Nov. 26, 1929. G. EZBELENT ET AL 1,737,304

PLAITING MACHINE

Filed June 16, 1928 3 Sheets-Sheet 1

Fig. 1

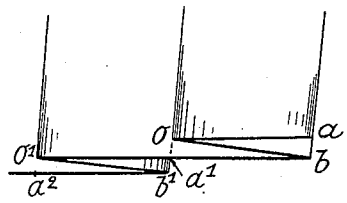


Fig. 2

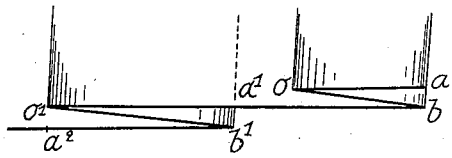
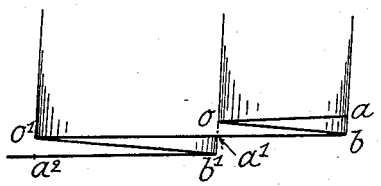


Fig. 3



G. Ezbelent and
R. Ezbelent
INVENTORS

By: Marks & Clerk
Attys.

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PLAITING MACHINE

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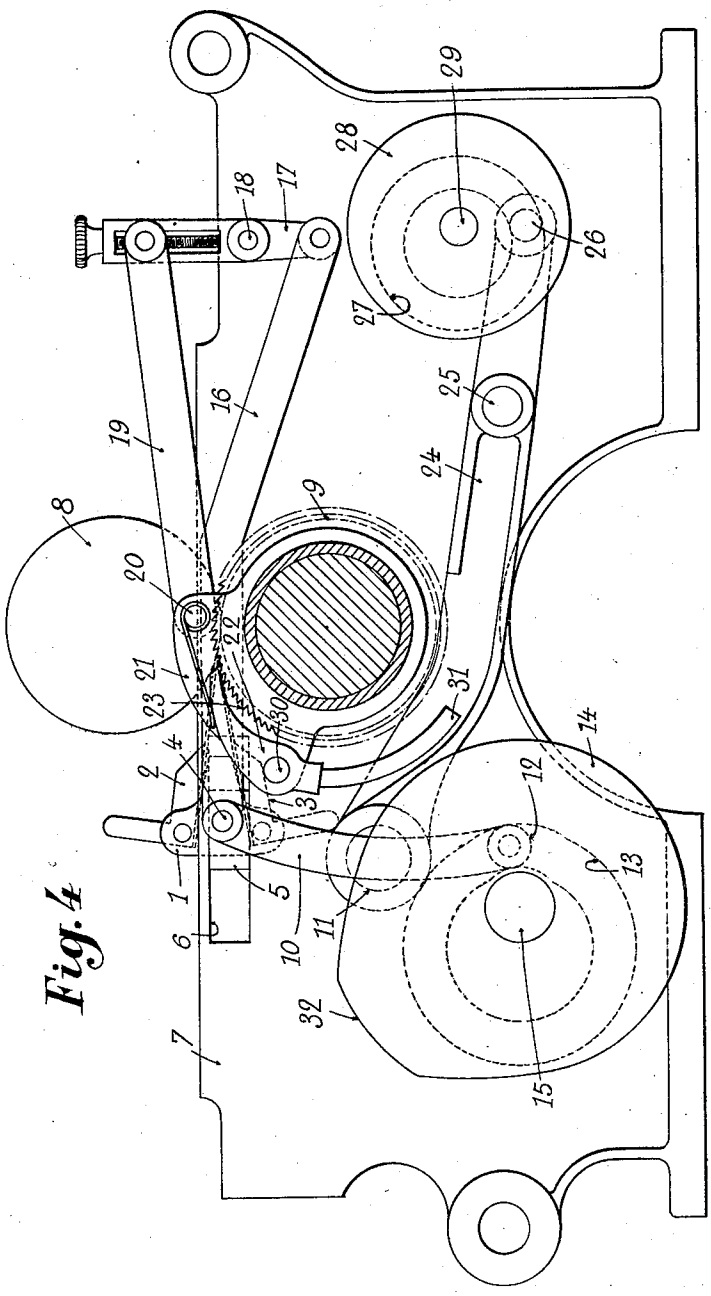

Fig. 4

G. Ezbelent and
R. Ezbelent
INVENTORS

By: Marks & Clark
Attys.

