

Nov. 22, 1932.

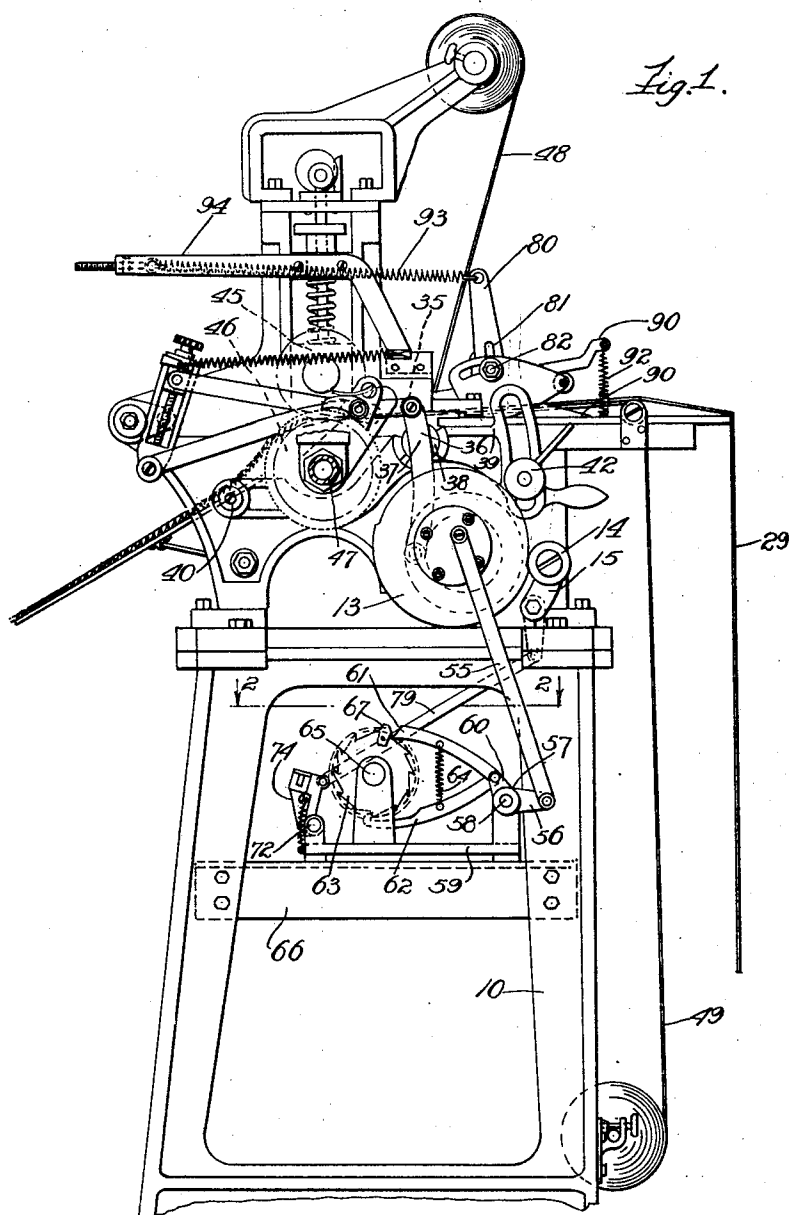
L. E. McDONOUGH

1,888,232

PLAITING MACHINE

Filed Dec. 26, 1928

3 Sheets-Sheet 1



Witness.
McDonough

Inventor.
Lawrence E. McDonough.
by Burtin & Burtin
his Attorneys.

Nov. 22, 1932.

