June 14, 1960 T. A. G. SHIMELD 2,940,612

TURN-OVER GEAR FOR USE WITH ROLLING MILLS AND THE LIKE

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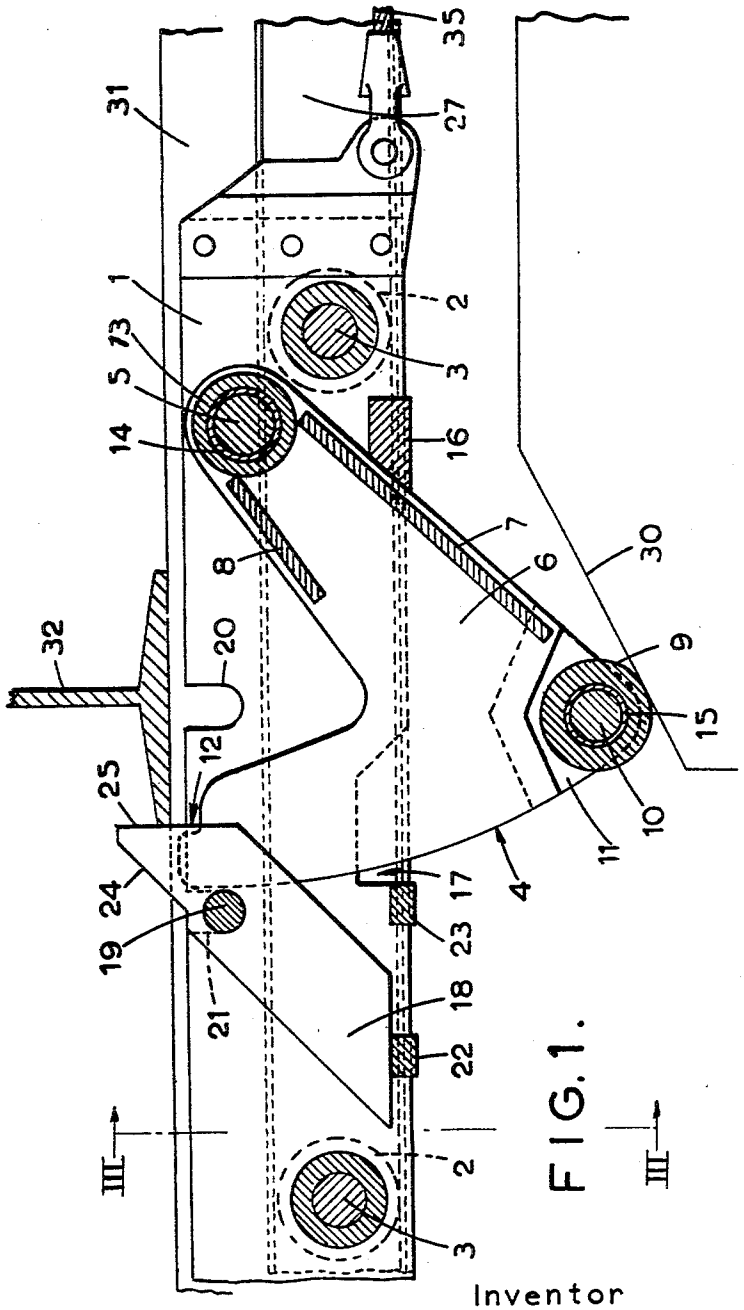


FIG. 1.