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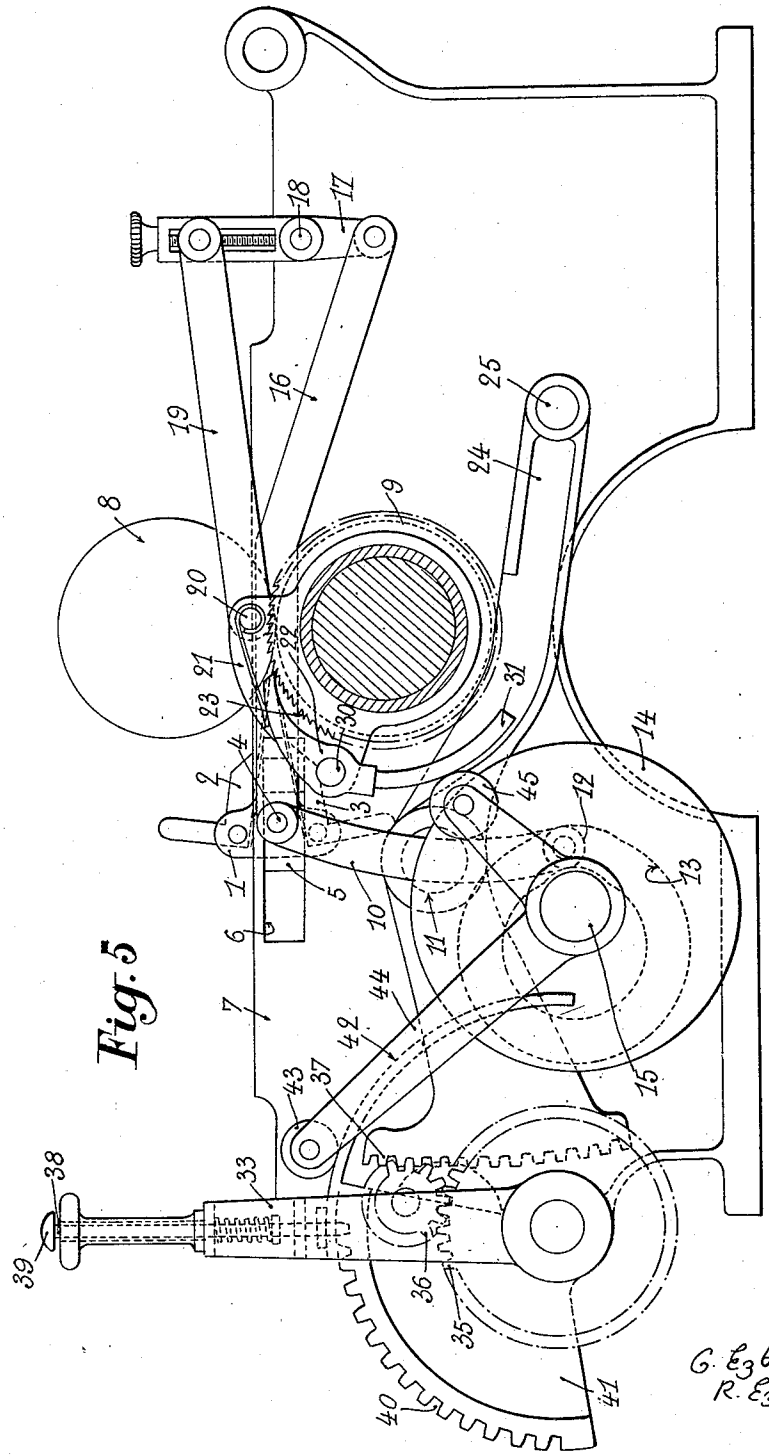

Fig. 5

G. Ezbelent and R. Ezbelent INVENTORS

by: Marks & Clark Attys.

Patented Nov. 26, 1929 1,737,304

UNITED STATES PATENT OFFICE

GEORGES EZBELENT AND ROGER EZBELENT, OF PARIS, FRANCE, ASSIGNORS TO EZBELENT FILS, OF PARIS, FRANCE

PLAITING MACHINE

Application filed June 16, 1928, Serial No. 286,038, and in France March 7, 1928.