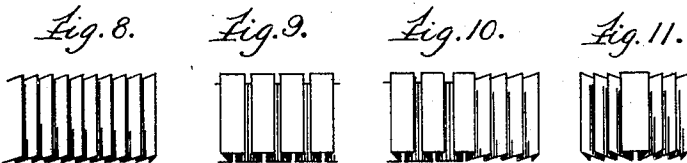
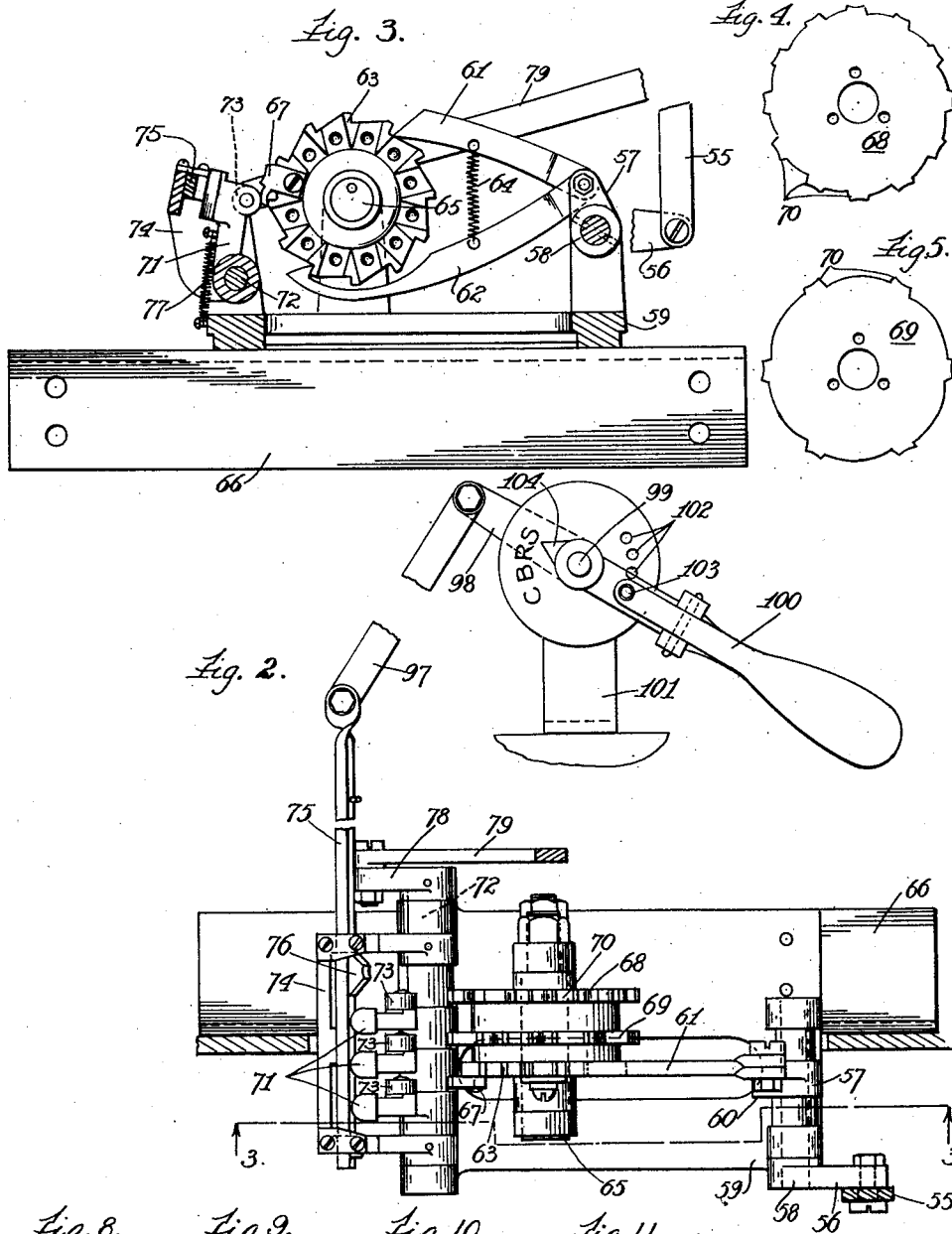
L. E. McDONOUGH

1,888,232

PLAITING MACHINE

Filed Dec. 26, 1928

3 Sheets-Sheet 2



Inventor.
Lawrence E. McDonough
by *Bulfin & Bulfin*
his Attorneys

Witness
A. C. Wright

Nov. 22, 1932.

