

July 12, 1966

R. H. CHILD

3,260,146

DOUBLE HEAD SIDE TRIMMER

Filed Nov. 30, 1964

3 Sheets-Sheet 1

Fig. 2.

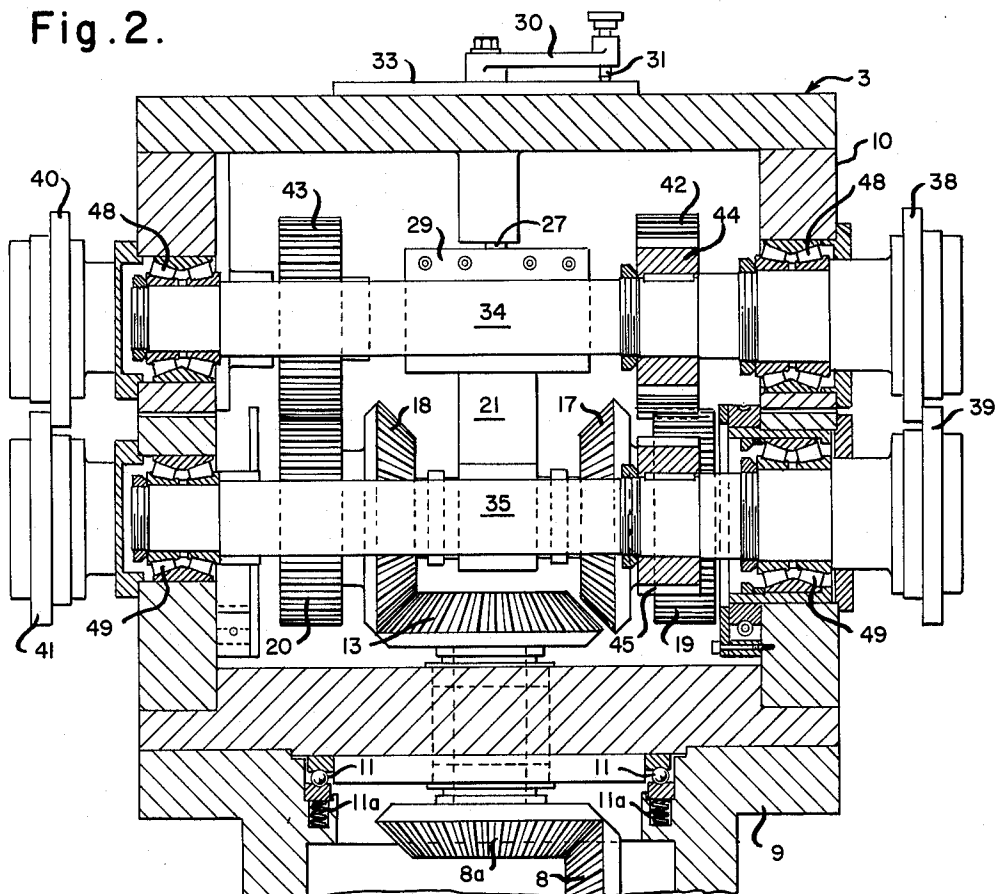
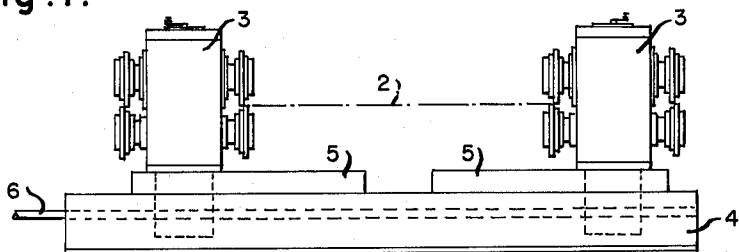


Fig. 1.