When it is desired to change the width of the plaits produced by the known types of plaiting machines, the device for changing the stroke of the knives is operated at the end of the forward stroke of the said knives. In this manner, the covering portion of the last plait of a series will not correspond to the normal covering portion of this series of plaits, but to the covering portion of the succeeding series of plaits, and this will produce a disagreeable effect at the parts at which the width of the plaits is changed.

The present invention relates to a method of producing plaits by the use of a plaiting machine provided with a suitable device for changing the stroke of the knives, whereby each plait will in all cases comprise the covering portion corresponding to this plait, irrespectively of any changes which may be made in the width of the plaits, the said method being characterized by the fact that the operation for changing the stroke of the knives is performed at the end of the back stroke of the said knives, when the latter are separated from the drums of the machine.

The invention further relates to a plaiting machine in which the said method may be carried into effect, and which is characterized by the fact that a coupling device is added to the mechanism adapted for the intermittent rotation of the cylinders, and will uncouple the said mechanism when the device for changing the stroke is operated.

The appended drawings show by way of example two embodiments of a plaiting machine according to the invention, by which the said method may be carried into effect.

Fig. 1 shows a series of plaits of equal width.

Fig. 2 shows the transition between a series of plaits of a given width and a new series of plaits of greater width, as obtained by the use of the known devices.

Fig. 3 shows the transition between a series of plaits of a given width and a new series of plaits of a greater width, as obtained by the use of the method according to the present invention.

Fig. 4 is a side elevation of a plaiting machine embodying the said method, and

Fig. 5 is a like view of a modification.

When the plaiting machine is to form a succession of plaits of equal length, as shown in Fig. 1, the drums of the machine remain stationary during the forward stroke of the knives, and the part of the fabric comprised between the point of contact with the drums and the point of contact with the knives will be folded upon itself so as to form the plait $a—o—b$ during this forward stroke. During the back stroke of the knives, the two drums turn through a given distance in order to draw forward the cloth and to seize the plait which has just been formed, and this drawing of the cloth produces at the same time the covering portion $b—a^1$ of the plait $a—o—b$ which has just been formed. During the next forward stroke of the knives, the latter will form another plait $a^1—o^1—b^1$, and during the next rear stroke, the knives form the corresponding covering portion $b^1—a^2$. The same cycle of operations takes place as long as it is desired to produce plaits of uniform width.

When the machine is then required to produce a new series of plaits having a different width, it is necessary, in order to change the width of the plaits, to increase or diminish the stroke of the knives. However, the extreme point of the forward stroke of the knives is situated at a stationary point near the drums, so that it is the extreme point of the rear stroke that will be varied when it is desired to change the stroke of the knives according to the width of the plaits to be obtained. Due to this variable position of the extreme point of the rear stroke, it has been found necessary, for reasons of construction, to operate the device employed for changing the stroke of the knives at the end of the forward stroke of the knives towards the drums. For this reason, when the machine has formed the last plait $a—o—b$ of a series of plaits, the device for changing the stroke of the knives is operated when the knives are close to the drums, and the machine is then ready to produce the plaits of the succeeding series. If it is desired to form plaits of greater width than those of the preceding series, the covering portion $b—a^1$

(Fig. 2) of the preceding plait a—o—b will no longer correspond to this plait a—o—b, but will correspond to the succeeding plait a^1—o^1—b^1. This excess of the covering part of the last plait will produce a disagreeable effect between two successive sets of plaits of a different nature.

The method according to the present invention obviates all such defects, due to the fact that the operation for changing the stroke of the knives is performed at the end of the back stroke of the said knives, i. e. when the latter are separated from the drums of the machine. In this event, when the last plait a—o—b of a set has been formed (Fig. 3), the knives will return to the rear, producing the normal covering portion b—a^1, and it is only at the end of this rear stroke of the knives that the device for changing the stroke of the knives is operated in such manner that the machine will only be prepared to make the new plaits when the covering portion of the preceding set has been produced.

