Jan. 1, 1952 B. N. PIERCE 2,580,953

CAM MECHANISM

Filed April 28, 1949 2 SHEETS—SHEET 1

Fig. 2.

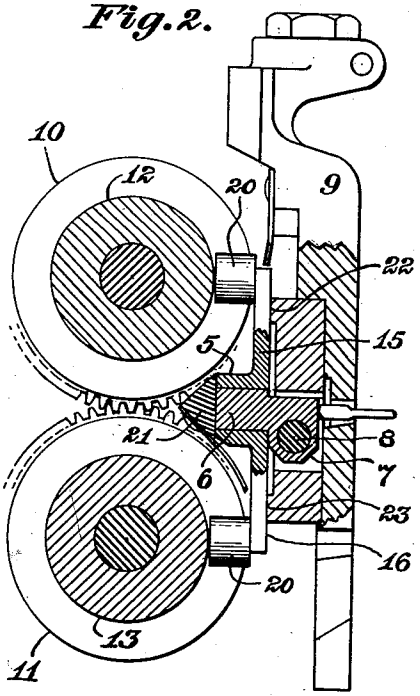


Fig. 1.

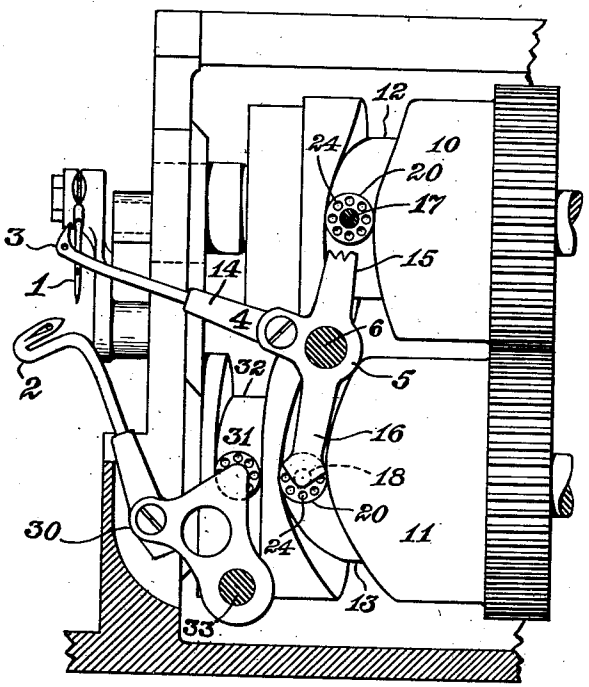
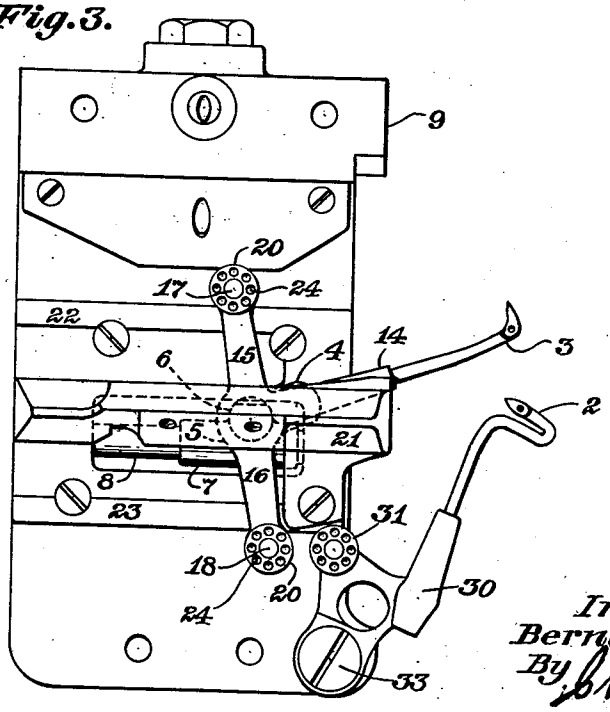


Fig. 3.



Inventor:
Bernard N. Pierce
By Church & Church
His Attorneys

Jan. 1, 1952

B. N. PIERCE

CAM MECHANISM

2,580,953

Filed April 28, 1949

2 SHEETS—SHEET 2

Fig. 4.