INVENTOR
Roland Hilton Child

By *Joseph Leonard & Bull*
his attorneys

July 12, 1966

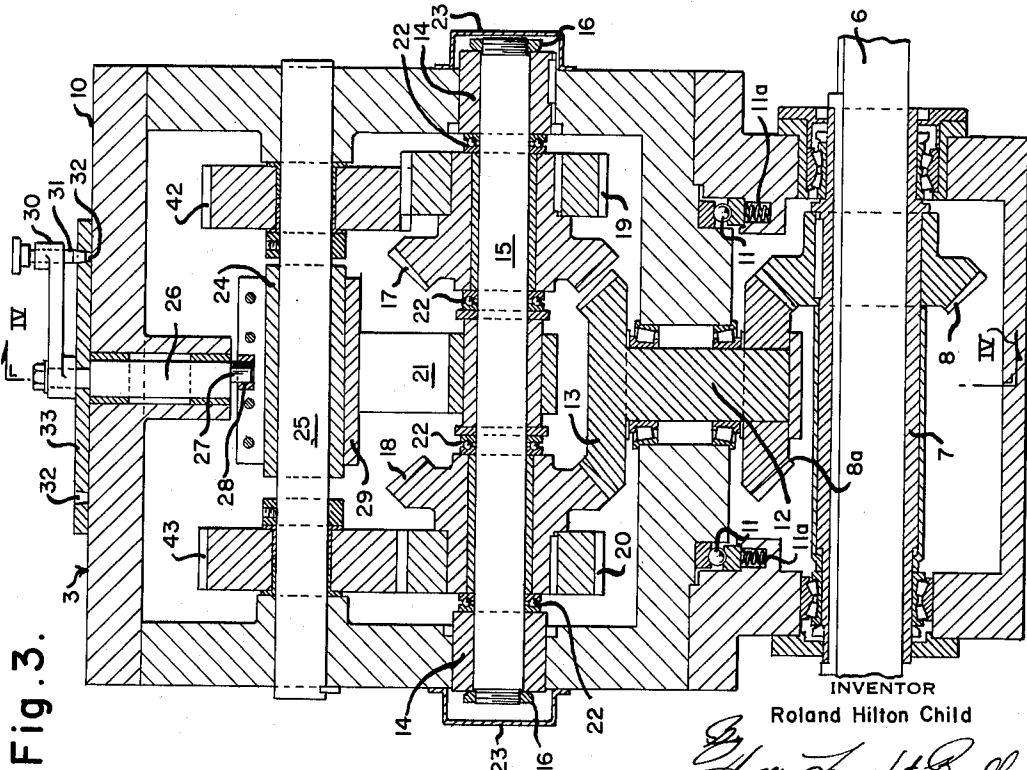
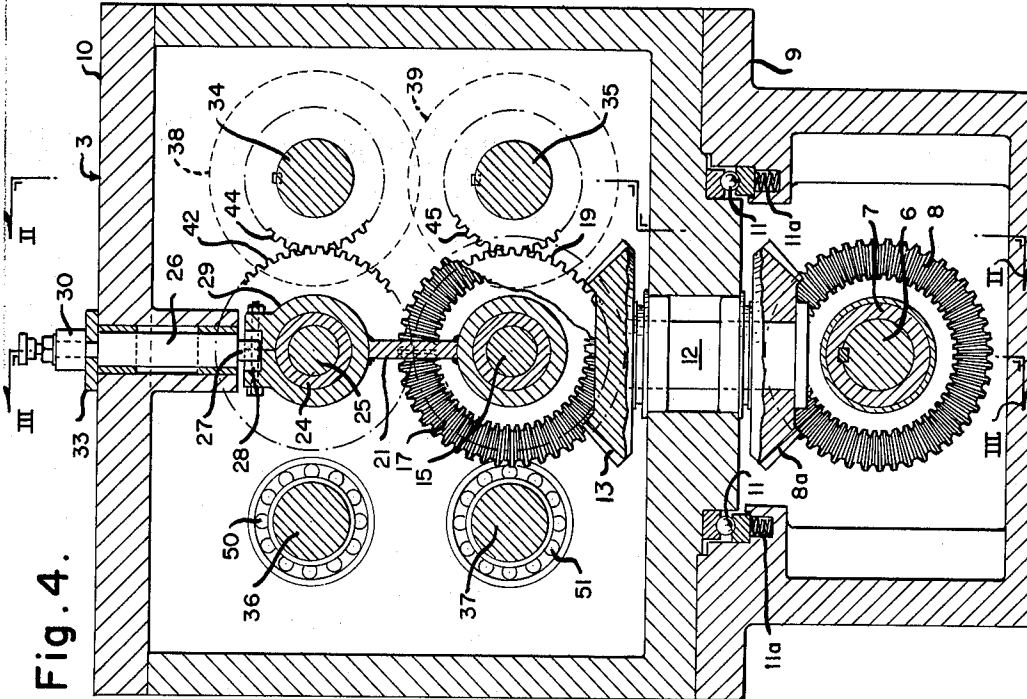
R. H. CHILD

