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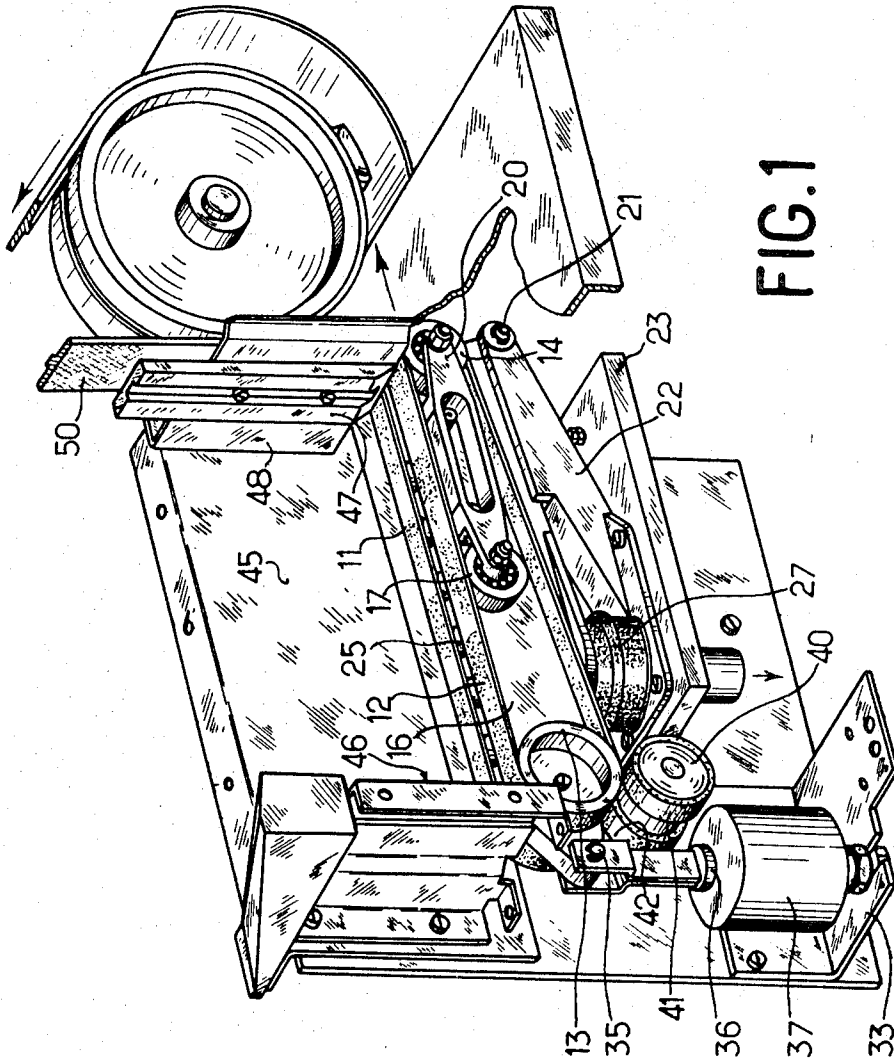
G. J. KEULEN ET AL

3,570,843

DOCUMENT-EXTRACTING MECHANISMS FOR MAGAZINES FOR
SUPPLYING RECORD CARDS, CHEQUES OR THE LIKE

Filed Feb. 7, 1969

3 Sheets-Sheet 1



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Inventors:

Gerben Jan Keulen

Johannes Petrus Kroes

BY Baldwin Wright Diller & Brown
Attorneys

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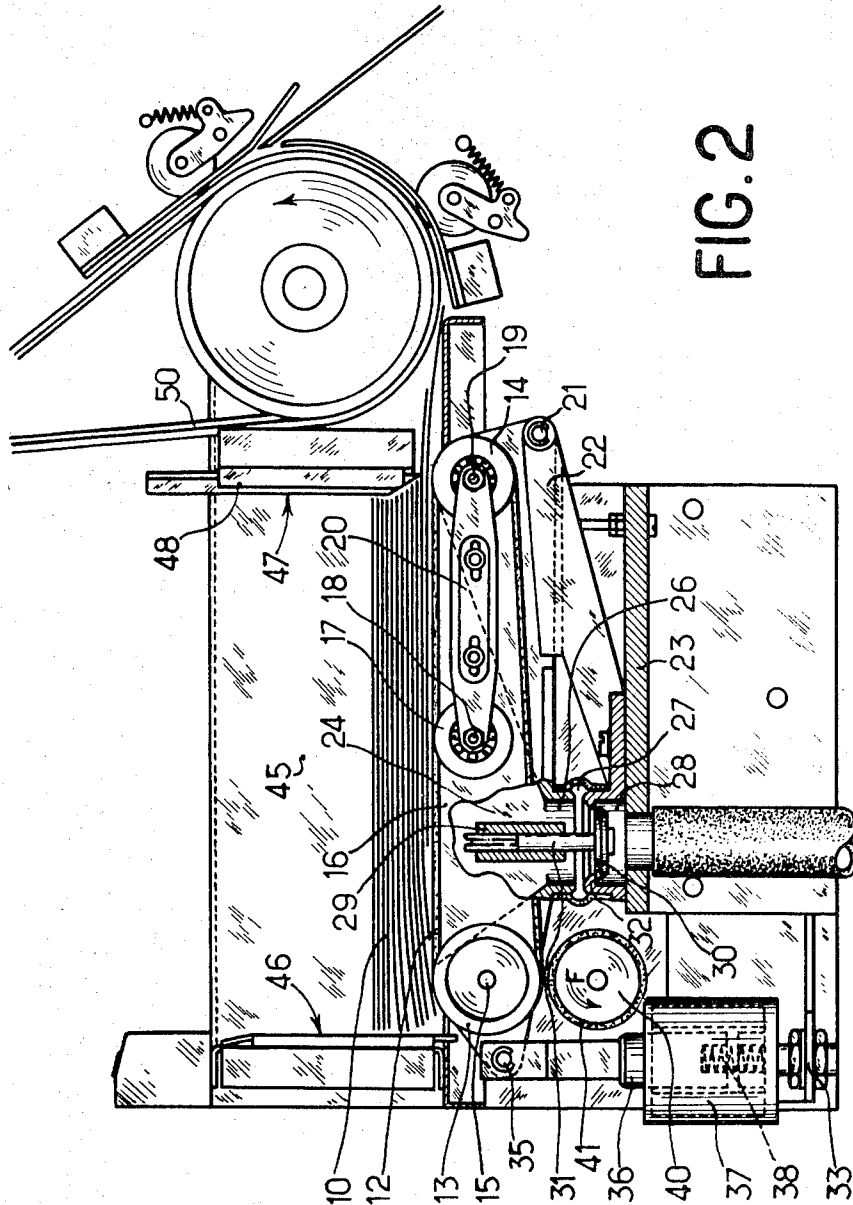


