L. W. G. FLYNT.

SKIVING MACHINE.

APPLICATION FILED JULY 8, 1909.

1,017,963. Patented Feb. 20, 1912.

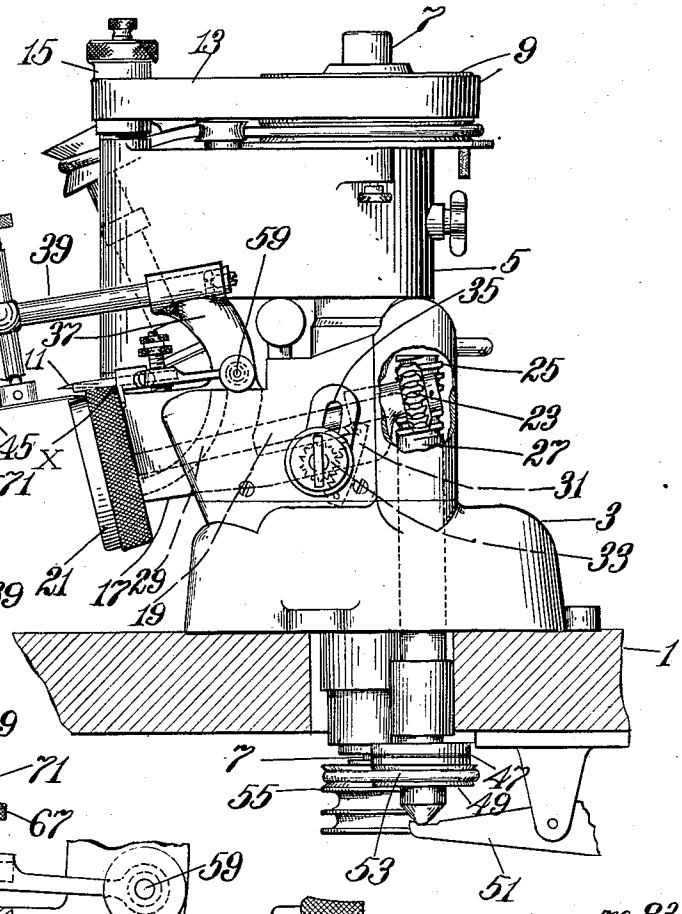

Fig. 1.

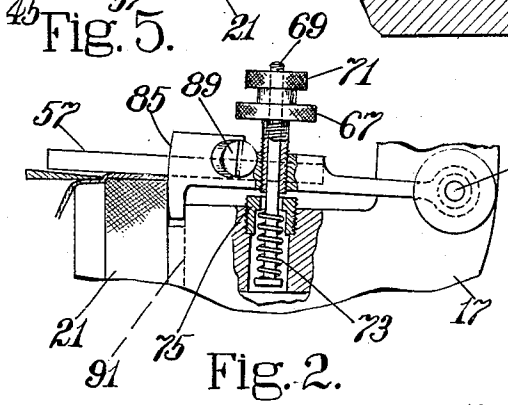

Fig. 5.

Fig. 2.

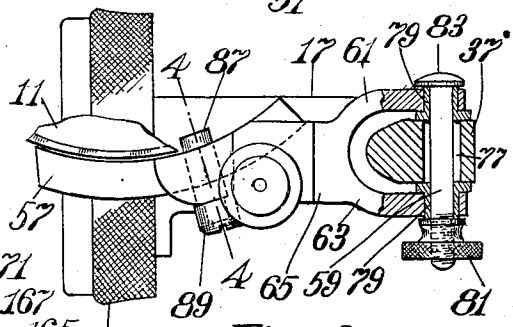

Fig. 3.

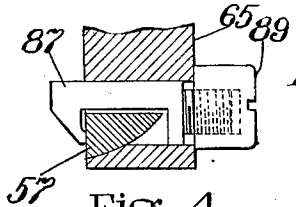

Fig. 4.

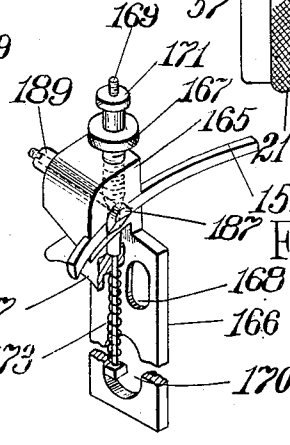

Fig. 6.

