

Nov. 4, 1958

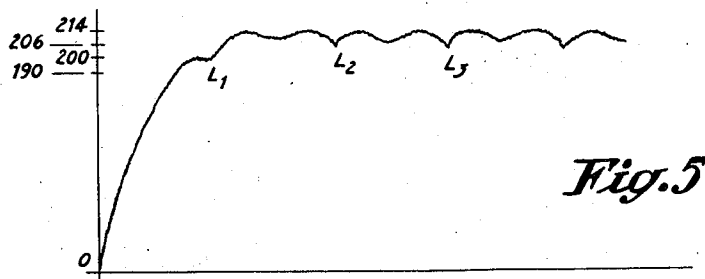
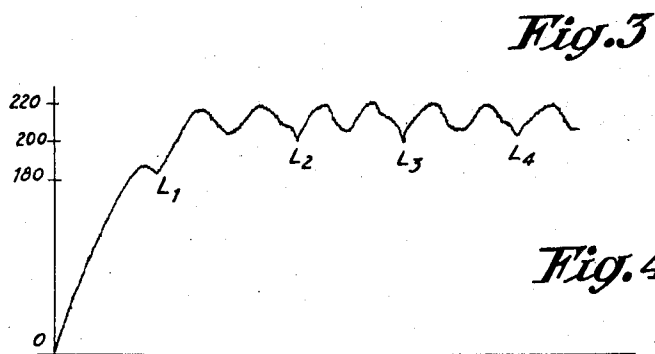
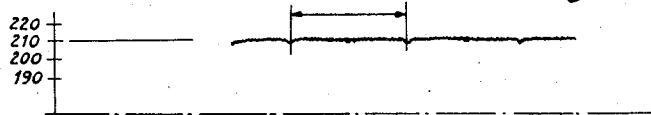
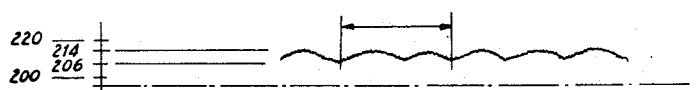
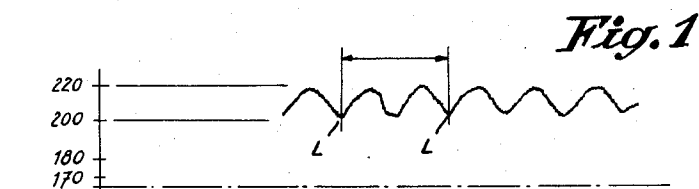
J. Picanol

2,858,855

METHOD AND APPARATUS FOR FACILITATING THE STARTING  
OF LOOMS WITHOUT CHANGING THE PICK

Filed Nov. 1, 1956

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

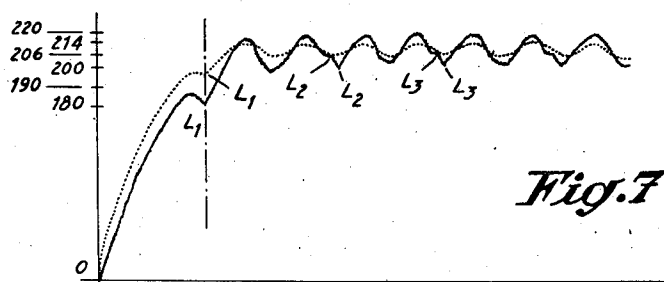
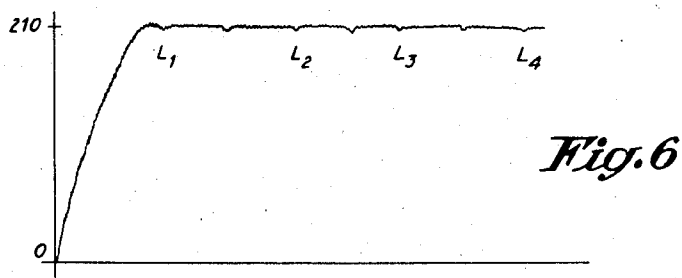
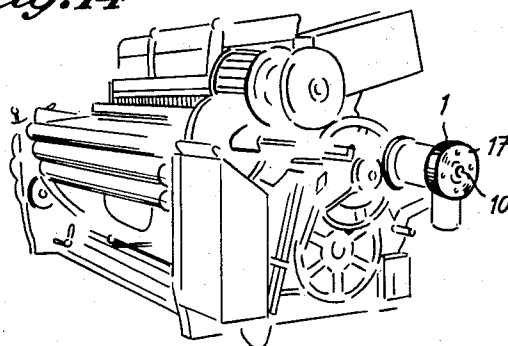