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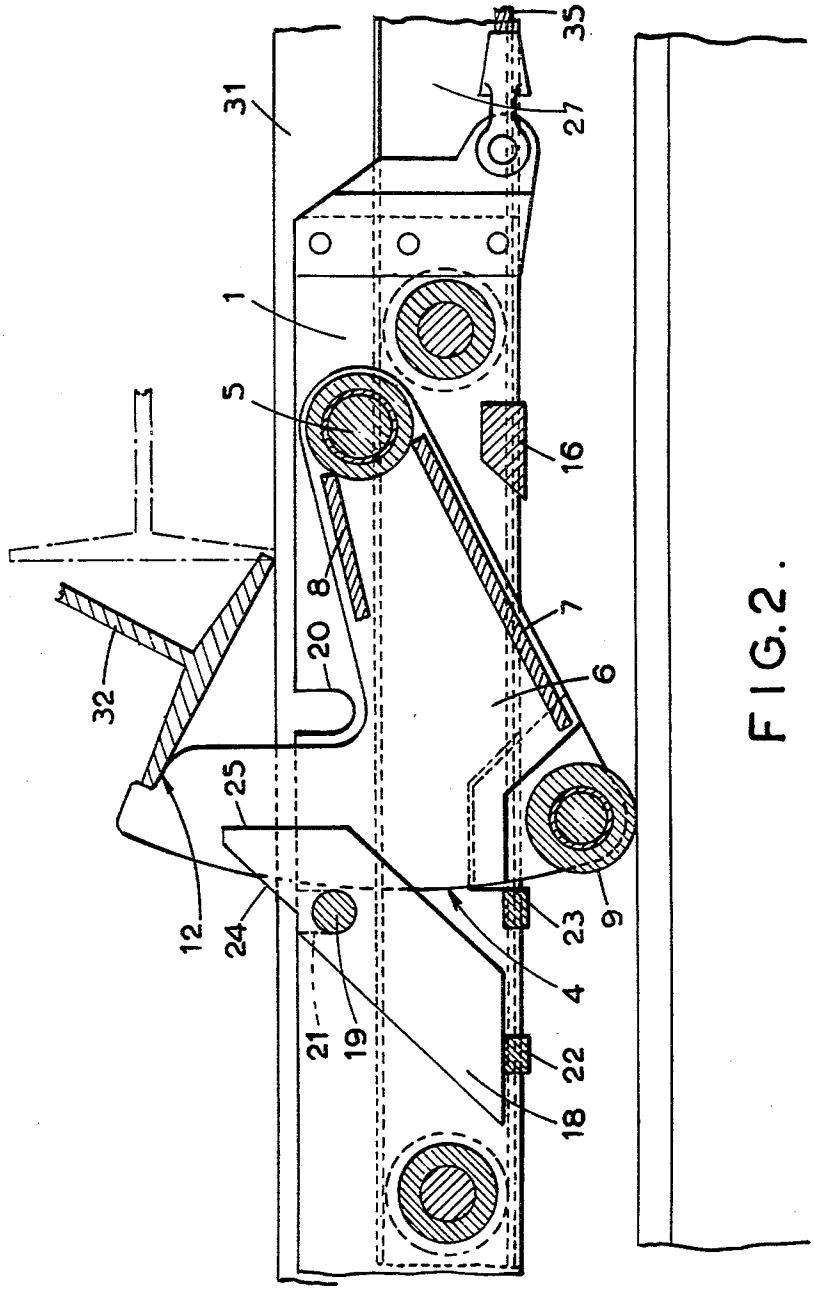


FIG. 2.

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FIG. 3.

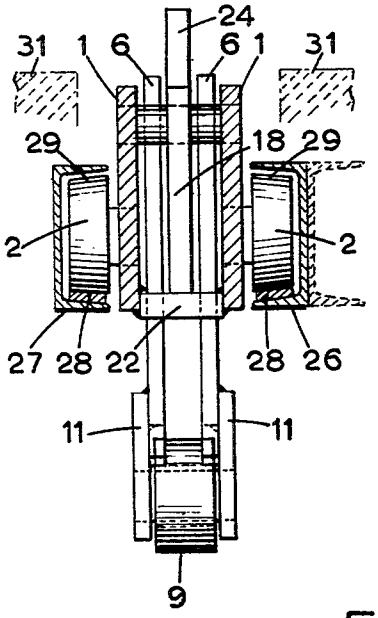


FIG. 6.

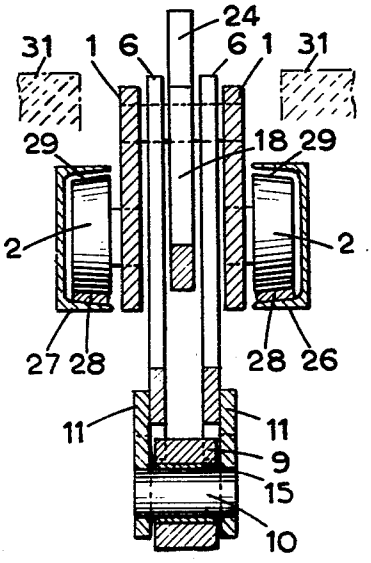
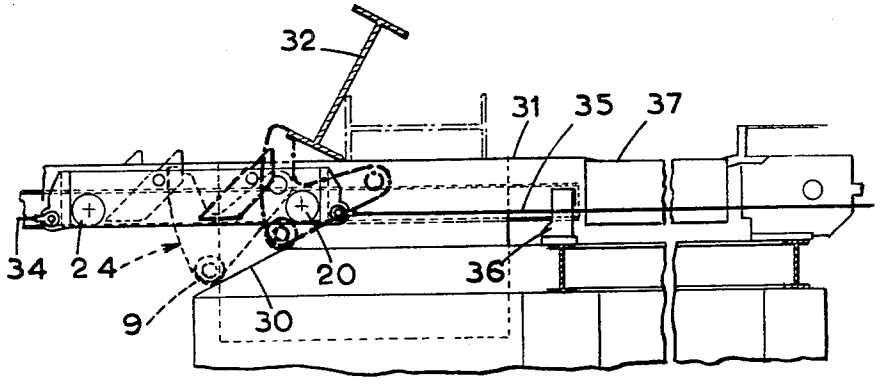