FIG. 2

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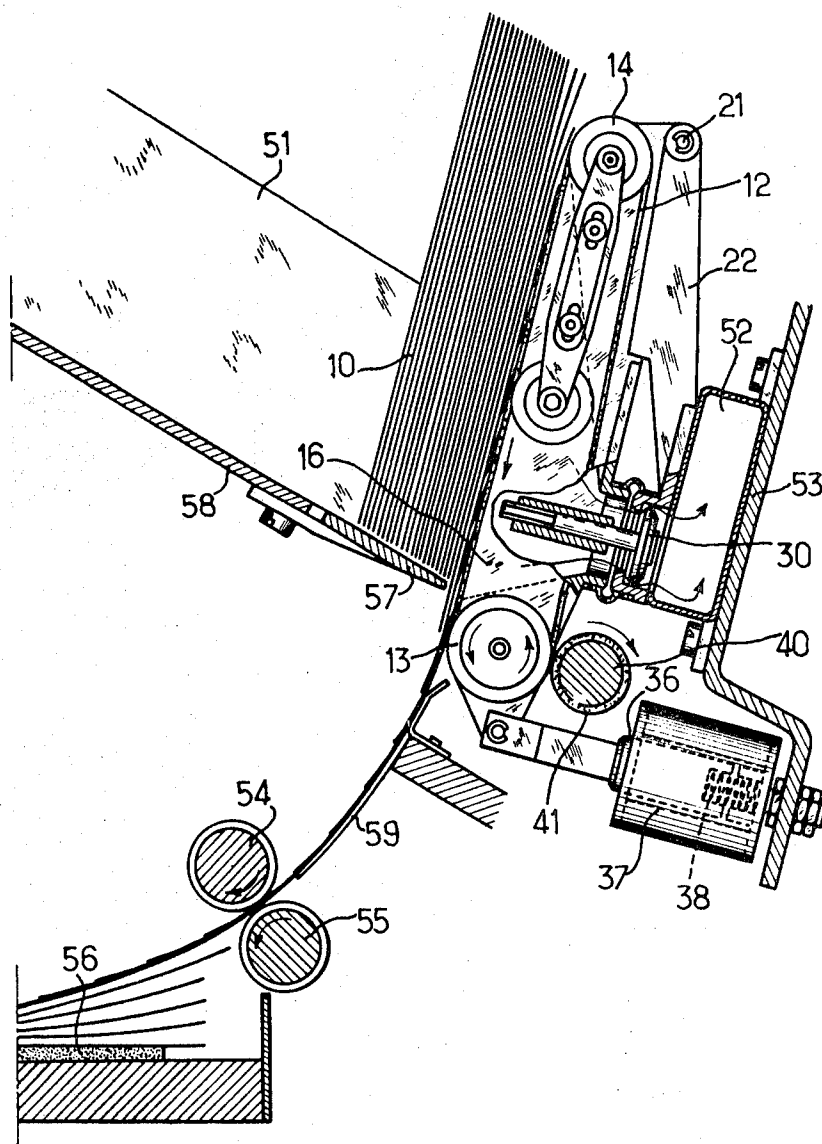


FIG. 3

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DOCUMENT-EXTRACTING MECHANISMS FOR MAGAZINES FOR SUPPLYING RECORD CARDS, CHEQUES OR THE LIKE

Gerben Jan Keulen, Amsterdam-Zuid, and Johannes Petrus Kroes, Amsterdam, Netherlands, assignors to Bull General Electrical (Nederland) N.V., Amsterdam, Netherlands

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8 Claims

ABSTRACT OF THE DISCLOSURE

The invention concerns, in a record-card supply magazine, a mechanism for extracting documents by means of a conveyor belt with pneumatic assistance in which a conveyor belt is mounted on a movable support in proximity to a driving shaft on one side and in proximity, on the other side, to a throat controlling the passage of the documents, a valve for controlling negative pneumatic pressure being partially fast with the movable support, which can occupy one of two positions under the action of an electromagnet, so that in the first position the belt is stopped and the valve and the throat are closed, while in the second position the belt is driven by the shaft, and the valve and the throat are open for the extraction of the cards.

The present invention relates to improvements in document-extracting mechanisms for magazines for supplying record cards, cheques or the like and concerns more particularly improvements in extraction mechanisms in which documents are extracted from the bottom of a stack by the combined action of the friction exerted on these documents by a travelling conveyor belt with the action of a negative pneumatic pressure, acting on at least a part of the said documents, so as to increase the action of the friction of the belt on the said documents.

Mechanisms of this kind are known and may be adapted to extract documents one-by-one separately or to distribute partially overlapping documents, that is to say, each document leaving the magazine partially overlaps the preceding document, while it is itself partially overlapped by the succeeding document, under conditions which are determined by the combined action of the movement of the conveyor belt and of the pneumatic action and also by the adjustment of a throat device disposed at the delivery end of the magazine.

The latter mode of extracting documents is employed, for example, to redistribute record cards accumulated in a buffer magazine. A buffer magazine may be adapted to effect in a predetermined manner the delivery of cards from a high-capacity supply magazine provided with a card-retaining and transferring device, or to effect the delivery of the cards from a reception magazine in a sorting machine operating with automatic recycling.