L. E. McDONOUGH

1,888,232

PLAITING MACHINE

Filed Dec. 26, 1928

3 Sheets-Sheet 3

Fig. 6.

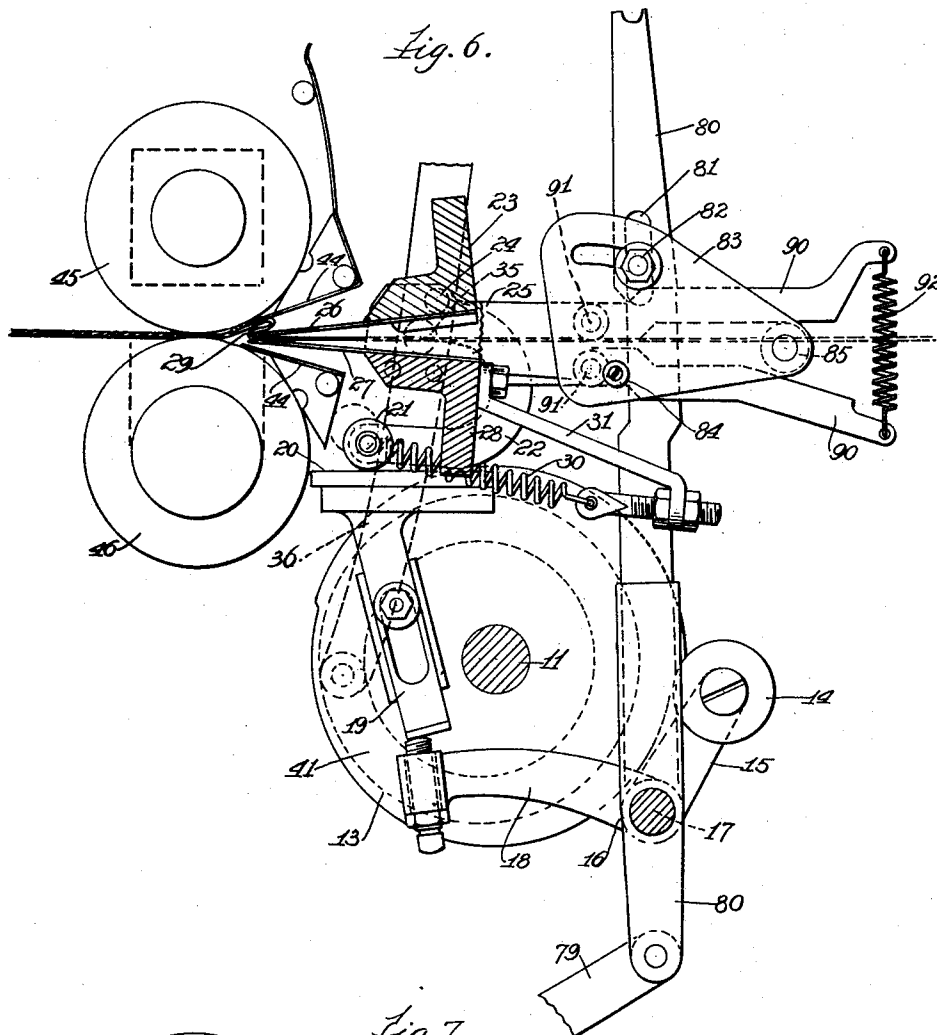
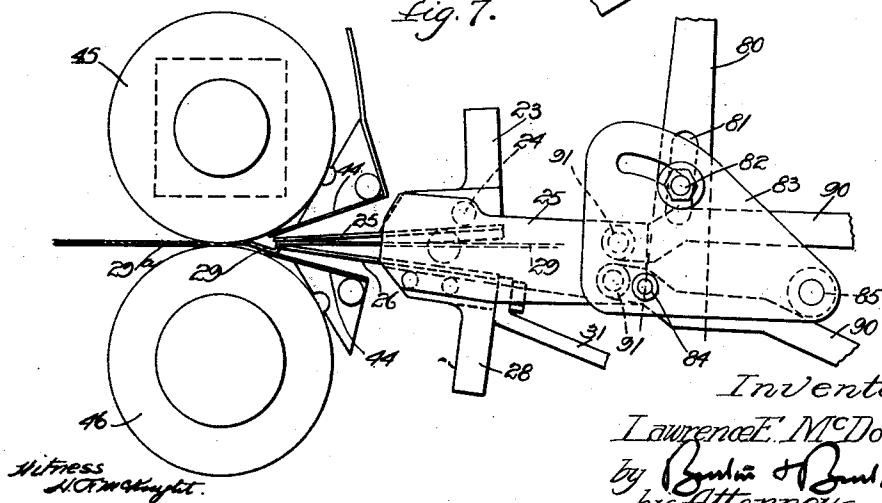