WITNESSES.

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SKIVING-MACHINE.

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To all whom it may concern:

Be it known that I, LOUIS W. G. FLYNT, a subject of the King of England, residing at Rochester, in the county of Monroe and State of New York, have invented certain Improvements in Skiving-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to skiving machines, more particularly to machines of this class wherein a knife having a circular edge is employed; and is herein shown as embodied in a skiving machine in which by the employment of a feed roll of particular form a substantially straight bevel is produced on the stock, it being especially well adapted for use with this type of machine. It should be understood, however, that its usefulness is not confined to the particular type of machine shown.

It is desirable that means be provided for pressing all points in that portion of the moving work which is about to be fed to the knife with equal force against the surface of the feed roll in order that the feeding of the work may be uniform, and one object of the present invention is to bring about such a pressure.

The machine chosen for illustration comprises a knife having a circular edge together with an angularly adjustable feed roll having a concave working face the curvature of which corresponds to that of the edge of the knife in such a manner that when the axis of the roll is at its least inclination the edge of the knife is parallel to the adjacent surface of the roll. Accordingly, a segmental presser foot is provided the inner, lower, operative edge of which is struck from a center coinciding with that of the knife. It will be clear, therefore, that since the edge of the operative portion of the knife follows the contour of the roll in one position of the roll, the operative edge of the presser foot will likewise follow it. In actual work, however, the roll is angularly adjusted as stated above so that the edge of the knife steadily recedes from the surface of the roll in order that a straight bevel may be produced. The presser finger, on the other hand, should in most cases be parallel to the adjacent surface of the roll in order that it may exert equal pressure upon all points in the stock engaged by it. Accordingly, the presser foot is mounted upon the feed roll carrier so that as the feed roll is adjusted angularly the presser foot is adjusted with it and the relation of the two remains unchanged.

It is sometimes desirable, for example, in reskiving stock, that a relation other than that of parallelism be maintained between the operative portion of the presser foot and the adjacent surface of the feed roll, and a further object of this invention is to provide means whereby such a relative position may be attained. This may be accomplished in any convenient manner, and in the illustrated embodiment the presser foot is made angularly adjustable about a pivot which is itself bodily adjustable so that the presser foot can be moved for a certain distance transversely across the surface of the feed roll. As the result of such movement the center of curvature of the segmental presser foot no longer coincides exactly with the center of curvature of the knife and consequently the operative portion of said foot is no longer parallel to the adjacent surface of the roll.

In certain circumstances, for example, when a change is made from a wide feed roll to a narrower one or vice versa, it is desirable that the presser foot be adjustable in such a manner that its proper position with respect to the feed roll may be maintained.

Accordingly, another object of this invention is to provide means for adjusting the segmental presser foot circularly about the center of the knife and for holding it in adjusted position. This means in the illustrated embodiment comprises a segmental guideway the curvature of which corresponds to that of the presser foot and a clamp for holding said presser foot in position.

These and other features of the invention including certain details of construction and combinations of parts will be explained in connection with the following description of a machine and will be pointed out more definitely in the claims.

Referring now to the accompanying drawings,—Figure 1 is a side elevation with certain parts broken away of a skiving machine embodying the present invention. Fig. 2 is

a side elevation of the improved presser foot together with portions of the adjacent parts of the machine, certain parts of the feed roll carrier being broken away. Fig. 3 is a plan view of the parts shown in Fig. 2, the yoke of the presser foot carrier and the adjacent portion of the feed roll carrier being shown in section. Fig. 4 is a section on the line 4—4 of Fig. 3 showing the means whereby the presser foot may be circularly adjusted. Fig. 5 is a perspective showing the position of the presser foot with respect to the knife, the feed roll and the guard disk; and Fig. 6 is a perspective of a modified form of presser foot.