In magazines provided with an extraction mechanism comprising a pneumatically assisted conveyor belt, the means for setting the belt in motion and the means for applying a negative pneumatic pressure are generally actuated by separate means. Consequently, the means for actuating these devices, which must also be synchronised with one another, are generally fairly complex and of costly construction. With the object of simplifying these actuating means, it is often found desirable, in the course of the use of a machine, to control only the setting in motion and the stopping of the conveyor belt, while the negative pneumatic pressure is maintained in the

extraction mechanism even while the conveyor belt is stopped. Apart from the noise produced by the air intake orifices at the level of the belt and of the appreciable loss of energy resulting therefrom, the maintenance of the negative pneumatic pressure in the magazine may be detrimental to the correct positioning of the first documents which are introduced into an empty magazine.

The present invention has for its object to obviate these disadvantages and to provide document-extracting mechanisms provided with reliably operating control and actuating means of simplified construction, in which the starting and stopping of the conveyor belt, the opening and closing of a pneumatic valve and optionally the opening and closing of a throat controlling the delivery of the cards are effected by means of a single actuating member, for example an electromagnet, depending upon whether or not the latter is energized.

In a document supply magazine, an extraction mechanism according to the herein disclosed representative embodiment of the invention comprises at least one conveyor belt passed over guide pulleys which rotate on spindles carried by a support, which is formed with orifices communicating with an internal cavity connected to a negative air pressure duct, the said orifices being so arranged as to supply a negative air pressure co-operating with the action of the conveyor belt, in order to carry along documents which are to be extracted through a throat when the said belt is driven by a driving mechanism; the extraction mechanism being characterised in addition in that the support of the belt is movable about a spindle situated close to a first guide pulley and may occupy one of two positions under the action of an actuating member carried by the said support; a driving member comprising a constantly rotating shaft disposed close to a second pulley, in proximity to the conveyor belt so that when the support of the said belt is in the first position, the latter is not in contact with the driving shaft and in such manner that when the said support is in the second position, the conveyor belt is brought into contact with the driving shaft and is driven thereby. The internal cavity of the support is connected to a fixed negative air pressure duct through a second flexible fluid-tight union permitting a displacement of the movable support in relation to the said fixed negative air pressure duct; a closure valve is disposed between the internal cavity of the movable support and the fixed negative air pressure duct, one portion of the said valve being fast with the movable support and another portion being fast with the said fixed duct so that, when the movable support is in the first position, the valve is closed, while the said valve is open when the movable support is in the second position.

Further advantages and features of the invention will become more clearly apparent in the course of the following description and with reference to the accompanying drawings, in which:

FIG. 1 is a view in perspective of the main elements of the mechanism for extracting cards from a card supply magazine, in accordance with a first embodiment,

FIG. 2 is a view showing some internal details of the mechanism of FIG. 1, and

FIG. 3 illustrates the arrangement of the main elements of an extraction mechanism adapted in a second embodiment for the recycling of the cards from a reception magazine in a sorting machine operating with automatic recycling.

In the buffer magazine illustrated in FIGS. 1 and 2, record cards 10 coming from an inclined storage compartment (not shown) disposed above the buffer magazine are transferred in known manner, so as to be stacked in the said buffer magazine on a card extraction mechanism comprising conveyor belts in which two belts 11 and 12

parallel to one another are mounted symmetrically on a support 16. The belt 12 is passed around two pulleys 13 and 14 so mounted as to be able to rotate on spaced spindles 15 and 19 respectively. The spindle 15 is secured to the support 16, while the pulley 14 and an intermediate pulley 17 are mounted on spindles 18 and 19 fast with a support 20 adjustable on the support 16 for tensioning the belts. One end of the support 16, close to the pulley 14, is so mounted as to be able to oscillate about a pin 21 fast with a support 22 secured to a fixed bed 23. The movable support 16 has an internal cavity 24 formed in its upper part with apertures 25 opening (FIG. 1) between the belts 11 and 12. The cavity 24 is formed in its lower part with an orifice 26 which is connected to a fixed negative air pressure duct 28 by means of a flexible and fluid-tight union 27. An adjustable valve element means 30 is provided with a stem 31 screwed into a portion 29 of the support 16 so as to be movable in response to movement of the support. The valve element 30 is so adjusted as to be able to rest on a relatively fixed valve seat element 32 provided inside the fixed duct 28. The other end of the support 16, close to the pulley 13, is coupled by a joint 35 to the movable armature 36 of an electromagnet 37, the fixed frame of which is fast with a fixed support 33 and is internally provided with a return spring 38 which urges the movable armature 36 upwards, so as to maintain the valve 30 against its seat 32 when the electromagnet is not energised. Disposed below the pulley 13 (FIGS. 1 and 2) and the pulley symmetrical therewith on the support 16 is a driving shaft member 40 provided with friction rings 41 and 42 situated opposite the belts 11 and 12.

