June 22, 1965 I. WILSON 3,190,098

CANTILEVER ROLLING MILL

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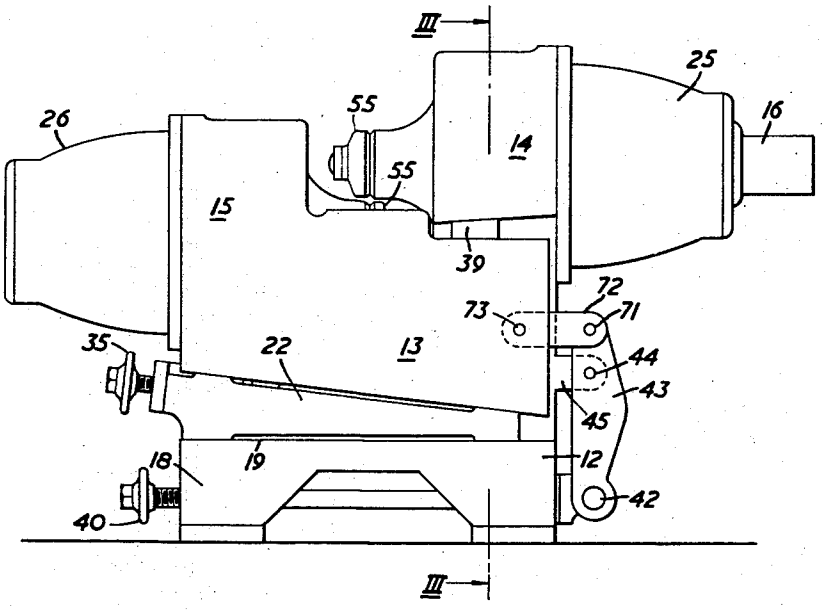


FIG. 1.

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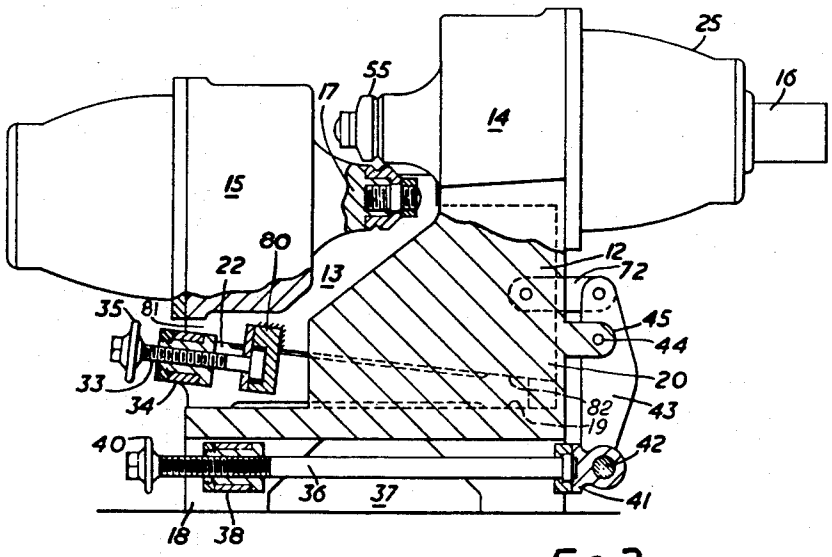


FIG. 2.

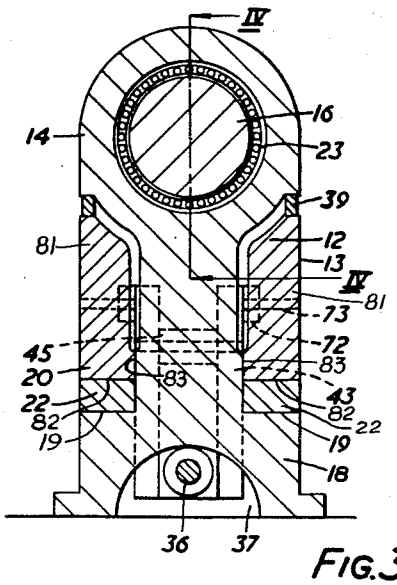


FIG. 3.