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DOUBLE HEAD SIDE TRIMMER

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3 Sheets-Sheet 2



INVENTOR
Roland Hilton Child

By
Hoyes, Howard & Ewell
his attorneys

July 12, 1966

R. H. CHILD

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3 Sheets-Sheet 3

Fig. 6.

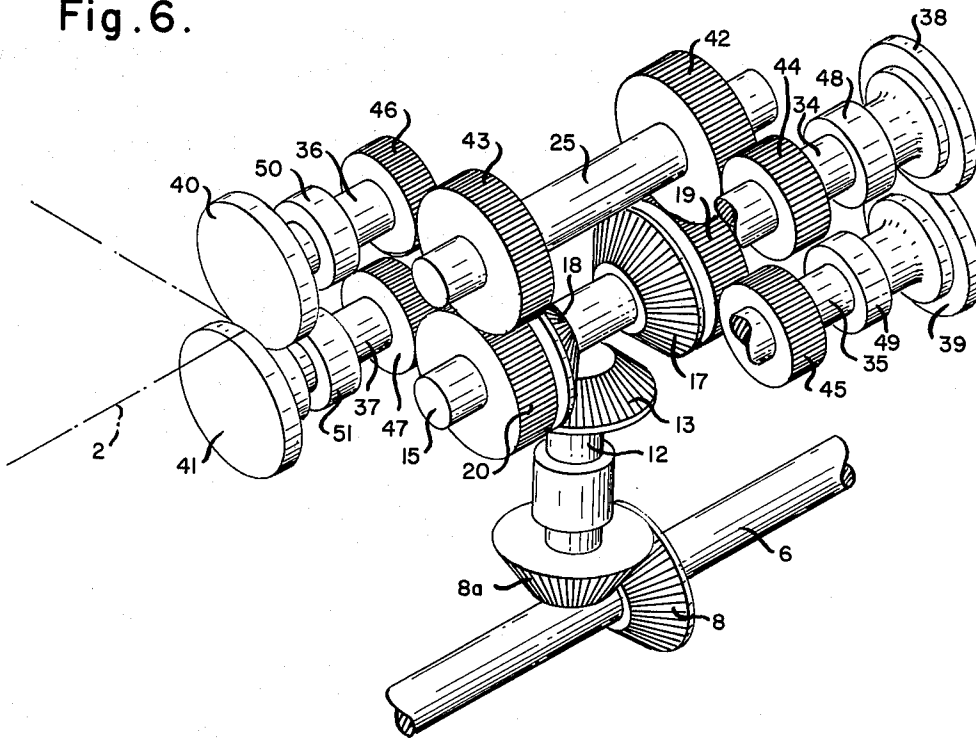
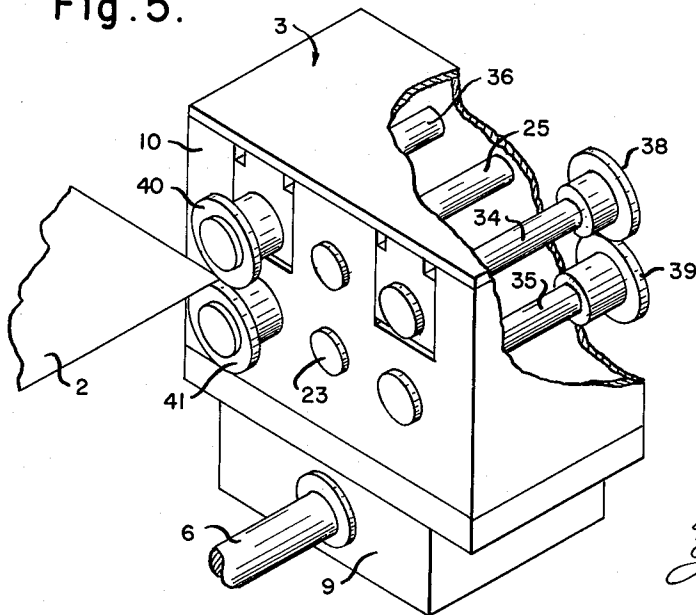