Fig. 7.



Witness
H. F. Wright.

Inventor
Lawrence E. McDonough.
by Burke & Burke
his Attorneys.

UNITED STATES PATENT OFFICE

LAWRENCE E. McDONOUGH, OF CHICAGO, ILLINOIS

PLAITING MACHINE

Application filed December 26, 1928. Serial No. 328,476.

The present invention relates to plaiting machines, adapted for making side, box and combination plaits, and has for its object to provide a selective control mechanism for changing the type or arrangement of plaits at will. It consists of certain features and elements of construction, in combination herein shown and described, and as indicated by the claims.

In the drawings:

Figure 1 is an end elevation of a plaiting machine embodying the present invention.

Figure 2 is a horizontal view of the control mechanism, omitting the machine framing, taken at line, 2—2, on Figure 1, showing broken linkage connections with operating lugs, and shift bar.

Figure 3 is a vertical section through the selective control mechanisms, showing the ratchet with a reversing dog in operating position, taken at line, 3—3, on Figure 2.

Figure 4 is a detail of a cam of the control mechanism, for making a "reverse plait."

Figure 5 is a detail of a cam of the control mechanism for making "box plaiting."

Figure 6 is an enlarged detail of the main operating members of the plaiting machine, with parts broken away and omitted, showing the cloth being undertucked to make a "side plait" in the usual manner.

Figure 7 is a fragmentary detail of the operating members, showing the cloth overtucked, for making a "reverse side plait."

Figure 8, 9, 10 and 11 are somewhat diagrammatic illustrations of certain types and combinations of plaits.

The selective control mechanism comprising this invention may be used in connection with plaiting machines of the type which have three main operating functions, viz., opening and closing of the cloth-gripping members; reciprocation of the cloth-gripping members during opening and closing movement thereof; and rocking movement of the cloth gripping members about a horizontal axis for reversing the plaiting effect. The machine proper, is provided with a pair of cast frames or end pedestals, 10, for supporting the entire mechanism. A main operating shaft, 11, extends longitudinally of the

machine, having suitable drive connections to a motor (not shown). The shaft may be provided with a clutch and hand wheel (not shown) for the usual purpose of securing proper adjustment of the cloth and of the various operating elements, in setting the machine, preparatory to its operation.

Referring now in general to the opening and closing mechanism for the cloth gripping members, a master cam, 13, is mounted at the end of the shaft, 11, having engagement with a roller, 14, carried on the end of a short lever arm, 15, of a bell crank, 16, which is fulcrumed at 17, in the frame, 10. A long lever arm, 18, of the bell crank, 16, is axially spaced inwardly of the arm, 15, and engages the lower end of a pusher bar, 19, for raising or lowering the same through a limited distance. Said pusher, when not actuated by arm, 15, is slidably supported by the frame, 10, as shown in Fig. 6.