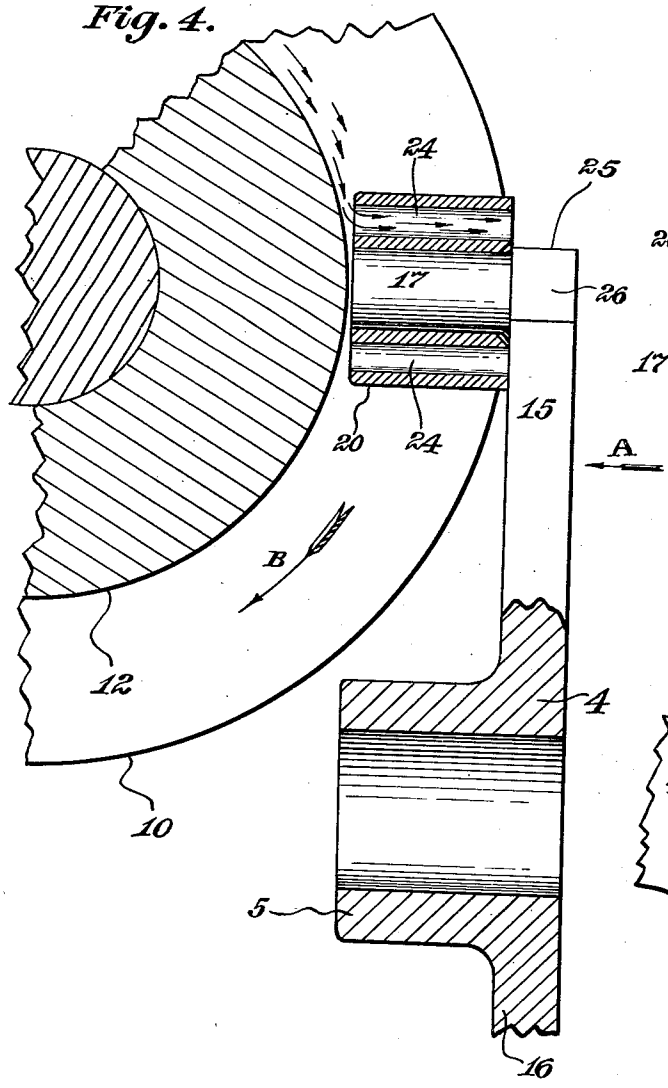
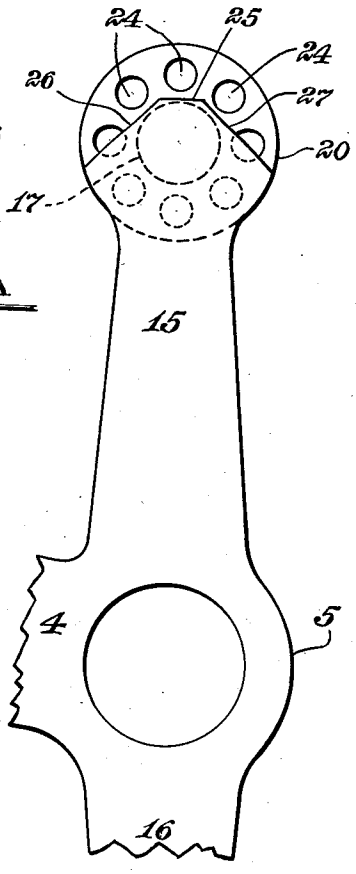


Fig. 5.



Inventor:
Bernard N. Pierce
By Church & Church
His Attorneys

Patented Jan. 1, 1952

2,580,953

UNITED STATES PATENT OFFICE

2,580,953

CAM MECHANISM

Bernard N. Pierce, Avon, Conn., assignor to The Merrow Machine Company, Hartford, Conn., a corporation of Connecticut

Application April 28, 1949, Serial No. 90,200

10 Claims. (Cl. 74—54)

1

This invention relates to a cam mechanism of the type employing a rotary cylinder having a peripheral cam groove with a cam roller arranged to follow the groove.