Fig. 5.



INVENTOR
Roland Hilton Child

By
Hoopes Leonard & Duell
his attorneys

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3,260,146

DOUBLE HEAD SIDE TRIMMER

Roland Hilton Child, Downsview, Ontario, Canada,
assignor to The Steel Company of Canada, Limited,
Hamilton, Ontario, Canada, a corporation of Canada
 Filed Nov. 30, 1964, Ser. No. 414,668
 6 Claims. (Cl. 83-479)

This invention relates to the art of side trimming, i.e., the trimming off of relatively narrow edge portions of continuously moving elongated material either for the purpose of removing out-of-tolerance material or to trim the material to desired width or for both purposes. Side trimming is generally associated with the treatment of metal strip and more specifically with the trimming of hot rolled or cold rolled steel strip. For purposes of explanation and illustration the invention will be described as embodied in apparatus for side trimming hot rolled steel strip although it is applicable in other fields.

In conventional side trimmers the changing of knives, which occurs primarily to replace dull knives with sharp ones but which may be required because of damage to a knife or for other reasons, requires considerable time during which the line must be stopped and no production achieved. The present invention is designed to greatly reduce the down time when, for example, dull side trimmer knives are to be taken out of operation and sharp knives placed in operation.

I have conceived the provision of a housing carrying opposed sets of side trimmer knives so that the housing may be rotated through an angle of 180° to remove one set of knives from operation and place the other set of knives in operation. This has the advantage that the sharp knives to be placed in operation may while the line is in operation be applied and adjusted so as to be ready to act on the material to be side trimmed and can be placed in operative position by rotating the housing through 180°. The time required for changing knives by the use of my invention is a small fraction of the time heretofore required using side trimmers which have been available. I provide means for driving the knives with connections such that only the knives which are in operation are driven, providing for replacement of the knives of the other set while the line is in operation.

I designate my apparatus a double head side trimmer. It comprises a housing, a first set of side trimmer knives carried by the housing and disposed at one side thereof, a second set of side trimmer knives carried by the housing and disposed at the opposite side thereof, the housing being mounted for rotation through 180° to respective operative positions to present the respective sets of side trimmer knives selectively to material to be side trimmed, and means for driving the set of knives presented to the material. I preferably provide connections between the driving means and the knives whereby whichever set of knives is presented to the material to be side trimmed is driven and the other set of knives is not driven, enabling replacement of the latter mentioned set of knives while the set of knives presented to the material is being driven to side trim the material.

My double head side trimmer may have a drive shaft, transmission means driven by the drive shaft in both operative positions of the housing, gearing for driving the respective sets of knives and shiftable means for operatively connecting the transmission means selectively with the gearing for driving one or the other of the set of knives. I preferably provide means operable at the will of the operator for causing the drive shaft to rotate the housing.