*Fig. 14*



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Fig. 9

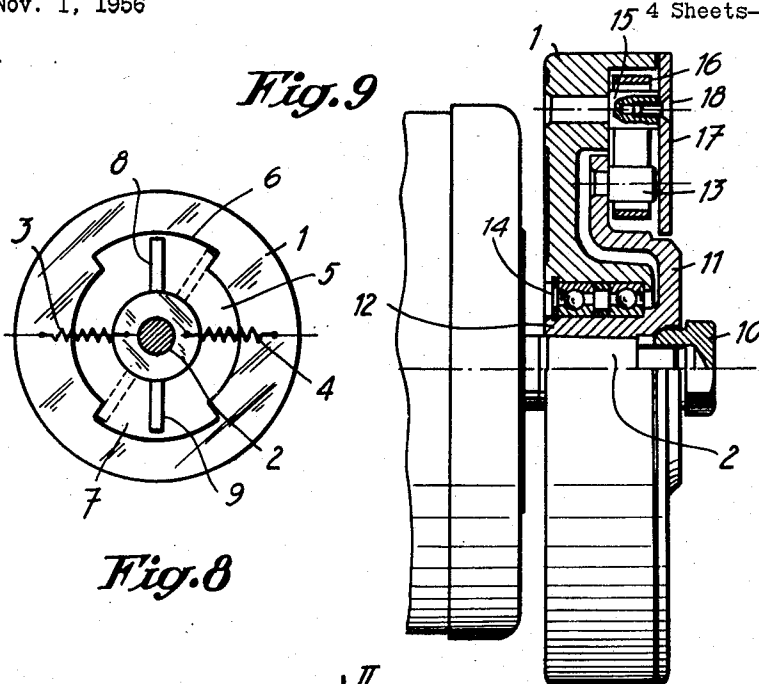


Fig. 8

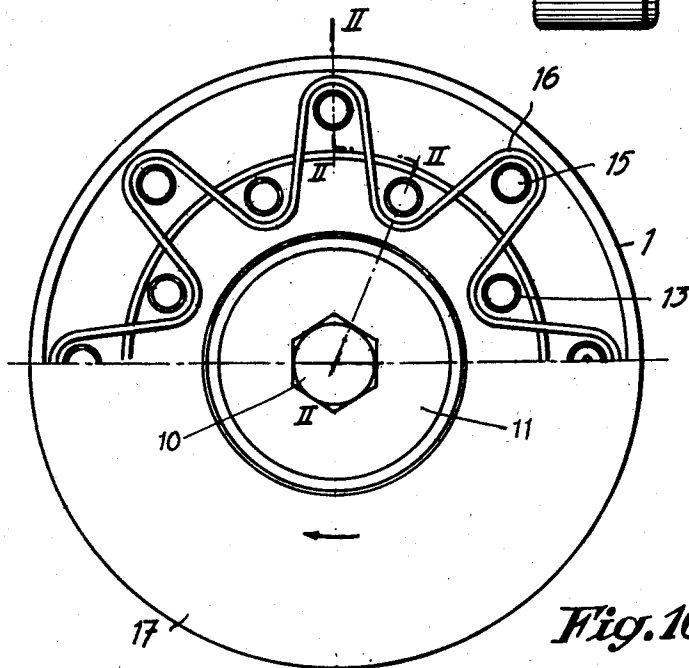


Fig. 10

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*Fig. 11*

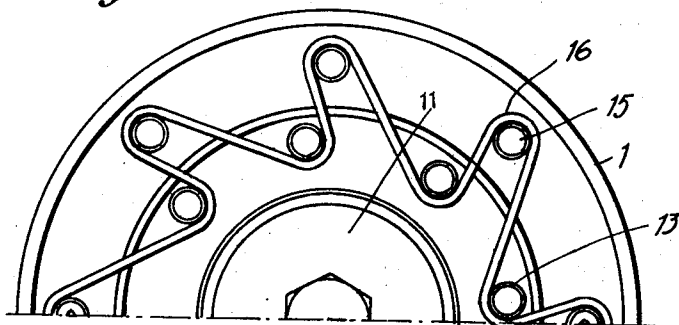


*Fig. 12*

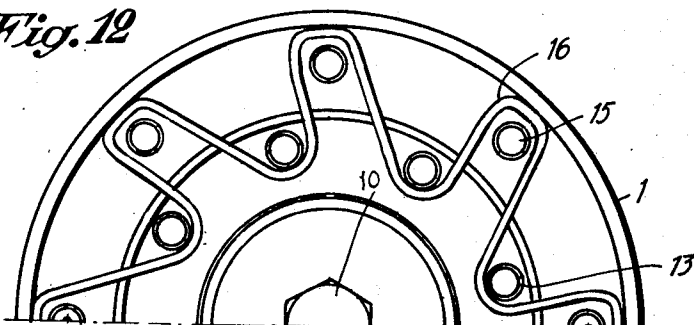
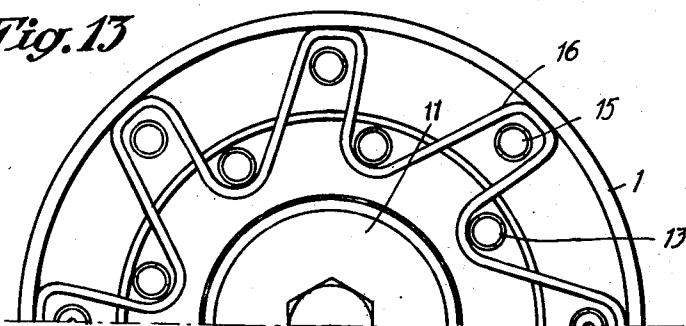


*Fig. 13*



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## METHOD AND APPARATUS FOR FACILITATING THE STARTING OF LOOMS WITHOUT CHANGING THE PICK

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Claims priority, application Belgium November 29, 1955

7 Claims. (Cl. 139—1)

This invention relates to a method and apparatus for facilitating the starting of looms without changing the pick.

It is well known that difficulty is encountered in starting a loom due to the fact that the first throw of the shuttle is weaker than the following throws. This difficulty is further increased when it is desired to start the loom with the slay in the forward position.

Various arrangements have already been proposed for facilitating the starting of looms.

One such proposal consists in regulating the mechanism for throwing the shuttle so that it imparts to the latter a speed greater than the minimum which is necessary in continuous operation. In this way it is achieved that, notwithstanding that the first throw is effected at a lower speed than the following throws, it is nevertheless sufficient to ensure starting. This arrangement which is frequently employed is very simple, because no difficulty is involved in such a regulation. However, it has the disadvantage of increasing wear on the shuttle, and on the pickers and other auxiliary parts, by reason of the relatively high speed of the shuttle when the loom is in continuous operation.

The consequences of this disadvantage will be better understood when it is observed that looms are very often required to function for 24 hours of each day.

A second prior proposal, which is also very much used, consists in withdrawing the slay into its extreme rear position. This preliminary operation enables the loom to start more easily because it is given a longer time to attain the operating speed before the first throw of the shuttle.

Nevertheless, although this second proposal has the advantage that it does not call for too great a speed of the shuttle, it involves the disadvantage that time is lost on each stoppage, for withdrawing the slay. Bearing in mind that a single attendant supervises several tens of looms, it is possible to form an estimate of the total loss of time which may result from this disadvantage. Mechanisms have been designed for automatically effecting the rearward movement of the slay but although these mechanisms save the attendant the physical labour involved in returning the slay into the extreme rearward position, they do not avoid the loss of time which is involved in this operation, preliminary to starting.

A further prior proposal used in some cases, consists in keying on to the driving member of the loom a flywheel having a big inertia. This apparently very simple arrangement has, nevertheless, the very serious disadvantage that it considerably increases the forces acting on the driving members, these forces producing premature wear of parts such as gear wheels, bearings, spindle bearings, and the like.