FIG. 7.



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FIG. 4.

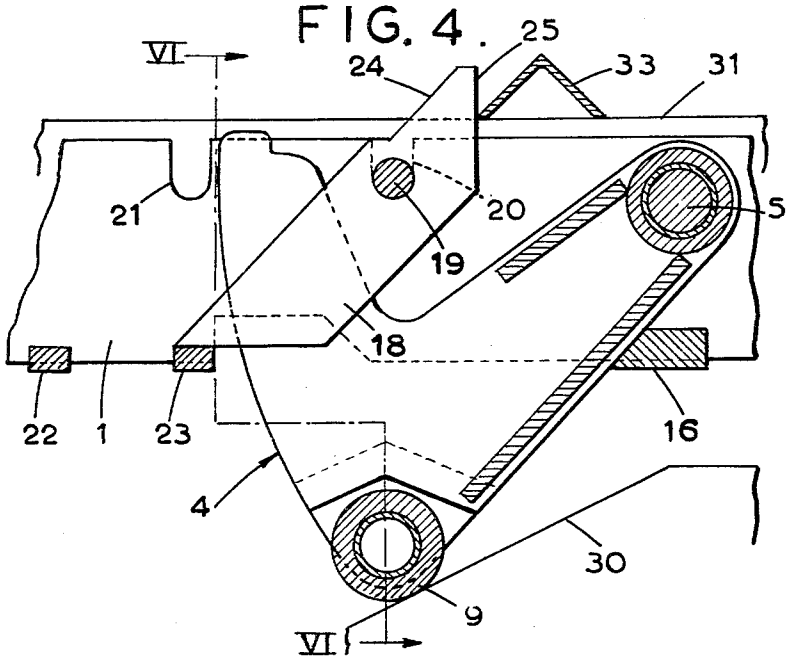
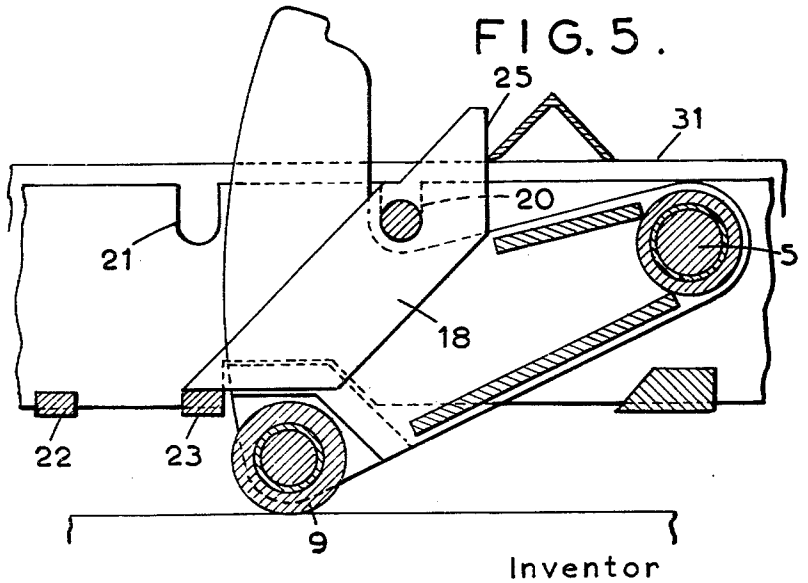


FIG. 5.



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TURN-OVER GEAR FOR USE WITH ROLLING MILLS AND THE LIKE

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1 Claim. (Cl. 214—1)

This invention relates to a turn over gear for use in conjunction with a rolling mill or the like.