Upon a base 1 is mounted a frame 3 which in turn carries a head 5, said head being adjustable vertically and also angularly about the axis of the shaft 7. Extending upwardly through the base, frame and head is said shaft 7 carrying a pulley 9 at its upper end; and from this pulley is driven a knife 11 through the medium of a belt 13 and a sleeve 15 which is connected to the knife spindle. In the frame 3 of the machine is mounted a feed roll carrier 17 which is formed with a bearing for the shaft 19 of a feed roll 21. The feed roll is driven by means of a gear 23 which meshes with a worm 25 on an upright shaft 27. The teeth of the gear 23 are chamfered or beveled, as shown, so that the feed roll carrier 17 may be angularly adjusted without throwing said gear out of mesh with the worm 25. The feed roll carrier 17 is formed on its inner side with a groove 29 which fits over a correspondingly shaped guide formed on the frame of the machine, angular adjustment of the carrier 17 on this guide being effected by means of a fixed rack 31 and a coöperating pinion 33 the shaft of which extends through a slot 35 in the frame and is rotatably mounted in the feed roll carrier. Extending upwardly from the feed roll carrier 17 is a bracket 37 in which is adjustably mounted a rod 39 carrying at its outer end a tubular bearing 41 for the spindle 43 of a guard disk 45. The upright shaft 27 is driven by means of a friction device 47 and a pulley 49, said friction device being controlled by a lever 51 operated by a treadle (not shown). A belt 53 connects the pulley 49 with the pulley which drives the shaft 7. The object of the driving mechanism described above is to permit the speed of rotation of the feed roll to be varied independently of the speed of rotation of the knife.

The construction of the machine outlined above will not be taken up more in detail since it is set forth and claimed in my previous application, Serial No. 313,775. It should be observed, however, that the machine is provided with a knife the spindle of which is fixed against tilting movement, with an angularly adjustable feed roll, and with means for actuating said knife and roll. The particular roll shown is also set forth in my previous application above referred to, but inasmuch as up to this time the present invention has found its best application in combination with a roll of this kind, said roll will now be described.

In machines of this class hitherto used having a circular knife and in which the work is supported and fed by a revolving cylinder or cone the opening between the knife and the work support does not progress regularly from the narrower to the wider portion so that a straight bevel will be produced on the work, but opens from the narrower to the wider portion in a steadily increasing ratio dependent upon the diameter of the knife and that of the work support. The effect of this, more noticeable in a wide skive than in a narrow one, is to produce a curved instead of a straight bevel.

In order to produce a substantially straight bevel the surface of the feed roll in the present machine is formed with a concavity which corresponds, in a manner presently to be described, to the cutting edge of the circular knife and is made adjustable about a particular axis. This concavity of the surface of the feed roll can best be defined by stating that it is the concavity which would be produced were the knife replaced by a milling cutter of the same diameter and caused to mill off a portion of the rotating roll, the axis of said roll being held during the operation at the least angular inclination which it assumes in the skiving machine. It is clear now that if the milling cutter were replaced by the disk knife all points in that portion of the edge of the knife which were located above the feed roll at any instant would be equidistant from said surface. In fact, the edge of this portion of the knife would substantially coincide with the adjacent surface of the roll, thus a relation of knife to feed roll is obtained which does not exist when a cylindrical or conical feed roll is used, since in these latter cases the curvature of the roll about its axis tends to make the surface of said roll fall away, so to speak, from the receding curved edge of the knife. As stated, the feed roll of the illustrated machine has a concave working face the curvature of which is determined by the curvature of the edge of the knife as described above, said roll being shown most clearly in Fig. 3. It should be noted that this roll may also be said to be one in which the diameter increases from one end to the other, the increase being dependent upon the diameter of the knife.

Having obtained a relation of knife and roll such that all points in the operative portion of the edge of the knife at any given

instant are equidistant from the surface of the roll it only remains to make the roll adjustable about a proper center or axis in order to adapt the machine to the production of straight bevels of various angles. This center is substantially that point in the edge of the roll at the end having the smaller diameter which is nearest the cutting edge of the knife. Or to locate the center in another manner it is approximately the point at which the edge of the stock adjacent the gage meets the knife as said stock is being skived. This point is indicated at X in Fig. 1.

In order that the work may be properly fed to the knife it is desirable that it be pressed against the roll with a pressure which is uniform throughout the portion upon which it is exerted. Accordingly, a segmental presser foot 57 is provided, said presser foot being of the form of an arc struck from a center which coincides with the center of the circular cutting edge of the knife. This presser foot is shown in cross section on an enlarged scale in Fig. 4, and it will be seen that it approximates a quadrant in section, the curved portion being of such form as will permit the work to be readily fed beneath it. It should be noticed that the operative portion of this presser foot is a comparatively thin edge and that since said edge is parallel to the adjacent edge of the knife it is consequently parallel to the adjacent surface of the feed roll when the axis of said roll stands at its least inclination.