Moreover, for such a flywheel to be really effective it must be of big dimensions and must rotate at high speed to store sufficient kinetic energy so that after starting the loss of speed is a minimum and the first throw

is effected at a speed substantially equal to the speed of the subsequent throws.

The invention relates to a method and apparatus for facilitating the starting of looms practically without changing the pick, that is to say, that the first or starting pick is practically the same as the pick in the normal operation of the loom. The applicant has ascertained that the problem of starting the loom can only be solved by a method and apparatus which provides for assisting the driving member of the loom at the time of the first throw, but which reduces or withdraws this assistance after starting, the arrangement being such that the first throw is effected practically in the same conditions as subsequent throws during the continuous operation of the loom.

The method and apparatus of the invention will be better understood with the aid of the following more detailed explanation, with reference to the accompanying drawings, in which:

Figures 1 to 7 respectively illustrate different oscillographs;

Figure 8 illustrates diagrammatically and as concisely as possible the method according to the invention;

Figure 9 is a view partly in radial section and partly in side elevation of a device suitable for carrying out the method of the invention;

Figure 10 is a front view in elevation of the device shown in Figure 8, with one half of the front wall removed;

Figures 11, 12 and 13 respectively illustrate diagrammatically three characteristic positions of the device shown in Figures 9 and 10, and

Figure 14 illustrates diagrammatically a loom fitted with a device for carrying out the present invention.

The oscillographs shown in Figures 1 to 7 were obtained from the crank shaft of a loom having a reed space of 112 cm. and turning at a speed of 200 R. P. M.

Figure 1 illustrates the oscillograph of a loom which is not fitted with a flywheel having inertia. It shows the different instantaneous speeds of the crank, the throws being effected at the points L where the speed is a minimum.

This oscillograph also clearly shows the variations in speed of each revolution of the crankshaft. It will be seen that on each revolution of the crankshaft, the loom slows down twice and accelerates twice, due to the big inertia of the slay, which operates with an oscillating movement.

Figure 2 illustrates an oscillograph of a loom fitted with a flywheel having a moment of inertia ( $PD^2$ ) of 0.300 kg.<sup>2</sup>, which turns at a speed of 1500 R. P. M. This oscillograph shows smaller variations in speed, the difference between the maximum and minimum speeds being in consequence, smaller. These differences could tend to zero only by considering a flywheel of infinite mass ( $PD^2$ ), which would give the ideal oscillograph shown in Figure 3, i. e. approximately a straight line, which is obviously not practicable. The oscillographs of Figures 1 and 2 were taken on a loom in normal operation.

Figures 4, 5 and 6 show oscillographs taken on starting from a loom at rest, the slay being in the middle of its stroke. These oscillographs illustrate the instantaneous speed of the crank shaft, starting from zero, up to normal operation, respectively, for the three cases considered in Figures 1, 2 and 3. Thus Figure 4 relates to a loom fitted with a motor which is not fitted with a flywheel, the point L1 representing the point of the first throw.

It will be noted that at this time the speed is substantially less than at the points L2, L3, etc., corresponding

respectively, to other points of the successive throws of the shuttle.

It will therefore be clearly seen that starting, as above stated, with the slay in the middle of its stroke, the first pick, i. e. the first throw will be too weak and the loom will stall if it is equipped with the "bang off" mechanism, or alternatively, it will not reach the bottom of the box, and is thus capable of causing damage.

The oscillograph shown in Figure 5 was taken in the same conditions but on a loom equipped with a motor provided with a flywheel having a moment of inertia ( $PD^2$ ) of 0.300 kg.<sup>2</sup>. It will be noted that in this oscillograph also the first pick, point L1, is made at a lower speed than the succeeding picks at the points L2, L3, and so on. Nevertheless, the difference is less.

Figure 6 illustrates the oscillograph which would be obtained on starting a loom fitted with a flywheel of infinite mass. In this case the first pick would evidently be made at the same speed as the others.