In the examples herein represented, each covered part is equal to the corresponding plait, but it is obvious that the covered parts, instead of being exactly equal to the width of the plaits, might be made proportional to the width of the said plaits, as can now be effected upon the known machines.

Fig. 4 represents a plaiting machine of the known type in which the apparatus embodying our said method is employed. The knife-carrier 1, carrying the upper knife 2 and the lower knife 3, is rotatably mounted at its ends upon axles 4 disposed upon the blocks 5 which are slidable in the slots 6 formed in the main frame 7 of the machine. The knife carrier 1 is given a reciprocating motion by which it is moved from or towards the upper and lower drums 8 and 9, by means of the two levers 10 which are disposed on the respective sides of the main frame and oscillate upon axles 11. The said levers 10 are connected at one end with the sliding blocks 5 and at the other with a roller 12 guided in the slot 13 of a cam 14 rotatable on the main shaft 15 of the machine. As is well known, each rotation of the shaft 15 effects—by means of the cam 14 and the lever 10—a complete cycle covered by the knife-carrier 1, comprising a forward stroke moving towards the said drums and a rear stroke receding from these drums.

As above indicated, the knives when moving forward will fold the fabric so as to form a plait; during the back stroke of the knives, the drums rotate in such manner as to draw with them the plait thus formed. The drums are rotated by known means, and for example in the machine herein represented, by means of a link 16 which is connected at one end with one of the sliding blocks 5 and at the other end with a lever 17 adapted for pivotation on a stationary point 18; the lever 17 is adjustably connected by a link 19 with the axle 20 of a sector 21 which latter is pivoted to the axle of the lower drum 9 and carries a pawl 22 coacting with a ratchet wheel 23 keyed to the axle of the lower drum 9 of the machine. When the knives move forward, the link 16 causes the lever 17 to turn in the counter-clockwise direction, whereby the link 19 drives the pawl 22 which slides upon the teeth of the ratchet wheel 23. When the knives recede, the lever 17 turns in the clockwise direction and draws with it the pawl 22 in such manner as to turn the ratchet wheel 23 as well as the drums 8 and 9 which are connected together.

To adjust the width of the plaits, the pivot axle 11 may move in the known manner along the lever 10; the said axle may be constructed by the use of a slidable block mounted on a lever 24, which latter is pivoted to an axle 25 mounted in the fixed position on the machine frame.

The amount of motion of the sliding blocks 5 and of the knife-carrier 1 will depend upon the position of the said axle 11 along the lever 10, and the width of the plaits will gradually diminish according as the said axle 11 moves towards the sliding blocks 5.

In order to vary the width of the plaits formed by the machine, the lever 24 is operated, by moving it from or towards the sliding blocks 5, and this can be effected automatically or by hand. As shown in Fig. 4, the lever 24 is automatically operated by means of the pin 26 mounted on a extended part of the lever 24 and engaged in the slot 27 of a cam 28 rotatable on the shaft 29. As above specified, this operation is performed in the known machines at the end of the forward stroke of the knives, but according to the present invention, the lever 24 is operated at the end of the back stroke of the knives. Since the distance between the axle 25 and the axle 11 is obviously invariable, when the lever 24 is moved, the lever 10 will be necessarily moved at the same time, since the curved form of this lever will not be centered at the axis 25 at the end of the rear stroke of the knives. If it is desired to produce larger plaits than the aforesaid, the lever 24, when moved, will separate the lever 10 from the drums 8 and 9, thus displacing the links 16 and 19 in a direction such that the pawl 22 will turn the ratchet wheel 23 and with it the said drums.

The fabric will be drawn forward by this rotation of the said drums, and this will increase the covering portion made in the last plait of the preceding series. To obviate this defect, the pawl 22 which is rotatable on the axle 30 carries a projecting part 31; at each end of the back stroke of the knives, the said projecting part makes contact with the boss 32 of a cam which is mounted on the main

shaft 15 of the machine. The said cam may be formed in one with the cam 14, the slot 13 being formed in a disc provided with the boss 32, so that at the end of the back stroke, the pawl will be released from the ratchet wheel, and no improper rotation of the drums will take place when the plait is changed at the end of the said back stroke. It is obvious that the device consisting of the cam and the rear end of the pawl is given solely by way of example and any other suitable releasing device may be placed in the mechanism controlling the intermittent rotation of the said drums.

