Sept. 2, 1958 B. DE KALBERMATTEN 2,850,280

MACHINES FOR OPERATING ON SHEETS, SUCH FOR EXAMPLE AS A STRIP-CUTTING PRESS OR A PRESS FOR CORRUGATING CARDBOARD SHEETS

Filed March 30, 1955 4 Sheets-Sheet 1

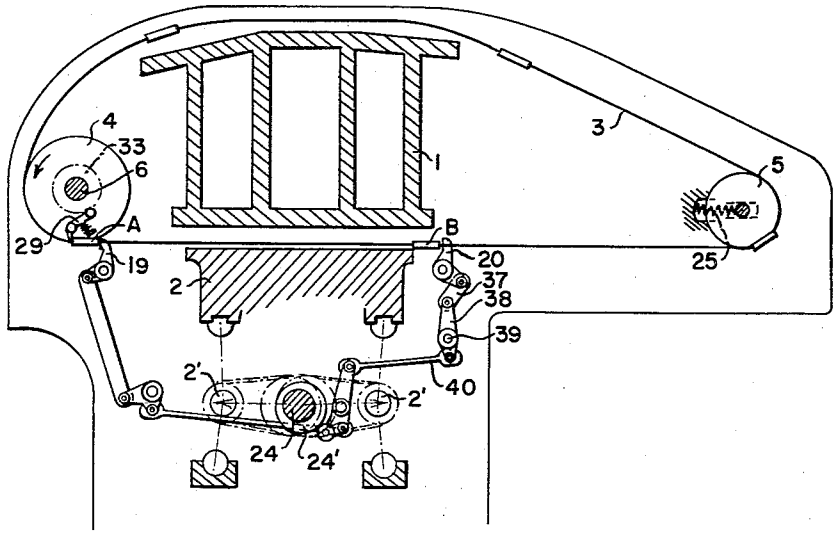

FIG. 1

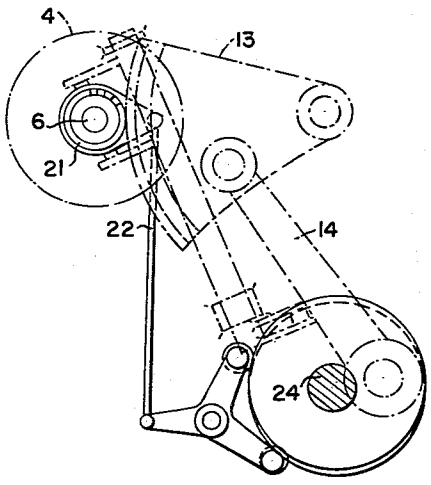

FIG. 10

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Fig.2.

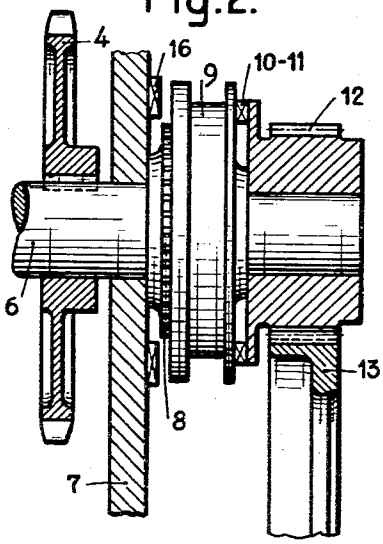


Fig.3.

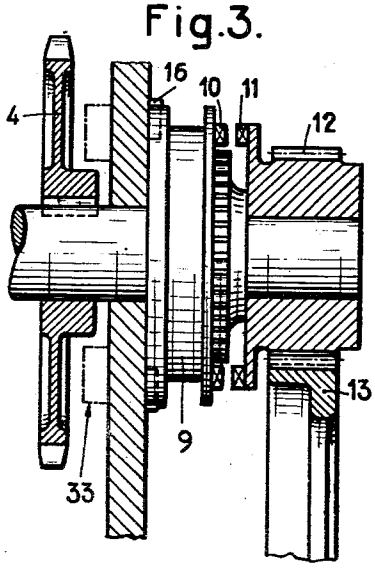


Fig.4.