In actual use, as has been mentioned, the feed roll is tilted about an axis passing through the point X in order to vary the angle of the skive; and in order that the relation of parallelism between the operative portion of the presser foot and the adjacent surface of the feed roll may be maintained, said presser foot is so mounted that it may be adjusted with said carrier. Any convenient means for accomplishing this may be employed, and in the illustrated embodiment the presser foot is mounted upon the carrier so as to partake of the movement of the latter. Again this mounting may be accomplished in any suitable manner; and in the preferred form the presser foot is pivoted to the feed roll carrier by means of a bolt 59 which passes through the forks 61, 63 of a presser foot carrier 65, while a yielding device maintains the presser foot in engagement with the work. This yielding device comprises a tubular member 67 screw-threaded through the presser foot carrier and abutting the feed roll carrier so as to limit the downward movement of the presser foot; a headed bolt 69 passing freely through said tubular member and provided at its upper end with screw threads which are engaged by a thumb nut 71; a spring 73, and a perforated cap 75 screw-threaded into the upper wall of a cavity in the feed roll carrier.

It sometimes happens that it is desirable to disturb the parallel relation which normally prevails between the operative portion of the presser foot and the adjacent surface of the feed roll, for example, when it is desired to re-skive the work or when for any reason the portion of the work which is engaged by the presser foot is not of uniform thickness. In order, then, to produce an angular opening between the presser foot and the working face of the feed roll the pivot bolt 59 is arranged for adjustment with respect to the feed roll carrier as follows:—A bore 77 is provided through the bracket 37 of the feed roll carrier, said bore being of greater diameter than that of said bolt. The forks 61 and 63 have alined bores which receive flanged bushings 79, and these bushings are clamped in adjusted position by means of a thumb screw 81 threaded on one end of said bolt and a head 83 integral with the other end. It should be noted that the bore in the top of the cap 75 is of greater diameter than the headed bolt 69, so that longitudinal movement of the presser foot is not prevented. It should also be noted that the pivot bolt 59 is adjustable both vertically and horizontally and that the outline of the face 85 of the presser foot carrier which abuts the feed roll is an arc struck from a point in the axis of the pivot bolt 59. Owing to this arc-shaped outline, if for any reason the pivot bolt 59 is raised, a space is created between this curved face 85 and the end of the feed roll. Since, however, this curved face acts as a gage for the edge of the work as it is fed through the machine it becomes necessary to move the face 85 up to the feed roll, and this illustrates a further condition wherein longitudinal adjustment of the presser foot is advantageous. Besides this longitudinal adjustment of the presser foot a second adjustment which will be termed circular is provided for to accommodate said presser foot to rolls of different widths. In order to permit this circular adjustment a segmental guideway is formed in the presser foot carrier in which said presser foot is held by means of a bolt 87 provided at one end with a hook and at the other with threads which are engaged by a nut 89, it being apparent that by loosening the nut the segmental presser foot may be moved along in the guideway.

In operation, the thumb nut on the tubular member 67 is adjusted to the desired position, and the thumb nut 71 adjusted to obtain the proper tension of the spring 73. The nut 89 is then loosened and the segmental member 57 moved circularly to the desired position after which the nut 89 is again tightened. If now for any reason it becomes

necessary or desirable to adjust the position of the pivot bolt the adjustment is made in the manner indicated above. The machine is then started, and the work fed between the presser foot and the roll with its edge against the face 85 of the presser foot carrier which, as above stated, serves as a gage.

In Fig. 6 is shown a modified form of the invention wherein the segmental presser foot is not pivoted to the feed roll carrier but is mounted for sliding movement only. In this construction the presser foot carrier 165 is provided with an extension 166 which is adapted to slide in a guideway indicated in Fig. 2 by dotted lines at 91. In this extension are two elongated openings 168 and 170. The former is provided for the passage of one of the screws which fastens to the feed roll carrier the plate (not shown) against which the inner end of the feed roll bears, while the latter is provided for the passage of the feed roll shaft. The headed bolt 169, the nut 171 for regulating the tension of the spring, the tubular member provided with the nut 167 for limiting the downward movement of the presser foot, the hooked bolt 187 and the presser foot 157 are similar to the corresponding parts in the preferred form.