The pusher bar is provided with a flat guide surface, 20, at the upper end engaging a roller, 21, of the pivot curved link, 22, which is rigidly connected to the movable frame, 23, so that as the pusher bar is forced upwardly by the lever arm, 18, the said curved link, 22, is shifted upwardly. Said frame, 23, which is pivoted at 24 to a reciprocating frame, 25, carries the upper cloth-gripping member, 26. A lower cloth-gripping member, 27, moves with the member, 26, being secured to a supporting frame member, 28, which is also connected to the reciprocating frame, 25, so as to reciprocate both gripping members as a unit. The gripping members, 26 and 27, when closed, taper toward each other so that only the tips thereof actually grip the cloth indicated at 29. It will be apparent that as the curved link, 22, is forced upwardly, the frame, 23, carrying the gripping member, 26, will be moved upwardly about the pivot, 24, into open position.

The cam, 13, has two sectors of different diameters, so that as it revolves the larger sector of the cam surface engages the roller, 14, and swings the lever arm, 15, about its pivot, 17, thus lifting the pusher bar, 19, and roller, 21, to hold gripper frame, 23, up for a definite period, to release the hold of the grippers on

the cloth. Then when the smaller sector of cam, 13, engages the roller, 14, the pusher, 19, will drop and permit gripping of the cloth by grippers, 26 and 27. The opening movement of the member, 26, is positive, and for the closing motion a tension spring, 30, is connected at one end to a bracket, 31, secured to the supporting frame, 28, while the other end of the spring is attached to the lower end of the link, 22, which gives a snap action effect, and tends to keep the members, 26 and 27, in a closed position.

The cloth-gripping members, 26 and 27, with their frames, 23 and 28, together with the supporting reciprocating frame, 25, are carried by trunnions, 35, at the ends of the machine, said trunnions being mounted in suitable cross heads (not shown) reciprocable in guides formed in the end frames, 10. The trunnions, 35, also are concentric with the pivot connection of a rocker, 36, which is fulcrumed at 37, in an adjustable sliding bearing, 38, carried by an auxiliary bracket, 39, pivoted at 40, to the end frame, 10. The lower end of the pitman, is guided in an eccentric groove, 41, formed in the inner surface of cam, 13, so that as the cam is rotated, the rocker is oscillated about its fulcrum, 37, thereby transmitting reciprocating motion to the cloth-gripping members and their frames, through the connections of the pitman to the trunnion, 35. As may be seen in Figure 1, the free end of the bracket, 39, is slotted and provided with a lock screw, 42, for adjustment vertically about pivot, 40, so as to raise or lower the fulcrum, 37, thereby increasing or decreasing the lever arm from said fulcrum to the trunnion, 35.

This adjustment permits variation in length of stroke or amount of reciprocation of the gripping members, which of course will govern the amount of material being fed through the machine, and determine the size of plaits. It will also be apparent that the opening and closing of the gripping members is synchronized with the reciprocating movement, and it is to be understood that as soon as the gripping members start on the back stroke, the upper gripping member, 26, is opened by the cam action hereinbefore described, and at the end of the stroke said gripping member is again closed so as to grip the cloth, 29, and feed it forwardly in either an overtuck or undertuck manner to form a plait, as will hereinafter be described.