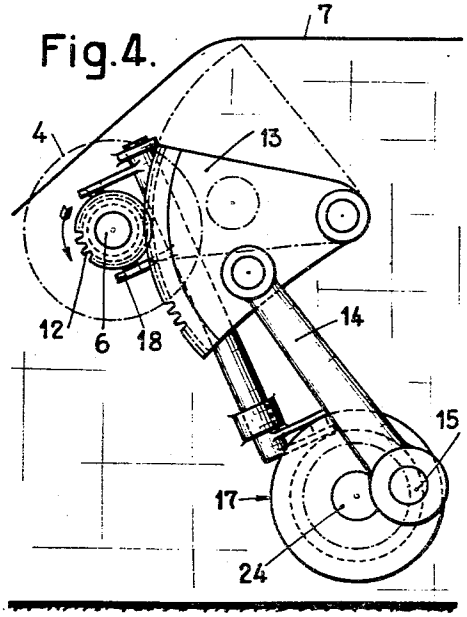
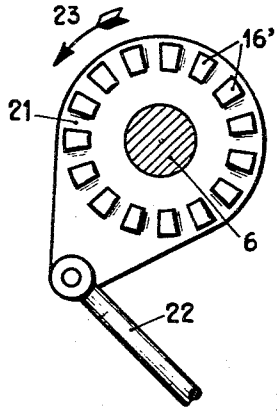


Fig.5.



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Filed March 30, 1955 4 Sheets-Sheet 3

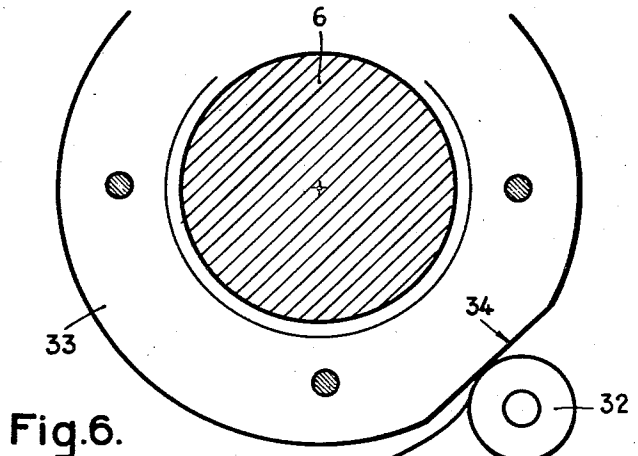

Fig.6.

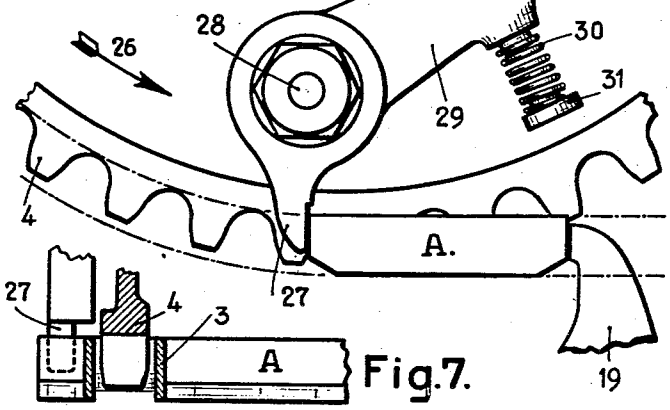

Fig.7.

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MACHINES FOR OPERATING ON SHEETS, SUCH FOR EXAMPLE AS A STRIP-CUTTING PRESS OR A PRESS FOR CORRUGATING CARDBOARD SHEETS