The cards which are transferred into the buffer magazine and arrive through the top are automatically stacked above the conveyor belts and between vertical walls comprising a rear wall 45, a left-hand wall 46, the internal face of a throat plate 47 to the right and a front wall which is assumed to have been removed in FIGS. 1 and 2 for the sake of the clarity of the drawing.

The throat plate 47 is secured to a wall 48 of the magazine at a predetermined height so that its lower portion is above the belts 11 and 12, at a distance depending upon the total thickness formed by the cards which are allowed to leave the magazine through the said throat when the conveyor belts are set in motion.

When the electromagnet 37 is not energised, the cards 10 rest in the magazine (FIG. 2) on the conveyor belts, and negative air pressure is established in the fixed duct 28, the movable support 16 being in its initial position, and the valve 30 then being applied to its seat 32 by the action of the spring 38, which is situated inside the unenergised electromagnet 37, while the shaft 40 rotates in the direction indicated by the arrow F (under the action of a motor not shown). The friction rings 41 and 42 on the said shaft 40 are at such a distance from the belts 11 and 12 (FIG. 1) as not to drive them, and the extraction mechanism is thus not operating. For the extraction of cards, the mechanism operates as follows: the electromagnet 37 is energised and the movable armature 36 of the said electromagnet is displaced downwards by magnetic attraction. In this movement of the armature, the spring 38 is compressed and the support 16 pivots about the fixed pin 21 and is brought into its second position. The belts 11 and 12 are brought into contact with the friction rings on the shaft 40, which is rotating and drives the belts 11 and 12. At the same time, the valve 30 is lowered, the negative air pressure reaches the suction orifice means 25 between the belts, and the cards situated at the bottom of the stack are vigorously applied by this negative pressure against the belts, which carry them along so as to deliver them from the magazine through the throat plate 47. In the example illustrated in FIGS. 1 and 2, the extracted cards are taken up on leaving the magazine by a conveyor belt 50 which conducts them to another part of the machine.

When the electromagnet 37 is de-energised, the spring 38 returns the support 16 into its initial position and the extraction of cards is stopped.

In the second embodiment illustrated in FIG. 3, an extraction mechanism is adapted to recycle the cards from a reception magazine is a sorting machine operating with automatic recycling. Parts shown in FIG. 3 which are already shown in FIGS. 1 and 2 are denoted by the same references as in these figures. The mechanical parts other than those intended to retain the cards in this magazine or to extract them therefrom are not shown. In FIG. 3, cards 10 are stacked almost vertically in an inclined magazine, which comprises a base plate 58 and side walls 51 disposed on each side of the stack of cards. The front wall is assumed to have been removed for the sake of clarity of the drawing. An adjustable throat plate 57 is secured to the base plate 58. The support 16 is adapted to pivot about the pin 21 fast with the support 22, which is in turn secured to a negative-pressure tank 52, which is fast with a fixed support 53, as also is the electromagnet 37. In FIG. 3, the shaft 40 turns in the direction opposite to that indicated in FIGS. 1 and 2 and the throat plate 57 is in proximity to the pulley 13 instead of the pulley 14. The direction in which the cards are delivered is therefore opposite to that of FIGS. 1 and 2.