Cam mechanisms of this type have been employed in sewing machines for actuating looper elements at high rates of speed. An example of a looper operating mechanism is disclosed in United States Letters Patent No. 1,983,631, granted December 11, 1934, upon an application of Joseph M. Merrow, also in United States Letters Patent No. 1,966,367, granted July 10, 1934, upon application of John M. Washburn. In the mechanism shown in those patents, a looper carrier is actuated by cam rolls following cam grooves in rotary cylinders. With this arrangement, considerable heat is developed when the sewing machine is operated at speeds demanded by modern industrial production. Due to the position of the cam rolls, partially enclosed by the side walls of the cam groove, the heat is not dissipated rapidly enough.

It is, therefore, a major object of the present invention to reduce overheating of a cam roll in a cam groove by more rapidly dissipating heat generated by operation of the cam mechanism. More particularly, it is an object of the invention to improve the ventilation of a cam roll operating in a cam groove on a rotary cam.

In accordance with these objects, an important feature of the invention resides in the provision of ventilating passages or channels in the cam roll so air is circulated through the roll during operation of the mechanism. Another important feature resides in the arrangement of the cam roll so a pressure differential created by rotation of the cylinder forces air through the ventilating passages. A further feature of the invention resides in the location of the cam roll on its supporting arm so only a portion of the ventilating passages are obstructed by the arm so the passages successively pass into and out of registration with the arm upon rotation of the cam roll.

In the accompanying drawings there is illustrated a preferred form of the invention embodied in a looper actuating mechanism which is fully described in the following detailed description while the invention is defined in the appended claims.

Figure 1 is a longitudinal sectional view of part of the frame of an overseaming machine and parts supported thereby including looper carriers bearing cam rolls formed in accordance with the invention.

2

Fig. 2 is a transverse sectional view of cams shown in Fig. 1, looper carriers operable by the cams and a frame cap for supporting the looper carriers.

Fig. 3 is an inner face view of a frame cap and associated parts including looper carriers.

Fig. 4 is an enlarged detail view partly in section showing a cam, cam roll and a movable arm supporting the cam roll; and

Fig. 5 is a view of parts shown in Fig. 4 looking in the direction of arrow "A."

In accordance with this preferred form of the invention, a looper carrier is pivotally supported on a reciprocable carriage. To bodily shift the looper carrier and effect pivotal movement thereof, a pair of rotary cylinders are arranged parallel to the path of movement of the carriage and each cylinder has a peripheral cam groove, the side walls of which form cam surfaces. Oppositely extending arms on the looper carrier have studs projecting into the grooves of the respective cylinders and carry cam rolls engageable with the cam surfaces to impart movement to the carrier. Ventilating passages or channels are formed in each cam roll parallel to its axis of rotation. The arms and studs are so arranged that each cam roll has its end substantially tangent to but slightly spaced from, the bottom of a cam groove, so the pressure differential created by rotation of the respective cylinders will force air to circulate through the ventilating passages. Also, the studs are located on the arms so that the arms cover some of the ventilating passages which, upon rotation of the cam rolls, pass into and out of registration with the arms.

Referring to the drawings, mechanism illustrated therein is characteristic of the well known "Merrow" over-seaming machine in which a needle 1 and a lower looper 2 cooperate with an upper looper 3 to form overedge stitches. The upper looper 3 is secured in a looper carrier 4 which is designed to be actuated by mechanism suitable to impart to the looper a compound motion effective to pass the thread engaging end of the looper in a required path. For this purpose the looper carrier 4 has a hub 5 pivoted on stud 6 extending from sleeve 7 which is reciprocable on a rod 8 carried by frame cap 9. With this mounting, the looper carrier 4 may oscillate on the axis of its hub 5 while it is shifted bodily back and forth as in a rectilinear path.