Filed March 30, 1955 4 Sheets-Sheet 4

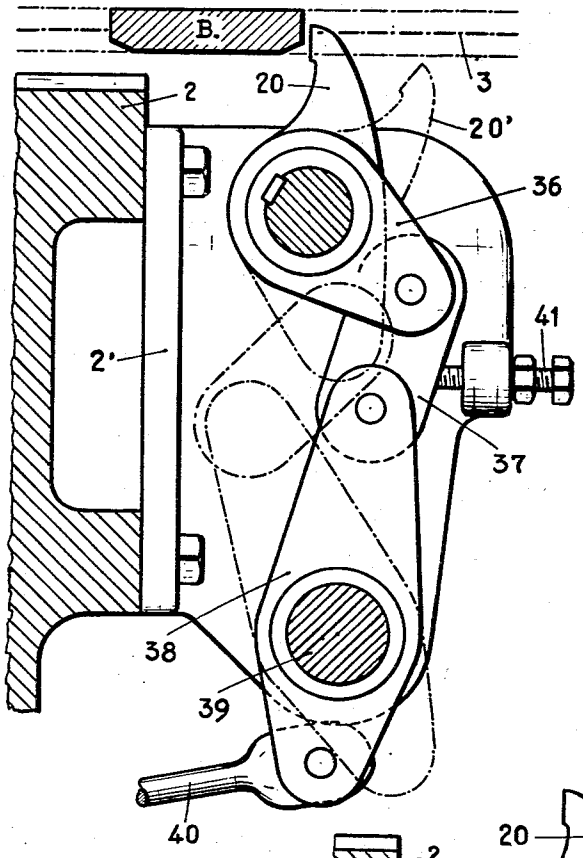
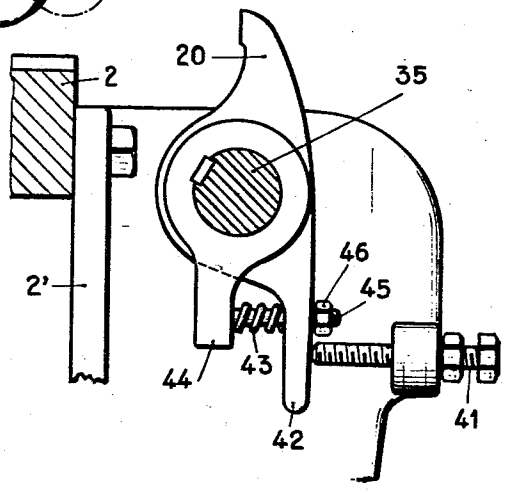


Fig.8.

Fig.9.



United States Patent Office

2,850,280

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2,850,280

MACHINES FOR OPERATING ON SHEETS, SUCH FOR EXAMPLE AS A STRIP-CUTTING PRESS OR A PRESS FOR CORRUGATING CARDBOARD SHEETS

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Application March 30, 1955, Serial No. 498,021

Claims priority, application Switzerland April 3, 1954

7 Claims. (Cl. 271—60)

This invention relates to machines for operating on sheets, and more particularly to printing presses, strip-cutting presses or presses for corrugating cardboard sheets wherein sheets are carried sequentially by gripper bars moved intermittently by endless chains or the like.

In such machines it is difficult to obtain both high speed and perfect registration of sheets, not only because the inertia of the moving masses resists the intermittent motion, but also as a result of the use of chains the members of which are subjected to irregular wear making it impossible to stop at a precise position.

It is accordingly one object of the invention to provide an improved positioning mechanism for aligning sheets of paper, cardboard and the like in exact registration for printing or cutting operations or the like.

More particularly, the invention is concerned with the above provision in equipment in which sheets are moved from a first position to a second. In such equipment, the sheet transporting devices have an inertia which is difficult to overcome and known registration devices are required not only to halt these transporting devices but to reverse the direction of travel thereof for purposes of urging the same against registration devices.

Accordingly, it is a further object of the invention to provide an improved mode of registration in which the need for reversing the direction of travel of transporting devices is avoided.

To achieve the above and other objects, the invention contemplates the registration of transporting devices by urging these devices in the same direction in which they normally travel. By so providing, the invention substantially reduces the wear on the equipment and further provides for accomplishing the desired purpose more rapidly and more efficiently and without the destruction of the sheets to be processed.

The invention will be more readily understood from the following description as illustrated in the accompanying drawing in which:

Fig. 1 illustrates a basic sheet processing device as known from the prior art;

Figs. 2–4 illustrate a mechanism for imparting cyclical and intermittent transporting forces to a sheet;

Fig. 5 illustrates a modification of the structure of Figs. 2–4;

Fig. 6 shows a detail of a member provided in accordance with the invention;

Fig. 7 shows a partial front view of the structure of Fig. 6;

Fig. 8 illustrates a registration abutment;

Fig. 9 illustrates a control detail; and

Fig. 10 illustrates a further control detail.