The cloth, 29, is fed over suitable guide rollers of the machine, through the gripping members, which, through the assistance of a pair of converging or funnel-shaped guide plates, 44, secured to the end frames, 10, direct the same in either undertucked or overtucked foldings or plaits, to a pair of horizontal pressing rollers, 45 and 46. As shown in Figures 6 and 7, one of the rollers, preferably the lower, is provided with a pipe, 47,

for supplying steam thereto for pressing the plaits in the cloth as it passes between these rollers. These rollers are geared together and driven in a usual manner in synchronism with the reciprocation of the gripping members, by pawl and ratchet connections to the trunnion, 35, at the upper end of the rocker, 36, so that the plaited cloth is passed through the pressing rollers in timed relation to the plait formation. Rolls of light weight paper, 48 and 49, are mounted in a suitable manner at the top and bottom of the machine; this paper is directed over guides so as to contact with opposite surfaces of the cloth and be fed therewith through the machine. It will be understood by those familiar with the art that the paper coverings on each side of the cloth assist the creasing of the cloth in the formation of plaits and also tend to maintain the plaits therein, as well as serving as a protection therefor during the entire plaiting operation and subsequent handling.

Referring now to the mechanism for directing the cloth gripping members, 26 and 27, so as to form plaits, it may be understood that with the mechanism thus far described the gripping members may be permanently positioned either above or below the center line of feed for overtucking or undertucking, which would permit the making of a single type side (sometimes termed "knife") plait, as illustrated in Figure 8. It is desirable at times to reverse the direction of plaiting for purposes of design and beauty; and this reversal if constantly alternated at each stroke will also effect a box type plait as shown in Figure 9.

Heretofore, plaiting machines were provided with linkage and ratchet mechanism for reversing the plaiting operation, but this required alteration and substitution of ratchet wheels or other parts to obtain reverse plaiting, box plaiting, or for making a combination plait. The mechanism now to be described, permits the making of the usual side plait, reverse side plait, box plait, or several specific combinations of either side plaits or box plaits by merely shifting a lever. This mechanism includes a pitman, 53, pivoted at one end to the cam, 13, the other end being connected to a short lever arm, 56, of a bell crank, 57, which is pivoted at 58 in a frame, 59. The other lever arm, 60, of the bell crank, 57, carries the pivot end of a pair of ratchet escapement pawls, 61 and 62, yieldingly held in operative engagement with a ratchet wheel, 63, by a spring, 64. It will be understood that each rotation of the cam, 13, will thus cause a partial rotation of the ratchet, depending on the design of the escapement movement. Said ratchet is keyed on a stub shaft, 65, journaled in the frame, 59, which is mounted on an angle iron support, 66, secured to the inner side of an end frame, 10.

Dogs or teeth, 67, may be detachably secured to the outer face of the ratchet, in certain spaced relation for obtaining any suitable combination of side plait, reverse side plait and box plait. Coaxial with the ratchet and keyed to said stub shaft are cams, 68 and 69 for standard reverse side plaiting and box plaiting, respectively. Each of these cams is provided with teeth, 70, in certain spaced relation to a definite number of teeth of the ratchet wheel, 63.

Three pivotally movable lugs, 71, are loosely mounted on a short shaft, 72, which is carried by the frame, 59. These lugs are aligned with the teeth of the cams, 67, 68 and 69, and are each provided with rollers, 73, for contact therewith when in operation. A pivotally movable frame, 74, surrounds the rear portion of the lugs, and is keyed to the shaft, 72. A sliding shift bar, 75, is mounted in said frame, having a tapered boss, 76, adapted to be shifted therewith for selective contact with one of the lugs, 71, forcing the latter forwardly so that its roller can engage the teeth of its respective cam. These lugs are yieldingly held toward the shift bar in the path of the boss, 76, by tension springs, 77, secured to said lugs and connected to the base of the frame, 59. A crank arm, 78, is keyed to the end of the shaft, 72, and is connected to a link, 79, the other end of which is pivoted to the end of a vertical guide bar, 80, which is fulcrumed at pivot, 17, on the frame, 10. A vertical slot, 81, is provided in said bar adjacent the upper end. A bolt, 82, through this slot, transmits the movement of the bar, 80, to the plate, 83, which may be swung forwardly or rearwardly with the guide bar, 80, about its pivotal connection, 84, to the frame, 10.