Cam mechanism for actuating the looper carrier 4, includes a pair of rotary members, such as cylinders 10 and 11, arranged to be rotated in

unison, and provided at their respective peripheries with suitably contoured cam grooves 12 and 13. These cylinders 10 and 11 are approximately parallel with and located in proximity to the rod 8. In addition to looper receiving arm 14 extending from hub 5 of looper carrier 4, a pair of motion receiving members or arms 15 and 16 extend in opposite directions from hub 5. Arm 15 is provided with stud 17 and arm 16 is provided with stud 18. Each stud supports a cam follower in the form of a roll 20 positioned in cam grooves 12 and 13 for engagement with side walls of a respective groove. The side walls of the grooves serve as cam surfaces for engaging the rolls 20, 20, which are free to rotate as they follow the grooves and impart movement to the carrier 4. By virtue of the connections just described the looper 3 will, upon rotation of the cam cylinders, be actuated to cooperate with the needle 1 and lower looper 2 to produce overedge stitches in a manner well known in this art. It is to be understood that the looper carrier 4 is laterally confined to its field of movement by a guide bar 21 on one side and guide rails 22 and 23 on the opposite side.

As hereinbefore stated the object of the present invention is to provide means whereby overheating of the cam rolls due to the effect of high speed operation may be prevented. For this purpose rolls 20, 20, have each been provided with longitudinally extending ventilation passages or channels 24, 24, preferably arranged in substantially parallel relation to the axis of rotation of the respective rolls.

Serving to promote flow of air through passages 24, 24, is the arrangement of the cam rolls 20, 20, substantially tangent to the bottoms of grooves 12 and 13, but slightly spaced therefrom. As the cam cylinder, with the groove of which the cam roll is engaged, rapidly rotates, air differential is developed at the free end of the roll. Thus, near the portion of the roll presented toward the oncoming surface of the cam air compression is developed, and near the portion of the roll presented toward the withdrawing surface of the cam a partial vacuum is developed. This air pressure differential in proximity to the roll directs flow of air through the holes in the roll thereby imparting the cooling effect which is desired.

Referring to Figs. 4 and 5, it will be seen that the free end of arm 15 terminates as in peripheral surface 25 and angled surfaces 26 and 27 only slightly beyond the adjacent peripheral surface of stud 17. Thus stud 17 is so located on arm 15 that perforations 24 in roll 20 successively pass out of register with the arm as said roll rotates. It will, therefore, be apparent that air may pass freely through roll perforations and provide ventilation to keep the roll relatively cool.

Thus, with a cam cylinder rotating in the direction indicated by arrow "B" in Fig. 4, air compression would be built up in proximity to the roll in the vicinity of the holes unobstructed by arm 15 and cause an air current moving in the direction indicated by the small arrows, while if the cam were rotated in the opposite direction to arrow "B," a partial vacuum would be created in the vicinity of the unobstructed holes and air currents established therethrough would flow in the opposite direction to that shown by the small arrows. In the arrangement of parts shown in Fig. 2 each cam rotates in a direction suitable to build up air pressure toward that portion of each respective cam roll which is unobstructed by a supporting arm of carrier 4, therefore the movement of air through holes in each roll will be as indicated in Fig. 4, that is, from the free end of the roll toward the supporting arm.

The carrier 30 for lower looper 2 may also be provided with a cam roll as 31 for engagement with a groove 32 in cam cylinder 11. This lower carrier is not mounted for bodily movement but simply oscillates on a pivot 33 in a manner that is obvious.

Having thus described my invention, what I claim is:

1. A cam mechanism comprising a rotary member having at its periphery a radially extending wall forming a cam surface, a motion receiving member, and a cam follower on said motion receiving member for engaging and following said cam surface to impart motion to said motion receiving member upon rotation of said rotary member, said cam follower being formed with ventilating passages extending between its ends and being so positioned that the openings of said passages at one end of said follower are adjacent a peripheral surface of said rotary member and exposed to an area of pressure differential created by rotation of said rotary member.

2. A cam mechanism comprising a rotary member having cam surfaces formed by the walls of a groove at its periphery, a motion receiving member, and a cam follower on said motion receiving member for engaging and following said cam surfaces to impart motion to said motion receiving member upon rotation of said rotary member, said cam follower being formed with ventilating passages extending between its ends and being so positioned in said groove with one end adjacent the bottom of said groove so that the openings of said passages at said one end of said follower are exposed to an area of pressure differential created by rotation of said rotary member.

3. A cam mechanism comprising a rotary member having at its periphery a radially extending wall forming a cam surface, a motion receiving member, and a cam roll rotatable on the motion receiving member about an axis parallel to said cam surface for engagement with said cam surface, the latter being effective to impart movement to the motion receiving member upon rotation of said rotary member, said cam roll being formed with ventilating channels extending between its ends substantially parallel to its axis of rotation, said cam roll being positioned with respect to said member in a manner such that said ends of the roll are exposed to areas of differential pressure.