United States Letters Patent 2,385,581, which discloses a mechanism a part of which is used in combination with the present invention, was directed to the controlled immobilization of bars in a precise position at which sheets might be operated on. The provision of this patent, however, was insufficient due to the absence of means

adapted to determine a precise positioning of each gripper bar when holding a sheet in operating position.

Figure 1 of the accompanying drawing will serve to explain the foregoing considerations.

This figure shows, very diagrammatically, a press as viewed from the side and having a frame 1, a bottom platen 2 which is adapted to be raised and lowered by means of toggle joints 2', and chains 3 driving the gripper bars around the front and rear chain wheels 4 and 5 respectively.

Each time a gripper bar reaches position A beneath wheel 4, it engages a sheet and then, after the wheel has made one turn, the bar arrives at position B and holds the sheet between the frame 1 and the platen 2 so that it can be operated on. The sheets must be exactly registered in these two positions.

A means of achieving this registration has already been proposed in one of the embodiments of United States Letters Patent 2,512,084 wherein the bars are brought cyclically into a position slightly too far advanced and are moved rearwardly against correcting abutments, the sections of chain between the two stations A and B slacking slightly as a result of the backward movement of the bar occupying the operation station (station B in Figure 1).

The mechanism of Figures 2 to 4 has also been previously proposed however for the purpose of communicating rapid revolutions, limited to single turns, to the front chain wheels 4. Since this mechanism can be used in combination with the present invention, it will next be described.

Figure 2 shows a wheel 4 rigidly connected to a shaft 6. This shaft passes through the wall 7 of a press and carries a fluted cylinder 8 with which it is rigidly connected and on which a sleeve 9 can axially reciprocate.

In the position of this sleeve as seen in Figure 2, dogs 10 of the latter are in engagement with dogs 11 on a pinion 12 to which a toothed sector 13 imparts a rotary movement alternating in opposite directions (see the assembly view of Figure 4). Thus the pinion 12 drives the shaft 6 and the direction of movement is made to correspond to that of the movement of the chains and it is arranged that the dimensions of the pinion 12, the sector 13, a crank 14 operating the same, and a lever 15 to which this crank is attached are such that the wheels 4 make single turns.

In the position illustrated in Figure 3, the sleeve 9, which is no longer in engagement with the pinion 12, has been axially displaced such that the recesses in the periphery thereof on the frame side of the press are in engagement with fixed dogs 16 of the latter. This positively arrests the shaft 6 and the wheels 4 after each turn of the latter, that is to say at the instant at which the gripper bars occupy the positions A and B of Figure 1.

The sleeve 9 is automatically displaced by a lateral cam 17 which is rigid with the lever 15 as is the fork 18. Patent No. 2,385,581 gives all of the required details of this construction.

The present invention, which is adapted, for example, to utilize the essential elements of the above arrangement, provides that when chains are stopped, the positions of bars at the stations A and B are corrected by means which impart to the chains a supplementary advance which is adapted to apply the bars against abutments which are in accurately pre-determined positions.

Thus, and in contrast to the procedure set forth in Patent No. 2,512,084, the correction or registration is carried out in the normal direction of travel of the bars, and not in the opposite direction so that the bars do not have to stop and then move back before the operation takes place. This new method avoids a movement which

thin operating sheets cannot endure due to inherent weakness and the rapid operation of the machine.

Referring again to Figure 1, it can readily be understood that if, behind the bars in position A and B and at a distance from these bars, abutments **19** and **20** are raised, it is only required to impart to the chains 3 a supplementary advance to bring the bars into contact with these abutments so as to fix them exactly in a registered position.

This can be effected by means of wheels **4** by imparting thereto a rotary movement through a supplementary angle after each turn which they are normally arranged to perform.

It will be evident that the exaggerated proportions of Figure 1 are not used in practice, the supplementary advance to be given to the bars being of a very small size.

As has been seen in the description of Figures 2–4, the arrangement illustrated therein opposes any possible supplementary advance of the chains, since the fixed dogs **16** of the frame of the machine immobilize the sleeve **9** each time the chains are stopped.