It is common practice in rolling mills to deliver a rolled billet, bar or structural section on to a series of driven conveyor rollers which take it to a sawing, shearing or like dividing appliance and thence to a further series of rollers from which the severed pieces are transferred one by one to a series of skid rails lying in a direction perpendicular to the run of the conveyor, the rails forming a bank upon which the pieces are allowed to cool. The pieces are usually transferred by a series of skid monkeys moving in tracks between the rails, and each provided with a ratchet finger so that the skid monkey is capable of moving the pieces, individually or collectively, in a direction at right angles to the direction of the conveyor and is depressed as it travels beneath the pieces in a return direction.

When cooling structural shapes such as I beams, particularly broad-flanged beams, which are rolled and divided with their flanges in a vertical plane, it is desirable to turn the piece through an angle of 90° in order to avoid damage to the edges of the flanges. Moreover a plurality of large I-beams arranged on the skid rails with their flanges horizontal normally occupy less space than the same number of beams arranged with their flanges vertical. Since the space in a mill shed is restricted, this is an additional reason why the beams are left to cool with their flanges horizontal.

After the beams have cooled it is usual to pass them through a straightening device with the flanges of the beams vertical. It is therefore necessary to turn the beams on the cooling bank down so that their flanges are vertical before they pass to be straightened.

Various forms of turn-over gear for rolled sections are well known in the art but they suffer from one or more of the following disadvantages:

(*a*) They are very cumbersome and/or costly.
(*b*) The turning means may comprise serrated fingers which damage the surface of the section,
(*c*) The gear cannot be retracted until the section has been withdrawn longitudinally and
(*d*) The gear is unreliable in operation.

The object of the invention is to provide a simple turn-over gear which does not suffer from the above disadvantages.

According to the invention a turn-over gear for turning rolled steel sections and the like, comprises a carriage movable between skid rails upon which sections to be turned are received, a guide-way along which the carriage may be moved, means to move the carriage along said guideway, a lifting member pivotally mounted on said carriage and having an inoperative position below the level of said skid rails, a pusher member associated with the carriage and having an operative position in which the pusher member projects above the skid rails, and means associated with said guide-way to pivot said lifting member to an operative position, in which the lifting member projects above the skid rails, said means becoming operative at a predetermined point during the travel of the carriage along the guide-way in one direction.

The pusher member may be pivotally mounted on the carriage and two alternative pivot axes may be provided, one of said axes being so arranged that if the pusher member is pivoted thereabout the lifting member is non-effective.

The means for moving the lifting member about its axis may be a ramp arranged to co-act with the lifting member as the carriage is moved.

The invention will be described by way of example with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a section through a turn-over gear arranged so that the lifting member is effective;

Figure 2 is a part section similar to Figure 1, in which the lifting member has been moved about its axis;

Figure 3 is a section on the line III—III of Figure 1;

Figure 4 is a diagrammatic section through part of a turn-over gear arranged so that the lifting member is non-effective;

Figure 5 is a section similar to Figure 4 in which the lifting member has been moved about its axis;

Figure 6 is a section on the line VI—VI of Figure 4 and,

Figure 7 is a diagram showing the movement of the gear in turning down a section.

Referring to the drawings the turn-over gear comprises a carriage formed of two spaced apart side members **1** which is provided with four wheels **2** running on axles **3** journalled in the side members **1**. A substantially L-shaped lifting member **4** is pivoted at one extremity about an axis **5** journalled in the side members **1**. The lifting member comprises two elements **6** each L-shaped, which are joined by ribs **7** and **8**. A roller **9** is pivoted on an axis **10** journalled between stop plates **11**, welded to the outer sides of the elements **6**. At its upper extremity each element **6** is formed with a step **12**, the purpose of which will be described hereafter. A collar **13** surrounds the axis **5** and is spaced therefrom by a bearing **14**. A bearing **15** is provided between the roller **9** and the axis **10**.

A stop **16** is welded between the side members **1** and co-acts with one face of each of the elements **6** when they are in the position shown in Figure 1. A recess **17** is cut in the side members **1** as shown.

A pusher member **18** of substantially trapezoidal shape has a projection **19** secured to each of its sides. Two pairs of recesses **20** and **21** are formed in the top edge of the side members **1** and provide two alternative positions for the reception of the projections **19** and therefore, two alternative axes about which the pusher member may pivot. Stops **22** and **23** are provided to support one end of the pusher member as shown. The other end of the pusher member projects above the top of the side members **1** and is formed with a recessed surface **24** and an operative pushing surface **25**.

