel to the printing member shaft, and a printing gap adjusting device at the other end of the machine head supporting the weight of the machine head and the strip feeding means and connecting the machine head to the base, said adjusting device comprising a rotatable adjusting shaft extending in the machine base parallel to the axis of the printing member, a threaded portion on said adjusting shaft, a nut running upon the threaded portion and a lifting link connecting the said nut to the machine head.

3. In a printing machine adapted to operate upon perforated strip material, a machine head comprising side plates rigidly connected together carrying bearings, a shaft carried in said bearings and a rotary printing member secured to the shaft, means for rotataing the printing member and means for feeding the strip material in timed relation with the rotation of the printing member; a machine base carrying bearings for a freely rotatable counter-pressure roller, and means for adjusting the size of the printing gap between the printing member and the counter-pressure roller, said adjusting means comprising a pivot shaft for the machine head at one end thereof remote from the printing couple, said pivot shaft being parallel to the printing member shaft, and an adjusting device at the other end of the machine head supporting the weight of the machine head and of the strip feeding means and connecting the machine head to the base, said adjusting device comprising a lead screw extending in the machine base parallel to the axis of the printing member a traversing nut

carried on the lead screw and a lifting link pivoted at one end to the nut and at tthe other end to a rigid part of the machine head.

4. In a printing machine adapted to operate upon perforated strip material, a machine head comprising side plates rigidly connected together, bearings in each of said side plates, a shaft carried in said bearings, and a rotary printing member secured to said shaft, means for rotating the printing member and means for feeding the strip material in timed relation with the rotation of the printing member; a machine base carrying bearings for a freely rotatable counter-pressure roller, a pivot shaft for the machine head at one end thereof remote from the printing couple, said pivot shaft being parallel to the printing member shaft, and a printing gap adjusting device at the other end of the machine head supporting the weight of the machine head and of the strip feeding means and connecting the machine head to the base, said adjusting device comprising an adjusting lead screw shaft carried in bearings in the machine base, a traversing nut on said lead screw and a lifting link connecting the nut to the machine head, the lifting motion of said link when transmitted to the machine head being normal to the lead screw axis and said link moving in a plane substantially parallel to the adjusting shaft during the lifting motion.

5. In a printing machine adapted to operate upon perforated strip material a machine base carrying bearings, a freely rotatable counter-pressure roller, carried in said bearings, a machine head having side-plates rigidly connected together carrying journal bearings for a driven rotary printing member said printing member carried in said journal bearings and said counter-pressure roller together forming a rotary printing couple,

said machine head also housing means for feeding the strip material in timed relation with the rotation of the printing member; said machine base enclosing means for adjusting the size of the printing gap between the printing member and the counter-pressure roller comprising a pivot shaft for pivotally connecting the machine head and the base at one end thereof remote from the printing couple, said pivot shaft being parallel to the printing member shaft, and an adjusting device at the other end of the machine head including an adjusting shaft in the machine base, a lug member secured between the side plates of the machine head, said adjusting shaft and the lug member being parallel to the pivot shaft, a link extending between the said lug member and the adjusting shaft and means carried on said adjusting shaft and connected to said link for imparting lifting motion to the link and the machine head having a non-uniform relation to angular movement of said adjusting shaft.

6. A machine as claimed in claim 2 wherein the adjusting shaft is provided with a manually adjustable head which is locked in the adjusted position by a locking member, said locking member comprising a clamping plate carried on a locking screw and engaging with a flange on the adjustable head.

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