For this reason and in accordance with the invention, the fixed dogs are replaced by the arrangement of Figure 5. Here the dogs **16'** are disposed on a disc **21** which is coaxial with the shaft **6** and can be turned by an arm **22** around the latter.

If it is assumed that the direction of rotation is the same as for the advancement of the chains, i. e. the advance is that of the arrow **23**, a corresponding movement of the arm **22** will enable the chain wheels keyed on the shaft **6** to be given a supplementary advance each time these wheels tend to be stopped by engagement of the sleeve **9** with the dog **16'**.

This supplementary advance takes place as soon as the sleeve **9** has completely freed the dogs **10** from the dogs **11** on the pinion **12** which then turns idly. The said advancement will take place before the tools touch the sheet and as soon as this latter is freed from the pressure of the tools, the return movement in the opposite direction of the arrow taking place so that the dogs **10** of the sleeve **9** are engageable with the dogs **11** of the driving pinion. The resulting backward movement of this sheet is of no consequence, this sheet having then already been operated on.

The required displacements of the arm **22** are imparted thereto by an appropriate cam keyed on the main shaft **24**.

In Figure 10, the cam rotating about the axis **24** actuates a pivoted set of levers to impart a drive to the arm **22**. The arm **22** moves transverse to the shaft **6** and thus rotates the disc **21**.

Returning again to Figure 1, it is clear that if the application of the bar at position A against the abutment or abutments **19** can be caused directly by the wheels **4**, the application at position B against the abutment or abutments **20** is effected by the pull of the chain sections connecting the point B to the wheels **4** above the wheels **5** and other guiding wheels (not shown).

To obtain a satisfactory application of the described method, it is necessary to exert an adequate pull on the chains. This is achieved by having them effect, by means of the mobile dogs **16'**, a displacement which is slightly longer than the travel required to bring the bars against the abutment **20**, the excess travel being taken up partly by the chains and partly by a displacement of the wheel **5** against the pull of springs **25** urging the spindle of these wheels toward the rear.

An advantage of this supplementary advance of the bar which maintains the sheet in the operating position, in contrast to the devices in which use is made of a backward movement of a sheet before it has been operated on, resides particularly in the fact that an advance stretches the sheet whereas a return movement causes

it to bow between the platens, particularly if it is of thin material.

The action of the abutments **19** and **20** which fix the positions A and B of the bars will next be described.

The abutment **19**, which is seen at the bottom right-hand side of Figure 6 positioning the bar A which is conveyed by the chain wheel **4** driven in the direction of the arrow **26**, is in itself of known type. It is successively raised and lowered so as respectively to arrest the bars or allow them to pass.

With the object, however, of obtaining a positive application of the bar against this abutment and to extend the sections of chain between positions **19** and **20** (see Fig. 1), the wheel **4** carries a special device which is symmetrically duplicated on the accompanying wheel driving the other chain.

A finger **27**, pivoted on pin **28** carried by the wheel and rigid with one arm of a lever **29** is urged by a spring **30** supported on lug **31** in the same direction as the chain wheel.

A roller **32** on this lever arm bears against a fixed circular cam **33**. This cam is fixed opposite to the wheel on the wall **7** of the press, (see Figure 3) and, for example, occupies the position designated by dotted lines **33**.

The cam **33** has a flattened portion **34** which enables the spring **30** to expand slightly and to urge the finger **27** against the bar occupying the position A or the station at which it engages a registered sheet.

By this means, that is to say by reason of the pressure exerted by the finger on the bar which has just been advanced against the abutment **19**, all possible play is prevented, the bar bearing positively against the abutment, or against the abutments since a similar arrangement is provided at both ends of the bar.

The partial view in Figure 7 shows the bar A, the chain **3**, the wheel **4**, and the finger **27** applied forwardly against the bar from the rear with regard to the plane of the drawing.

The operation of the abutment **20** is disclosed in Figures 8 and 9.

A support **2'** fixed to the movable platen **2** carries the abutment control mechanism.

The abutment **20** oscillates about a shaft **35** on which is keyed a driving lever **36**. In addition Figure 8 shows the bar B and the chain **3**.

The abutment **20** is moved by the lever **36** through the agency of a compression spring, as will be described.