I further provide a double head side trimmer comprising a housing, a first set of side trimmer knives carried

by the housing and disposed at one side thereof, a second set of side trimmer knives carried by the housing and disposed at the opposite side thereof, the housing being mounted for rotation through 180° to respective operative positions to present the respective sets of side trimmer knives selectively to material to be side trimmed, a constantly driven bevel gear and means including opposed bevel gears selectively movable into mesh with the constantly driven bevel gear for respectively driving the opposed sets of side trimmer knives. A carrier is preferably provided which carries the opposed bevel gears and a manually operable control device is connected to the carrier for shifting the carrier to selectively move the opposed bevel gears into mesh with the constantly driven bevel gear. The constantly driven bevel gear is preferably adapted to rotate the housing when the one of the opposed bevel gears with which the constantly driven bevel gear is in mesh is held against rotation. Driving connections are preferably disposed at one side of the carrier which carries the opposed bevel gears extending to one of the sets of side trimmer knives while driving connections are disposed at the opposite side of the carrier extending to the other of the sets of side trimmer knives.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention in which

FIGURE 1 is a diagram illustrating in transverse view a strip line equipped with my double head side trimmers at both sides of the line;

FIGURE 2 is a vertical transverse cross-sectional view through my double head side trimmer taken on the line II-II of FIGURE 4 but to somewhat enlarged scale;

FIGURE 3 is a view similar to FIGURE 2 taken on the line III-III of FIGURE 4;

FIGURE 4 is a vertical longitudinal cross-sectional view taken on the line IV-IV of FIGURE 3;

FIGURE 5 is an isometric diagram illustrating my double head side trimmer; and

FIGURE 6 is an isometric diagram of the gearing employed in my double head side trimmer.

Referring now more particularly to the drawings and first to the diagram constituting FIGURE 1, there is indicated in chain lines in transverse cross section and designated by reference numeral 2 hot rolled strip moving continuously through a side trimming line. Positioned to act on each of the side edges of the strip 2 is one of my double head side trimmers. Each of the double head side trimmers shown in FIGURE 1 is designated generally by reference numeral 3. As shown each double head side trimmer 3 has side trimming knives at opposite side thereof. Means presently to be described are provided which drive only the set of knives which are presented to the strip 2, the opposed set of knives being undriven so that they may be replaced and the new knives adjusted while the line is in operation. Each double head side trimmer 3 is adapted to be turned through 180° as will presently be described to remove from operation the set of knives which has been presented to the strip 2 and place in operation the opposed set of knives. This can be accomplished in a very short time, largely eliminating the down time heretofore required for the changing of side trimmer knives. Extending transversely of the line is a base 4 carrying at each side a guideway 5. The double head side trimmers 3 are adapted to be shifted along the guideways 6 to desired adjusted positions determining the trimmed width of the strip 2. Such adjustment of side trimmers is conventional and hence is not illustrated in detail.

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Both side trimmers are driven by a drive shaft 6 journaled in the base 4. The driving of both side trimmers 3 is effected in the same manner so description of the driving of one of the side trimmers will suffice for both.

Keyed to the drive shaft 6 but adjustably positionable therealong is a bushing 7 carrying a bevel gear 8. The double head side trimmer includes a base 9 with a housing 10 mounted upon the base 9 through a thrust bearing 11 overlying springs 11a. When the line is in operation fastening means such as bolts (not shown) tightly fasten the housing 10 to the base 9, compressing the springs 11a. When the housing 10 is to be rotated relatively to the base 9 the bolts are removed whereupon the springs 11a support most of the load of the housing 10 which reduces the friction between the housing and the base so that greatly reduced force or effort is required to rotate the housing on the base than if the springs 11a were not provided. In the drawings the housing is shown in its position tightly fastened to the base. The side trimmer is positioned along the drive shaft 6 in desired adjusted position so as to be driven by the bevel gear 8. Journalled in the housing 10 is a vertical shaft 12 to which is fastened at its lower end a bevel gear 8a meshing with the bevel gear 8. The shaft 12 carries a bevel gear 13 at its upper end.