The carriage is arranged to run between channelled guides **26**, **27** on the lower inner surface of which is provided a bearing rail **28**. The wheels **2** have a frusto-conical portion **29**, which combined with the angle at which the rail **28** is set, tends to keep the carriage central between the guides **26**, **27**.

A ramp **30** below the guides **26**, **27** is arranged to co-act with the roller **9** at a predetermined point. Rails **31** are provided to receive the lengths of rolled section to be moved and are arranged to be above the top surface of the side members **1**. Part of an I section beam is shown at **32** (Figures 1, 2 and 7) and a right angle beam is shown at **33** (Figures 4 and 5).

The carriage is moved along between the guides **26**, **27** by wire ropes **34** and **35** which are wound about driven drums (not shown).

Referring now to Figure 7, a stop **36** is provided to limit the movement of the carriage to the right, and a conveyor is indicated at **37** and is arranged to convey the turned down beams to the straightening device (not shown).

The operation of the turn-over gear is as follows: Referring to Figures 1 and 2, an I section beam **32** has been left to cool with its flanges horizontal and it is desired to move it to the right in the figures to a straightening machine. As explained above it is necessary to turn the beam, as it is straightened with its flanges vertical. The carriage moves from left to right and the operative surface **25** of the pusher member engages the edge of one of the flanges of the beam **32** as shown in Figure 1. As the carriage moves to the right the roller **9** co-acts with the ramp **30** and the lifting member **4** is moved about its axis **5**. As shown in Figure 2 the step **12** engages under the edge of the flange of the I beam so that as the carriage continues to move to the right the beam is pushed in a tilted position along the skid rails until the friction between the beam and the rails causes the beam to be turned down to the position indicated in chain lines in Figure 2. The carriage is moved to the right until it engages the stop **36** (see Figure 7), by which time the beam has been delivered on to the conveyor **37**. The carriage is then moved back to the left and the recessed surface **24** engages with the next beam which has been delivered during the turning down of the first beam. The pusher member pivots about the projections **19** in the recess **21** and passes under the beam without disturbing it. When the pusher member is clear of the beam it will pivot about its axis and return to the position shown in Figure 1. The direction of the motion of the carriage is then reversed and the turn-down operation is performed on the next beam.

The sequence of operations is best shown in Figure 7 where subsequent positions of the pusher member and lifting member are shown in dash lines and chain lines.

It will be seen that the position of the ramp **30** relatively to the position in which the beam is delivered, is of importance since the lifting member must not rise above the level of the rails **31** before it has engaged under the edge of the flange of the beam to be turned over. If the delivery point of the beam is liable to alteration then the ramp may be so mounted as to be adjustable in directions parallel to the direction of movement of the carriage.

Referring now to Figures 4 and 5, when it is desired merely to move a beam along the rails **31** without turning it over, the pusher member **18** is so mounted that the projections **19** are received in the recesses **20** as shown. As the carriage moves from left to right the operative surface **25** of the pusher member **18** is always in advance of the lifting member and thus the latter is rendered non-effective as the beam **32** is always moved ahead of the step **12**.

It will be appreciated that a plurality of carriages may be arranged along the length of a beam and arranged to operate simultaneously. Moreover, the turn-over gear may be used for turning ingots or billets as well as rolled sections.

I claim:

A turn-over gear for turning rolled steel I section beams from the vertical to the horizontal position comprising, in combination, a carriage movable between horizontal skid rails upon which I beams to be turned are borne, a horizontal guide-way along which said carriage moves, means for moving said carriage along said guide-way, a pusher member mounted on said carriage and having an operative position in which said pusher member projects above said skid rails to engage one flange of an I beam and push it horizontally along said skid rails, a lifting member including a roller pivotally mounted on said carriage for vertical swinging movement between an inoperative position in which said lifting member lies wholely below the top of said skid rails, and a second position in which said lifting member tilts said flange and, as a result of the continued movement of the carriage, pushes the beam in a tilted position along said skid rails and turns the beam to the horizontal position, an inclined ramp for said roller associated with said guide-way for raising said lifting member from said inoperative position to said second position, and a horizontal ramp surface following said inclined ramp for maintaining said lifting member in said second position.

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