Articulated to this lever **36** is a small lever **37** which forms a toggle with the operating lever **38**, the latter in turn rotating about a shaft **39** and being actuated by a bar **40**. Finally the latter is moved by a cam **24'** on shaft **24** (see Figure 1) which thus centralizes all of the controls of the mechanisms described including those of the abutment **19**.

Figures 1 and 8 illustrate the position of the aforesaid members in full lines when the abutment **20** is advanced and effective in the trajectory of the bar B against which it is applied. In dotted lines, Figure 8 shows these members in the reverse position, i. e. with the abutment **20** withdrawn to position **20'** to allow the passage of the bar B. This dotted position is self-explanatory and has not been given reference numerals so as not to complicate the drawing.

As will be understood, there will be an abutment at each end of the bar, and for this reason the lever **36** is keyed on the shaft **35** on which is also keyed another and similar shaft for the other abutment, a single control **37**, **38** and **40** being used.

Figure 8 shows, in part, the regulating means and Figure 9 will enable the operation thereof to be more clearly explained.

It is, in fact, desirable to be able to impose a fine regulation on the position of the abutment **20**, and therefrom of the bars in position B.

To this end, the support **2'** carries a setscrew **41** which is adapted to be applied against a lower extension **42** of the abutment **20** and thus to limit the degree of movement of the latter.

The setscrew **41** is rigid with the platen **2** through the support **2'** and follows the movement of this platen, as does the rest of the mechanism of Figures 8 and 9.

The lower arm **42** of the abutment **20**, which is loosely mounted on the shaft **35**, is applied against the setscrew **41** by means of a spring **43** which, at its other end, bears against a lever **44** which is keyed to the shaft **35** and consequently is adapted to rotate with the lever **36**.

A bolt **45** and a nut **46** limit the expansion of the spring **43** so as to provide for the return movement of the abutment **20**.

It will be apparent that the spring **43** must be sufficiently powerful for the arm **42** to remain applied against the setscrew **41** when a gripper bar is applied against the abutment **20**.

What I claim is:

1. In a machine for sequentially positioning sheets in exact registration with a reference line, said machine including gripper bars for gripping the sheets, chains for moving the gripper bars via a determinable path in a given direction, spaced drums for driving the chains, drive means for driving the drums, and coupling means for cyclically coupling at least one of said drums to said drive means in order to move the gripper bars to the reference line sequentially in cycles: the positioning mechanism comprising abutments cyclically intercepting the determinable path of the gripper bars at the reference line and supplementary drive means coupled to said drive means for effecting a cyclic supplementary drive to the chains in the given directon to urge the gripper bars against said abutments.

2. The positioning mechanism claimed in claim 1 comprising a cyclically operative positioning device on said cyclically coupled drum for contacting said gripper bars for further urging said gripper bars against said abutments.

3. The positioning mechanism claimed in claim 2 comprising adjustment means for adjusting the positions of the abutments relative to the reference line.

4. The positioning mechanism claimed in claim 3 comprising spring means for spring loading one of said drums to provide compensation for the cyclic supplementary drive imparted to the chains.

5. The positioning mechanism claimed in claim 4; the coupling means comprising axles, cooperating members on said axles, dogs on said members adapted for interengagement, one of the members being coupled to said drive means, the other of the members being axially displaceable on its axle to which is coupled one of said drums; said positioning mechanism comprising means for cyclically displacing said axially displaceable member for decoupling said drum from said drive means, engaging means for engaging said displaced member, and supplementary drive means coupling said engaging and supplementary drive means for imparting a supplementary drive to said drum and chains in the given direction.

6. The positioning mechanism claimed in claim 5 wherein said engaging means comprises a disc coaxial with said displaceable member and dogs on said disc adapted to engage said displaceable member; and said supplementary drive means comprises a cam driven by said drive means and a series of links cyclically urged into motion by said cam and coupled to said disc for imparting a small rotary motion thereto.

7. The positioning mechanism claimed in claim 6 wherein said cyclically operative positioning device comprises a spring loaded finger mounted on the driven drum and a cam normally maintaining said finger retracted from the periphery of the drum for avoiding contact with the gripper bars, said cam having a configuration which permits said finger to be spring urged against a gripper bar positioned substantially at the reference line.

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