Figure 7 illustrates the oscillograph of Figure 4 superposed on that of Figure 5. This superposition makes clear both the problem posed by the present application and the solution which it provides. It shows that when a flywheel having inertia is fitted, the pick is made at a greater speed than is the case in the absence of a flywheel. The result of this is that if it is desired to obtain with a flywheel the same intensity as is obtained in the absence of a flywheel, it is necessary to change the regulation of the picking mechanism in order to make the pick weaker. Further, notwithstanding that the first pick on a loom fitted with a motor and flywheel having inertia, is stronger than on a loom fitted with a motor without a flywheel, this increase is illusory since, as has been established in the foregoing, it is necessary, in order to achieve a good result, for the first pick to be identical with the later picks. It results from this, that, the first pick being effected by the intermediary of a flywheel, at a higher speed, the other picks will also take place at a higher speed, so that the difference in speeds between the first and the subsequent picks remains substantially the same. The small advantage produced can be shown on the hypothesis of an infinite flywheel, where it will be seen that the first pick is identical with the others.

Finally, it must be admitted that no satisfactory solution has hitherto been found of the problem of starting. In practice, one of the prior proposals involves abnormal wear of the shuttles, pickers and auxiliary devices, and another prior proposal involves loss of time and a substantial reduction in output; and the only solution which might give results is utopian, since it is based on the use of an infinite flywheel.

Finally, the use of a practical flywheel, whilst being of assistance to the pick is, on the one hand, insufficient, and, on the other hand, it also involves a greater wear of the driving members by the high pressures which are from three to four times greater for a flywheel having a moment of inertia ( $PD^2$ ) of 0.300 kg.<sup>2</sup>.

The foregoing explanation will it is believed, facilitate understanding of the present invention, the method and apparatus of which will now be described, firstly with reference to Figure 8. As shown in Figure 8 the method consists in introducing, on starting, an inertia mass capable of assisting momentarily the motor, this mass being automatically reduced or placed out of action after starting. To this end an inertia mass 1 is connected to the motor spindle 2 by radial springs 3, 4. The mass 1 is formed with a central opening 5 having two diametrically opposed slots 6, 7 and two diametrically opposed projections or tongues 8, 9 which can be displaced respectively in the two slots 6, 7 and which are rigidly connected with the motor spindle 2. Normally, the motor drives the inertia mass 1, forming a flywheel, in such a way that at the time of starting the loom the flywheel assists the motor. Nevertheless, when the latter encounters resistance forces, it is automatically discon-

nected from the flywheel 1, the latter being driven only by the springs 3, 4. The absence of any rigid connection between the inertia mass 1 and the spindle 2 of the motor then makes the inertia mass practically ineffective.

Inertia masses and individual connections between them and the spindle of the motor can be produced in many different ways without departing from the scope of the invention.

Figures 9 to 13 illustrate a preferred embodiment without in any way limiting the scope of the invention to this particular construction. In this preferred embodiment, on the motor spindle 2 there is firmly keyed by means of a lock nut 10, a light plate 11 formed with a hub 12 and, along its periphery, with a given number of equidistantly spaced pins 13, the longitudinal axis of each of which is parallel to the spindle of the motor. A flywheel 1 bears, with the interposition of bearings 14 on the hub 12. On the flywheel 1 are fixed equidistantly spaced pins 15, the projecting parts of which are substantially similar to those of the pins 11. An endless belt 16 bears on all the pins 13 and 15, passing under the pins 13 and over the pins 15, thus producing, at rest, the star arrangement shown in Figure 10. The belt 16 is very slack so as to permit of relative oscillating movement between the inertia flywheel 1 and the light plate 11 rigidly connected with the motor spindle 2. When the motor turns idly, that is before the starting of the loom, the inertia flywheel 1 is driven firmly by the relatively rigid connection which is established with the motor spindle 2 through the light plate 11 and the belt 16. At the time of starting the loom, the flywheel 1 will assist the motor to overcome the resistance of the loom, irrespective of the position in which the latter was stopped. When the shuttle has been thrown, that is to say immediately after the loom has been coupled to the drive, the motor will, however, be subject to resistance forces and, by reason of the particular connection between the inertia flywheel 1 and the motor spindle 2, the latter can oscillate in relation to the said inertia mass 1, so that, whilst turning with the inertia flywheel, the motor spindle 2 oscillates between the positions shown in Figures 12 and 13, during which time the belt 16 is pressed under the action of centrifugal force against the internal cylindrical wall of the inertia flywheel 1. The belt 16 is prevented from dropping by a cover 17 fixed by means of screws 18 on some of the pins 15.