In FIG. 3, the extraction mechanism is shown in operation, i.e. with the electromagnet energised and the support 16 in its second position. Under these conditions, the belts 11 and 12 are in contact with the friction rings 41 and 42 of the shaft 40 and are driven. The valve 30 is open and the negative air pressure is applied between the belts 11 and 12, and cards are extracted from the magazine and directed by a fixed deflector 59 to rolls 54 and 55 which deposit them on a conveyor band 56. In order to stop the extraction mechanism, the electromagnet 37 is de-energised and the spring 38 urges away the movable armature 36 and the support 16 fast therewith returns into its initial position. The conveyor belts are moved away from the shaft 40 and stop, the valve 30 is closed and the space between the throat plate 57 and the conveyor belts is closed, at least partially. Generally speaking, the extraction mechanism is stopped as soon as the magazine is empty, but the case may be envisaged where it is desirable for various reasons to stop the extraction of the cards before the magazine is empty. In this case, if cards are engaged in the throat at the moment when the mechanism is stopped, cards can be retained between the throat plate and the belts and cannot fall out of the magazine until the throat is opened again.

It is obvious that the examples described to illustrate various applications of the invention have no limiting character and that certain modifications and adaptations could be made, depending upon the requirements and the applications, without departing from the invention. Thus, it is possible to substitute for the throat devices described any other known device in which, for example, the throat plate is replaced by a rotatable roller or a belt travelling in the opposite direction to the advance of the cards in the throat or by any equivalent device. Likewise, the electromagnet for actuating the mechanism may be replaced, for example, by a pneumatic piston device or a mechanical control.

In addition, it is to be noted that the extraction mechanism according to the second embodiment illustrated in FIG. 3 could co-operate with a card supply magazine. In this case, the plates 51 and 58 would constitute the inclined card charging compartment.

We claim:

1. In a document supply magazine, a document-extracting arrangement comprising a conveyor belt passed around two guide pulleys mounted on spaced spindles carried by a support, a throat through which documents are extracted from said magazine, and suction orifice means associated with said belt for drawing documents against said belt for extraction from said magazine, said extraction arrangement being characterised by means mounting said support for movement about the one of said spindles situated close to a first one of said pulleys, where-

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by said support may occupy one of two positions, an actuating member connected to said support for moving said support about said one of said spindles selectively to said positions, an internal cavity in said support, said orifice means communicating with said internal cavity and a driving member comprising a constantly rotating shaft disposed close to the second of the said pulleys in proximity to the said belt so that when the movable support is in the first position, the conveyor belt is spaced away from the driving member, while when the movable support is in the second position, the conveyor belt is pressed against the driving member and driven thereby.

2. Arrangement according to claim 1, characterised in that the internal cavity of the said support is connected to a fixed negative air pressure duct through a flexible fluid-tight union permitting a displacement of the movable support in relation to the said fixed negative air pressure duct, a closing valve being disposed between the internal cavity of the movable support and the fixed negative air pressure duct, one part of the said valve being fast with the movable support and another part being fast with the said fixed duct so that when the movable support is in the first position the valve is closed, while when the movable support is in the second position the said valve is open.

3. An arrangement according to claim 1, characterised in that a fixed throat is disposed in the region of the said first pulley and in proximity to the said conveyor belt and it is adjusted to allow the passage of one or more documents extracted by the belt.

4. An arrangement according to claim 1, characterised in that a throat is disposed in the region of the said second pulley and in proximity to the said conveyor belt so that when the movable support of the belt is in the said first position no document can pass between the throat and the belt, while when the movable support is in the said second position one or more documents are allowed to pass between the throat and the belt.

5. An arrangement according to claim 1, characterised

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in that the said actuating member is an electromagnet whose movable armature is mechanically coupled to a movable part of the said belt support, so that when the electromagnet is not energised the said support is maintained in the first position under the action of a spring or brought into the second position by magnetic attraction when the said electromagnet is energised.

6. An arrangement according to claim 1, characterised in that the movable support is provided with a second conveyor belt disposed parallel to the first to co-operate therewith and in such manner that the negative air pressure acts between the two belts.

7. An arrangement according to claim 1 further characterised by means responsive to movement of said support to its said second position for applying suction to said internal cavity and responsive to movement of said support to its said first position for stopping the application of suction to said internal cavity.

8. An arrangement according to claim 7 further characterised in that said means responsive to movement of said support is a valve comprising a relatively fixed element and a relatively movable element connected to and movable with said support, whereby movement of said support respectively to its said two positions will move said movable element with respect to said relatively fixed element in opposite directions respectively to apply suction to said internal cavity and to stop application of suction thereto.

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