With regard to the circular adjustment of the presser foot which is provided for in both forms of the invention, attention is directed to the fact that the means whereby said adjustment is permitted is particularly satisfactory since said foot is compelled to move in a circular path about its center of curvature so that its relation to the knife and roll is changed only in the desired particular.

The invention has been set forth in connection with a particular machine, but nothing herein contained is to be construed as limiting the invention in the scope of its application to the specific machine shown and described.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. A machine of the class described, having in combination, a disk knife, a feed roll having a concave working face, means for actuating said knife and roll and means for pressing all points in that portion of the moving work which is about to fed to the knife with equal force against the working face of the feed roll.

2. A machine of the class described, having in combination, a disk knife, a feed roll having a concave working face, means for actuating said knife and roll, and an arc-shaped presser foot the operative edge of which is parallel to the edge of the knife.

3. A machine of the class described, having in combination, a disk knife, a feed roll having a concave working face the curvature of which is determined by the curvature of the knife, means for actuating said knife and roll, and a presser foot having all points in its operative edge equidistant from the adjacent surface of the roll.

4. A machine of the class described, having in combination, a disk knife, a feed roll the diameter of which increases from one end to the other, the increase being dependent upon the diameter of the knife, means for actuating said knife and roll, and a presser foot having an outline corresponding to that of the knife.

5. A machine of the class described, having in combination, a knife, a concave feed roll, means for angularly adjusting said roll about a point which coincides approximately with the uppermost point on the inner edge of said roll, a segmental presser foot also angularly adjustable about the same point, and means for actuating said knife and roll.

6. A machine of the class described, having in combination, a knife, a concave feed roll, a carrier in which said roll is mounted, said carrier being angularly adjustable, a segmental presser foot mounted upon said carrier and means for actuating said knife and roll.

7. A machine of the class described, having in combination, a knife, a feed roll having a concave working face, means for angularly adjusting said roll about an axis which coincides approximately with the edge of the work as it is being fed through the machine, a segmental presser foot adjustable with said roll, and means for actuating said knife and roll.

8. A machine of the class described, having in combination, a knife, a concave feed roll, an angularly adjustable carrier in which said roll is mounted, a segmental presser foot pivoted to said carrier, and means for actuating said knife and roll.

9. A machine of the class described, having in combination, a knife, a concave feed roll, an angularly adjustable carrier in which said roll is mounted, a segmental presser foot pivoted to said carrier, means whereby the pivot may be bodily adjusted, and means for actuating said knife and roll.

10. A machine of the class described, having in combination, a disk knife, a concave feed roll, a segmental presser foot, a bodily movable pivot about which said foot is angularly adjustable, and means for actuating said knife and roll.

11. A machine of the class described, having in combination, a knife having a circular edge, means for feeding work to said knife, a segmental presser foot, and means whereby said foot may be adjusted circularly about the edge of said knife, said means being constructed and arranged to prevent movement in any other path during the adjustment.

12. A machine of the class described having, in combination, a disk knife, a feed roll having a concave working face, means for actuating said knife and roll, a segmental presser foot the operative face of which is normally parallel to the adjacent surface of the feed roll and means whereby said parallel relation may be destroyed.

13. A machine of the class described having, in combination, a disk knife, a feed roll having a concave working face, means for actuating said knife and roll, a segmental presser foot the operative face of which is normally parallel to the adjacent surface of the feed roll and means including a bodily adjustable pivot for varying the position of said foot with respect to said roll.

14. A machine of the class described having, in combination, a knife, a feed roll, means for actuating said knife and roll, a presser foot, an arm upon which said foot is mounted, a pivot about which said arm is adjustable, said pivot being capable of bodily movement in two directions, and means for adjusting said foot angularly about said pivot while maintaining said pivot stationary.

15. A machine of the class described having, in combination, a knife, a feed roll, means for actuating said knife and roll, a presser foot, an edge gage, an arm upon which said foot and gage are carried, and a vertically and laterally adjustable pivot supporting one end of said arm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS W. G. FLYNT.

Witnesses:
FRED. C. PATRICK,
QUENTIN W. BOOTH.