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CANTILEVER ROLLING MILL

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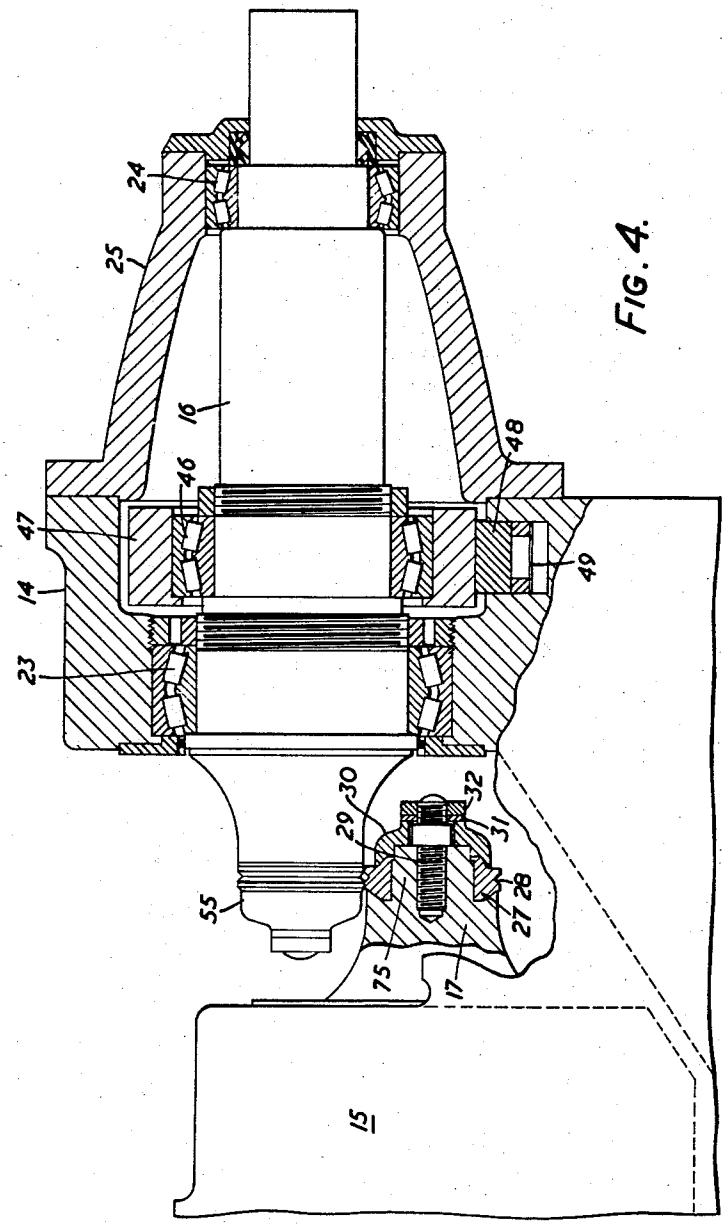


FIG. 4.

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CANTILEVER ROLLING MILL

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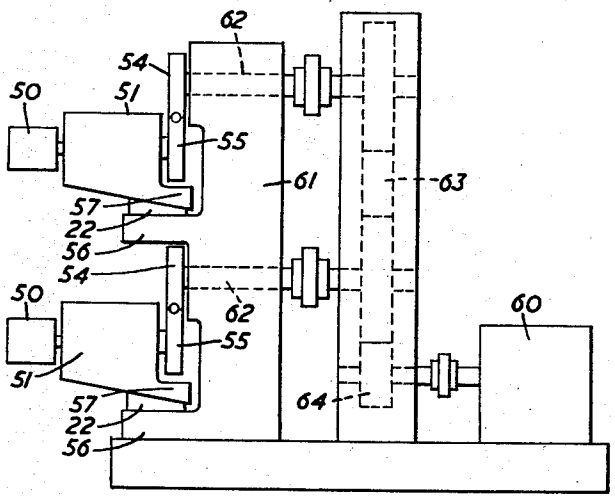


FIG. 5.

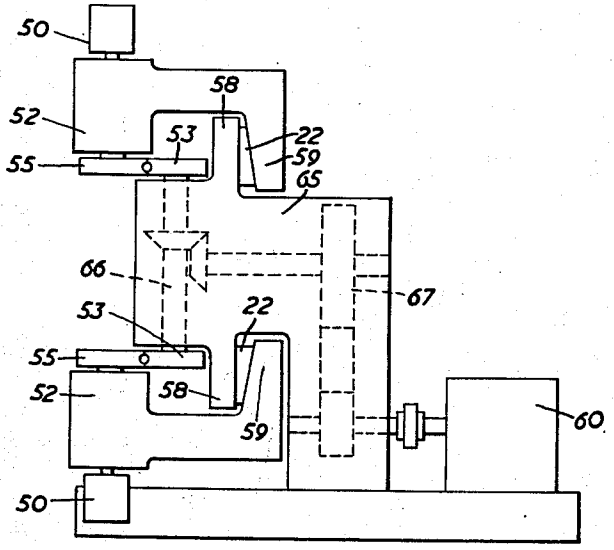


FIG. 6.

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CANTILEVER ROLLING MILL

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Filed Aug. 1, 1960, Ser. No. 46,784
9 Claims. (Cl. 72—223)

This invention relates generally to mills for the rolling or roll-flattening of elongated material of small width. It applies particularly to rolling mills for wire rods, narrow flats, light section bars and billets, especially when made of steel and hot-rolled continuously in two-high trains, in single or twin-strand fashion.