Fig. 5 shows a modified form of the machine in which the lever 24 is controlled by hand by means of an operating lever 33 rotatable on an axle 34, thus imparting a movement of pivotation to the lever 24 on its axle 25, through the medium of the gear wheels 35 and 36 and the toothed sector 37 mounted on the end of an extension of the lever 24. The operating lever 33 may be held in any one of its positions around the axle 34, by means of a rod 38 terminated by a controlling knob 39 and supported in an elastic manner by the lever 33, in such manner that it will be always impelled downwardly. The said rod 38 may fit into notches 40 formed on a sector 41 concentric with the axle 34. On the rod 38 is formed a roller path or cam 42, coacting with a roller 43 mounted on the end of a bent lever 44 which is pivoted on the shaft 15 of the machine and carries at the other end a roller 45 coacting with the end 31 of the pawl 22. Each time that the width of the plaits is to be changed, it is necessary before the lever 33 is operated, to release the rod 38 by raising it out of a notch 40, and in this raising movement the roller path or cam 42 will be raised, so that the said roller 43 will be displaced and the lever 44 thus turned, and this, through the medium of the roller 45, will release the pawl 22 from the ratchet wheel 23.

It is obvious that the apparatus according to the invention is susceptible of all desired modifications without departing from the principle of the invention.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a plaiting machine, a knife carrier, two rotatable drums, means for reciprocating said knife carrier towards and away from said drums, means for changing the stroke of the knife carrier at the end of the backward stroke of the knife carrier, means for rotating the drums during said backward stroke of the knife carrier and means adapted to make said drum rotating means inoperative during the operation of said stroke changing means.

2. In a plaiting machine, a knife carrier, two rotatable drums, means for reciprocating said knife carrier towards and away from said drums, means for changing the stroke of the knife carrier at the end of the backward stroke of the knife carrier, means for rotating the drums during said backward stroke of the knife carrier, a coupling device inserted in said drum rotating means and adapted to assume an operative position in which the drums are adapted to be rotated and an inoperative position in which the drums remain stationary, means adapted to urge said coupling device into its operative position and means for bringing said coupling device into its inoperative position during the operation of said stroke changing means.

3. In a plaiting machine, a knife carrier, two rotatable drums, means for reciprocating said knife carrier towards and away from said drums, means for changing the stroke of the knife carrier at the end of the backward stroke of the knife carrier, means for rotating the drums during said backward stroke of the knife carrier, said drum rotating means comprising a ratchet wheel and a pivoting pawl adapted to assume an operative position in engagement with said ratchet wheel and an inoperative position out of engagement with said ratchet wheel, elastic means adapted to urge said pawl in its operative position, and means for bringing said pawl into its inoperative position during the operation of said stroke changing means.

4. In a plaiting machine, a knife carrier, two rotatable drums, means for reciprocating said knife carrier towards and away from said drums, means for changing the stroke of the knife carrier at the end of the backward stroke of the knife carrier, means for rotating the drums during said backward stroke of the knife carrier, said drum rotating means comprising a ratchet wheel and a pivoting pawl adapted to assume an operative position in engagement with said ratchet wheel and an inoperative position out of engagement with said ratchet wheel, elastic means, adapted to urge said pawl in its operative position and a rotatable cam adapted to bring said pawl into its inoperative position during the operation of said stroke changing means.

5. In a plaiting machine, a knife carrier, two rotatable drums, means for reciprocating said knife carrier towards and away from said drums, means for changing the stroke of the knife carrier at the end of the backward stroke of the knife carrier, means for rotating the drums during said backward stroke of the knife carrier, said drum rotating means comprising a ratchet wheel and a pivoting pawl adapted to assume an operative position in engagement with said ratchet wheel and an inoperative position out of engagement with said ratchet wheel, elastic means adapted to urge said pawl in its operative position, a rotatable cam adapted to

be operated during the operation of said stroke changing means and a movable member bearing on said cam and adapted to bring said pawl into its inoperative position when said cam is operated.

In testimony whereof we have signed our names to this specification.

ROGER EZBELENT.
GEORGES EZBELENT.