The outer end of this plate carries a roller, 85, adapted to engage either of a pair of vertically spaced controlling arms, 90, which are pivoted at 91 to the gripping member frame, 25. These arms, 90, serve as lever arms for tilting the gripping members, 26 and 27, upwardly or downwardly as a unit about the pivot, 35, for overtucking or undertucking the cloth to form plaits. A spring, 92, is connected to the ends of said arms and tends to hold them in position and permit the same to yieldingly engage the roller, 85. A tension spring, 93, connects the upper end of the guide bar, 80, with a bracket, 94, on the frame, 10, thereby yieldingly holding said bar normally in a forward position. As illustrated in Figure 6, when the plate, 83, is in this forward position the roller, 85, impinges against the upper arm, 90, forcing it upwardly, and due to the connection of the arm to the frame, 25, naturally forces the forward ends of the gripping members, 26 and 27, downwardly about pivot, 35. It will now be seen that spring, 93, through the co-operating arm, 80, and link, 79, holds the frame, 74,

with the lugs, 71, yieldingly in position so that when the boss, 76, engages one of said lugs, it will force its roller into contact with the teeth of the respective cam. Further, as the ratchet rotates, and a cam tooth engages the roller, 73, of said lug, it will force it rearwardly thereby pulling link, 79, forward and moving arm, 80, backward about pivot, 17. This movement swings the plate, 83, downwardly, and causes its roller, 85, to impinge against the lower arm, 90, thereby moving the forward end of the gripping members upwardly about the pivot, 35.

This upward movement of the gripping members may be thought of as providing "reverse" side plaiting, merely because, normally the gripping members are yieldingly held downward to make standard side plaits without operating the trip cams or linkage connections. However, it will be clear that reverse plaiting can be a continuous operation if so desired, by the use of the cam, 68, shown in Figure 4, having as many teeth, 70, as there are teeth in the ratchet, or rather, corresponding to the number of escapement movements to rotate the ratchet one complete revolution. Further, it will be understood that, if a cam tooth were omitted from said cam, the lug, 71, with its roller will move forwardly to fill the gap, permitting the slide bar to follow and permit the link, 79, and arm, 80, to be returned to normal position by the tension spring, 93, which of course permits a standard side plait to be formed as originally or normally.

If every other tooth were omitted from the cam, it is clear that there would be alternately folded side plaits, the combination of which is known as a box plait. The box plait movement is obtained by the cam, 69, shown in Figure 5, which moves the gripping members up and down alternately as they are reciprocated. Frequently it is desirable to make certain combination box and side plaits such as shown in Figure 11, or numerous other combinations of these plaits; for this purpose the detachable teeth, 67, on the face of the ratchet may be spaced to suit. Of course it will be understood that these detachable teeth could be secured to any face plate, but for convenience, the face of the ratchet is employed. If cam teeth were provided on the ratchet, one for each ratchet movement, the effect would be a reverse plaiting movement, the same as obtained by the cam, 68. The spacing of the cam teeth or dogs, 67, must be predetermined so that the proper number of regular side plaits or reverse plaits will be formed to effect a desired combination.

For convenience and saving of time, the shift bar must be accurately and positively moved so that its boss, 76, engages the proper lug for operating. To this end I provide a pivot link, 97, connecting said shift bar with

a crank arm, 98, fixed to a stub shaft, 99, to which is also rigidly secured a shift lever, 100. The lever and crank arm are supported by a bracket, 101, secured to one side of an end frame, 10. This bracket also provides bearing for the pin, 99, and serves as an indicating dial, having the letters, "C" "B" "R" and "S" arranged concentrically with respect to said pin. Diametrically opposite each of the letters is an aperture, 102, for engagement by a spring detent pin, 103, of the hand lever, 100, for locking the same in position. An index pointer, 104, is formed on the pivot end of the lever to be aligned with one of the letters. The letters correspond to the various positions of engagement of the boss, 76, with the lug, 71, for operating movements. The letter "C" indicates the position when the shaft bar is at extreme position with the boss, 76, engaging the outer lug, 71, for making "combination" plaits. The letter "B" indicates a position for "box" plait, while "R" gives the position for reverse plaits, and the letter "S" indicates a position at which the boss, 75, is out of engagement with all the lugs, 71, as seen in Figure 2, and corresponding to the normal side-plaiting movement.