Opposed sleeves 14 are carried by the housing 10 and are slidable relatively thereto. A non-rotating shaft 15 has its ends disposed in the sleeves 14 with nuts 16 applied to the extremities of the shaft 15 and bearing against the sleeves 14 as shown in FIGURE 3. Journalled on the shaft 15 are bevel gears 17 and 18. Integral with the bevel gear 17 is a spur gear 19. Integral with the bevel gear 18 is a spur gear 20. Fixed to the shaft 15 is a bracket 21 whose function, through means presently to be described, is to shift the shaft 15 axially. Bearings 22 are disposed along the shaft 15 as shown providing for rotation on the shaft of the gears 17-19 and 18-20 while the shaft itself does not rotate. The bearings 22 take up all the spaces between the gears and the bracket 21 and between the gears and the sleeves 14 so that when the bracket 21 is moved parallel to the axis of the shaft 15 the shaft 15 and the gears 17-19 and 18-20 and the sleeves 14 all move in unison relatively to the housing 10. Caps 23 are applied to the housing over the ends of the shaft 15 as shown in FIGURE 3.

As FIGURE 3 clearly shows the bevel gears 17 and 18 are spaced apart a distance somewhat greater than the diameter of the bevel gear 13 so that when the shaft 15 is shifted in one axial direction the bevel gear 17 will be brought into mesh with the bevel gear 13 and when the shaft 15 is shifted in the opposite axial direction the bevel gear 18 will be brought into mesh with the bevel gear 13. In FIGURES 2 and 3 the bevel gear 18 is shown in mesh with the bevel gear 13 and the bevel gear 17 is shown out of mesh with the bevel gear 13.

The bracket 21 is carried by a bushing 24 slidable along a non-rotating shaft 25 which is fixed in the housing 10. Journalled in the top of the housing is a vertical shaft 26 having at its bottom an eccentric pin 27 entering a slot 28 in a collar 29 disposed about and to all intents and purposes integral with the bushing 24. The vertical shaft 26 may be turned by a hand operable lever 30 connected with the upper end of the shaft and provided with a pin 31 adapted to enter a selected one of two opposed holes 32 in a plate 33 applied to the top of the housing 10 as shown in FIGURE 3. Turning of the shaft 26 causes through the eccentric pin 27 movement of the bushing 24 and bracket 21 along the stationary shaft 25. But since the shaft 15 is fixed to and in effect integral with the bracket 21 the effect of turning of the shaft 26 between the positions in which the pin 31 is in the respective holes 32 is to shift the shaft 15 between the positions in which the respective bevel gears 17 and 18 are in mesh with the bevel gear 13.

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Journalled in the housing 10 and projecting from one side thereof are an upper knife arbor 34 and a lower knife arbor 35 and journalled in the housing 10 and projecting from the opposite side thereof are an upper knife arbor 36 and a lower knife arbor 37. The respective arbors 34, 35, 36 and 37 carry side trimmer knives 38, 39, 40 and 41 respectively which coast in the normal manner in which side trimmer knives coast as shown in FIGURES 1 and 2. The shaft 25 has journalled thereon two spur gears 42 and 43. The spur gear 42 meshes with the spur gear 19. The spur gear 43 meshes with the spur gear 20. Fixed to the arbor 34 is a spur gear 44 which meshes with the spur gear 42. Fixed to the arbor 35 is a spur gear 45 which meshes with the spur gear 19. Fixed to the arbor 36 is a spur gear 46 which meshes with the spur gear 43. Fixed to the arbor 37 is a spur gear 47 which meshes with the spur gear 20. The bearings for the arbors 34, 35, 36 and 37 respectively are shown at 48, 49, 50 and 51.