4. A cam mechanism comprising a rotary member having at its periphery cam surfaces formed by walls of a groove, a motion receiving member, and a cam roll disposed in said groove and carried by the motion receiving member for rotatable engagement with the walls of said groove, the latter being effective to impart movement to the motion receiving member upon rotation of said rotary member, said cam roll having ventilating channels extending between its ends substantially parallel to its axis or rotation, said cam roll being positioned with respect to said member in a manner such that said ends of the roll are exposed to areas of differential pressure.

5. A cam mechanism comprising a rotary member having at its periphery cam surfaces formed by the walls of a groove, a motion receiving member, and a cam roll carried by the motion receiving member for rotatable engagement with the walls of said groove, the latter being effective

to impart movement to the motion receiving member upon rotation of said rotary member, said cam roll being formed with ventilating channels extending between its ends substantially parallel to its axis of rotation, said cam roll having one end positioned adjacent the bottom of said groove so that the channel openings at said one end are exposed to an area of pressure differential created upon rotation of said rotary member.

6. A cam mechanism comprising a rotary member having a peripheral cam groove, a motion receiving member, and a cam roll rotatable on said motion receiving member and positioned in said groove with its end substantially tangent to but spaced from the bottom of the groove, said cam roll being formed with ventilating passages extending through it parallel to its axis of rotation.

7. A cam mechanism comprising a rotary member having a peripheral cam groove, a movable arm, a stud extending from the arm, and a cam roll on the stud and disposed in the groove for rotatable engagement with the walls of the cam groove, the latter being effective to impart movement to the arm, said cam roll having ventilating channels extending between its ends substantially parallel to its axis of rotation, said arm overlying only a portion of one end of the roll so that said channels successively pass into and out of registration with the arm upon rotation of the roll, said cam roll being positioned with respect to said member in a manner such that said ends of the roll are exposed to areas of differential pressure.

8. A cam mechanism comprising a rotary member having a peripheral cam groove, a movable arm, a stud extending from the arm, a cam roll rotatable on the stud and having ventilating channels extending therethrough substantially parallel to its axis of rotation, said stud being so located on the arm that only a portion of one end of the roll is covered by the arm, the latter being so arranged with respect to the rotary member that the roll is positioned in the cam groove with the other end of the roll substantially tangent to the bottom of the groove.

9. In a sewing machine, looper actuating mechanism comprising a looper carrier supported

for pivotal movements on a reciprocable carriage, a pair of rotary cylinders parallel to the path of said carriage, each cylinder being formed with a peripheral cam groove, a pair of arms extending oppositely from the pivot of said carrier, a stud at the end of each of said arms, one stud projecting into each of said grooves, a cam roll on each of said studs, said cam rolls being provided with longitudinally extending ventilation passages, said arms being so arranged that said rolls have their ends substantially tangent to and slightly spaced from the bottoms of the respective cam grooves.

10. In a sewing machine, looper actuating mechanism comprising a looper carrier supported for pivotal movements on a reciprocable carriage, a pair of rotary cylinders parallel to the path of said carriage, each cylinder being formed with a peripheral cam groove, a pair of arms extending oppositely from the pivot of said carrier, a stud at the end of each of said arms, one stud projecting into each of said grooves, a cam roll on each of said studs, said cam rolls being provided with longitudinally extending ventilating passages, said studs being so located on said arms that only a portion of the end of each roll is covered and said passages successively pass into and out of registration with the respective arms, said arms being so arranged that said rolls have their ends substantially tangent to and slightly spaced from the bottoms of the respective cam grooves.

BERNARD N. PIERCE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,169,715	Erickson	Jan. 25, 1916
1,751,634	Holmes	Mar. 25, 1930
1,824,938	Voorhees	Sept. 29, 1931
1,983,631	Merrow	Dec. 11, 1934
2,129,559	Blackwell	Sept. 6, 1938

FOREIGN PATENTS

Number	Country	Date
461,149	France	Aug. 6, 1913