These relative movements between the light plate 11 and the inertia flywheel 1, as well as the very characteristic positions of the belt 16, can be visually checked by stroboscope.

It is obvious that the method of the invention can be effected in many other ways, since a number of inertia masses or flywheels can be used, and the connection between the said masses and the motor spindle can be of very different constructions. These various constructions may operate by mechanical, electrical, pneumatic, or hydraulic means, or any combination thereof. Generally, the device made in accordance with the invention will be fitted on existing motors, but special motors may be made, if desired, in which the rotor is combined with at least one inertia mass and a suitable connection means for the purpose of carrying out the method of the invention.

The method and apparatus of the invention are particularly suitable for machines submitted to repeated oscillating movements, looms being one of the more pertinent examples.

What I claim is:

1. A method of facilitating the starting of a motor driven loom consisting in mounting an inertia mass on a rotary part of the driving motor and connecting the inertia mass to the said rotary part of the motor by a connection means which, on starting the loom, provides

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a connection between the said inertia mass and the said rotary part of the loom until such time as the shuttle is thrown, and thereafter enables the said rotary part of the loom to move angularly relatively to said inertia mass to render said inertia mass partly or completely inoperative.

2. A device for facilitating the starting of a motor driven loom without changing the pick density of the fabric comprising an inertia mass mounted on a rotary part of the driving motor and means for connecting said inertia mass to said rotary part of the driving motor, said connection means being adapted to provide a connection between said inertia mass and said rotary part during starting of the loom, i. e. until the shuttle is thrown, and thereafter to permit relative movement between said inertia mass and said rotary part in order to render said inertia mass partly or completely inoperative.

3. A device according to claim 2 in which said connection means comprises a resilient device.

4. A device according to claim 2 in which said connection means comprises a device adapted to connect said inertia mass to said rotary part when said motor rotates continuously in one direction and to interrupt this connection when said rotary part oscillates relatively to said inertia mass.

5. A device according to claim 2 in which said rotary part comprises the spindle of said driving motor and said connection means comprises a plate keyed on said spindle, a flywheel mounted concentrically with said plate, a plurality of pin like projections fixed equidistantly from one another on said plate, a plurality of pin like projections fixed equidistantly from one another on said flywheel, and an endless belt bearing on said pins so as to be alternately looped around the two series of projections and thereby provide a driving transmission between said plate and said flywheel when said motor rotates continuously in one direction of rotation.

6. A device according to claim 2 in which said inertia mass comprises a flywheel, said rotary part comprises the spindle of said driving motor and said connection means comprises a plate keyed on said spindle, said fly-

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wheel being mounted concentrically with said plate and further comprising an annular series of pin like projections fixed equidistantly from one another on said plate, an annular series of pin like projections fixed equidistantly from one another on said flywheel, said two annular series of projections being concentrically disposed and one series being disposed within the other series and an endless belt bearing on said pins so as to be looped alternately around the two series of projections to provide a star-shaped driving transmission between said plate and said flywheel when said motor rotates continuously in one direction of rotation.

7. A device according to claim 2 in which said inertia mass comprises a flywheel, said rotary part comprises the spindle of said driving motor and said connection means comprises a plate keyed on said spindle, said flywheel being mounted concentrically with said plate and further comprising an annular series of pin like projections fixed equidistantly from one another on said plate, an annular series of pin like projections fixed equidistantly from one another on said flywheel, said two annular series of projections being concentrically disposed and one series being disposed within the other series and an endless belt bearing on said pins so as to be looped alternately around the two series of projections to provide a star-shaped driving transmission between said plate and said flywheel when said motor rotates continuously in one direction of rotation, said two annular series of pins and said belt being disposed in a recess formed partly on one side of said plate and partly on one side of said flywheel, and further comprising a removable side plate adapted to close the open side of said recess.

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