The shift lever may be arranged adjacent the other controls of the machine for convenience of the operator. It will now be clear that the shifting of the lever, 100, affords selective plaiting movements, that may be varied to suit, and of course it will be understood that any number of variations and combinations of plaits may be had by merely shifting the lever to proper position, and providing the proper cams as an in-built feature of the machine.

I claim:—

1. In a plaiting machine, mechanism for forming side plaits, reverse plaits, box plaits or combinations thereof, and selective means operable at will for instantaneously setting the mechanism to form any one of said types of plaits, said machine adapted to normally form side plaits independently of the selective operative means; and said selective means including separate operating cams for reverse plaits, box plaits, and combination plaits.

2. In a plaiting machine adapted to form side plaits, reverse plaits, box plaits and combinations thereof, having reciprocating cloth gripping members, and means selectively adjustable at will for instantaneously changing from one type of plait to another, said means including operating cams for reverse plaits, box plaits and combination plaits, and follower means for engaging said cams selectively, whereby to communicate certain movement to the reciprocating gripping members to form the desired plaits in the cloth.

3. In a plaiting machine as defined in claim 2, said cams being spaced axially from each other, and provided with means for rotating

them in timed relation to said reciprocating cloth gripping members.

4. In a plaiting machine for making side plaits, reverse plaits, box plaits and combinations thereof, reciprocating cloth gripping members, means cooperating therewith, selectively adjustable for changing from one type of plait to another instantaneously, said means including a cam for reverse plaiting, a cam for box plaiting, and a cam for combination plaiting; means for operating said cams in timed relation to said gripping members, follower means co-operating with said cams, and a shifting rod for selectively engaging the follower means with any one of said cams for effecting a desired plaiting operation, and an indicating lever positively connected to said rod for shifting it manually at will.

5. In the combination defined in claim 4, said cam for combination plaiting being of an adjustable type with movable parts for changing its contour, whereby to secure various combination of side, reverse and box plaits.

6. In a plaiting machine adapted to form side plaits, box plaits and combinations thereof, reciprocating cloth gripping members, and means selectively adjustable at will for instantaneously changing from one type of plait to another, said means including operating cams for forming box plaits and combination plaits, and follower means for engaging said cams selectively, whereby to communicate certain movement to the reciprocating gripping members to form the desired plaits in the cloth.

7. In a plaiting machine adapted to form side plaits, box plaits and combinations thereof, reciprocating cloth gripping members, and means selectively adjustable at will for instantaneously changing from one type of plait to another, said means including operating cams for forming box plaits and combination plaits, and follower means for engaging said cams selectively, whereby to communicate certain movement to the reciprocating gripping members to form the desired plaits in the cloth, said cam for combination plaits having an adjustable camming surface to effect a predetermined combination of plaits.

8. In a plaiting machine, mechanism for forming side plaits, reverse plaits, box plaits or combinations thereof, separate means for controlling the mechanism for forming the respective types of plaits, and selective means operable at will for instantaneously rendering operative any one of said separate means.

9. In a plaiting machine, mechanism for forming side plaits, reverse plaits, box plaits or combinations thereof, separate cam surfaces adapted to be engaged for forming the respective types of plaits, and means for instantaneously substituting one cam surface

for another for producing a desired type of plait.

10. In a plaiting machine, mechanism for forming side plaits, reverse plaits, box plaits or combinations thereof, said mechanism including separate operating cams for forming the respective types of plaits, and selective means operable at will for instantaneously setting the mechanism to form any one of said types of plaits.

LAWRENCE E. McDONOUGH.

15

20

25

30

35

40

45

50

55

60

65