When the parts are in the position shown in the drawings the side trimmer knives 40 and 41 are operative to trim the edge of the strip 2. While the side trimmer knives 40 and 41 are thus trimming the edge of the strip 2 during operation of the line the sharp side trimmer knives 38 and 39 are applied and adjusted. The application and adjustment of the side trimmer knives may be effected in conventional manner. When the sharp side trimmer knives 38 and 39 are to be rendered operative to trim the strip 2 the line is stopped and the lever 30 is turned through 180° from the position shown which shifts the shaft 15 from the position shown in which the bevel gear 18 is in mesh with the bevel gear 13 to the position in which the bevel gear 17 is in mesh with the bevel gear 13. The bevel gear 17 is then held against turning by any suitable means, as, for example, by a rotation lock inserted between teeth of the spur gear 42. Then the drive shaft 6 is operated and since the gears with which the bevel gear 8 coacts are held stationary, turning of the drive shaft 6 will turn the housing 10 relatively to the base 9, such turning being provided for by the bearing 11. The housing is thus turned through 180° to bring the side trimmer knives 38 and 39 into position to act on the strip. To accurately position the side trimmer knives 38 and 39 to the strip the driving of the shaft 6 may be discontinued just prior to the completion of 180° rotation of the housing whereupon the rotation lock may be withdrawn and the final turning of the housing to precise adjusted position effected either by use of a spanner wrench or inching the drive motor.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A double head side trimmer comprising a housing, a first set of side trimmer knives carried by the housing and disposed at one side thereof, a second set of side trimmer knives carried by the housing and disposed at the opposite side thereof, the housing being mounted for rotation through 180° to respective operative positions to present the respective sets of side trimmer knives selectively to material to be side trimmed, a constantly driven bevel gear and means including opposed bevel gears selectively movable into mesh with the constantly driven bevel gear for respectively driving the opposed sets of side trimmer knives.

2. A double head side trimmer as claimed in claim 1 in which a carrier is provided which carries the opposed bevel gears and a manually operable control device is connected to the carrier for shifting the carrier to selectively move the opposed bevel gears into mesh with the constantly driven bevel gear.

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3. A double head side trimmer as claimed in claim 1 in which the constantly driven bevel gear is adapted to rotate the housing when the one of the opposed bevel gears with which the constantly driven bevel gear is in mesh is held against rotation.

4. A double head side trimmer as claimed in claim 1 in which a carrier is provided which carries the opposed bevel gears and driving connections disposed at one side of the carrier extend to one of the sets of side trimmer knives and driving connections disposed at the opposite side of the carrier extend to the other of the sets of side trimmer knives.

5. A double head side trimmer comprising a housing, a first set of side trimmer knives carried by the housing and disposed at one side thereof, a second set of side trimmer knives carried by the housing and disposed at the opposite side thereof, the housing being mounted for rotation through 180° to respective operative positions to represent the respective sets of side trimmer knives selectively to material to be side trimmed, means for driving the set of knives presented to the material, a drive shaft and connections therefrom for driving the knives and means operable at the will of the operator for causing the drive shaft to rotate the housing.

6. A double head side trimmer comprising a housing, a first set of side trimmer knives carried by the housing

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and disposed at one side thereof, a second set of side trimmer knives carried by the housing and disposed at the opposite side thereof, the housing being mounted for rotation through 180° to respective operative positions to present the respective sets of side trimmer knives selectively to material to be side trimmed, means for driving the set of knives presented to the material, antifriction bearings upon which the housing rotates, fastening means for fastening the housing in each of its operative positions and resilient means which underlie the antifriction bearings and upon rendering inoperative of the fastening means support most of the load of the housing and reduce the force required to rotate the housing.

References Cited by the Examiner

UNITED STATES PATENTS

| | | | |
|-----------|--------|------------|----------|
| 823,797 | 6/1906 | Lupton | 83—479 |
| 1,278,766 | 9/1918 | Seymour | 83—479 X |
| 2,291,789 | 8/1942 | Behrens | 83—479 X |
| 2,393,586 | 1/1946 | Bruker | 83—479 X |
| 3,080,783 | 3/1963 | Knepshield | 83—479 |

WILLIAM W. DYER, JR., *Primary Examiner.*

J. M. MEISTER, *Assistant Examiner.*