The prevailing practice is to employ for this purpose mill stands having two rolls supported at both ends in bearing chocks. It is necessary in this arrangement for the roll barrel diameter to be larger than the roll neck diameter, so that bearings may be accommodated on conjugate roll necks. Since the roll necks must be of sufficient size to withstand the stresses imposed by the roll separating force and the rolling torque, the roll barrel diameter is inevitably many times greater than the height of the stock. Now, it is a feature of the mechanism of rolling that, for a particular decrease in stock height, the force and torque required increase with the ratio of roll barrel diameter to stock height, and so does the degree of lateral spread of the stock in relation to its elongation. Consequently, the principle of supporting the rolls at both ends leads to the forces and torques being larger than necessary and the shaping of the stock being less effective for the purpose of elongating the material than need be.

Another feature of the aforesaid practice is that the length of the roll barrel is greater than its diameter, so as to accommodate more than one rolling groove, this being done in the interests of best utilization of the rolls, which are costly on account of the presence of precision journals on the roll necks. However, as a consequence, the bending deflection of the rolls during rolling is quite appreciable, and this contributes to the inaccuracy of rolling. It is particularly tiresome in multi-strand rolling owing to the variation of the deflection with distance from the bearing support.

The switching from a worn rolling groove to an adjacent, unused one necessitates the moving of roller guides. This is time consuming and, in view of the importance of correct alignment of grooves and guides, calls for considerable skill. This is particularly troublesome in mill trains; in these, moreover, it is impossible to make the best use of all the rolling grooves in all the stands, since these wear at different rates and yet groove-switching must be done simultaneously on all stands of a mill train. In multi-strand mills having rolls supported at both ends it is also impossible to adjust the relative disposition of mating grooves of one strand without affecting other strands. Also, it is impossible in this arrangement to combine multi-strand rolling with the alternation of horizontal and vertical stands in the mill train.

Yet another unfavourable feature of prevailing practice is that the bearing chocks are slideably mounted in U or O-shaped housing frames. The presence of these frames on either side of the rolling line reduces visibility and accessibility for adjustment during rolling, and makes roll changing cumbersome. If, in the interests of speedy roll changing, U-shaped frames are employed and the associated parts for location and adjustment of the bearing chocks are designed for quick dismantling, play is inevitable; this is responsible for much of the inaccuracy of rolling. If, on the other hand, emphasis is laid in the design on the elimination of play, then roll changing becomes so complicated that, in the interests of continuity of production, the entire mill stands have to be changed

so that the dismantling and roll changing may be done at leisure in a workshop away from the mill. A complete set of spare stands has then to be carried.

It is a further feature of this type of mill stand that the elastic spring of the housing is pronounced, because the points of application of the roll force and of the reaction to it are far apart. Recently, Swedish designers have evolved stiffer types of housings in which this distance is reduced and/or the assembly as a whole is prestressed. However, these designs only partially attain the desired high degree of stiffness and do so by further complicating the assembly.

In all these mills it is usual to drive both rolls, the drive being transmitted from a common pinion box through wobbler or universal shafts which allow the spacing apart of the rolls to be varied. A disadvantage of this arrangement is that the angularity of the drive causes undesirable torque fluctuations. Furthermore, in the absence of any means of ensuring equipartition of the rolling torque between the two roll drives, both have to be designed with ample reserve of strength to cope with the possible concentration of torque in one or the other roll drive. This further increases the size of the roll and aggravates the consequences of it as outlined above.

It is an object of the present invention to provide means of eliminating all or some of the disadvantages outlined above.

Considering the invention from this aspect we provide a rolling mill comprising a first roll mounted in a housing having a first locking surface facing towards said first roll, and a second roll mounted in a housing having a second locking surface facing away from said second roll, the second roll and surface being arranged between the first roll and the first surface in such a manner that the rolls co-operate for rolling, and the surfaces co-operate in order to lock the housings against the separating force developed between the rolls during rolling, both surfaces intersecting the pass plane, in which the separating force will be developed, and both surfaces being as close as is conveniently possible to the roll gap. The closer the connection between the housings is to the roll gap and pass line the better, for closeness reduces the length of the path between the rolls through the housings, and hence reduces the amount of spring in this path.

Additionally, the invention provides that roll gap adjustment means be located between the locking surfaces to couple the same, since in this way the adjustment means will be in compression during rolling. For this purpose a wedge or wedges are preferred for roll gap adjustment, since a wedge bearing between the locking surfaces and so coupling the two housings is readily arranged to intersect the pass plane as do the locking surfaces, and at the same time, a wedge or wedges provide a means for obtaining fine adjustment of the roll gap without increasing the spring of the mill.

Regarding the above terminology: the pass line is the line along which the material being rolled travels, that is to say, it is a line through the roll gap at right angles to the plane containing the roll axes. The pass plane is the plane containing the pass line and the line of action of the separating forces developed between the rolls during rolling, so that if the roll axes are parallel and the work surfaces are parallel to the roll axes it is the plane through the roll gap perpendicular to the roll axes.

Considering the invention from another viewpoint, there is provided a rolling mill comprising two, generally U-shaped, roll housing structures, one such structure being located with both its U-arms disposed between and in opposition to the U-arms of the other structure. A first pair of corresponding adjacent U-arms, one from each structure, respectively include the rolls of the mill mounted in overhung manner and the associated roll spindles and

chocks: while the remaining second pair of U-arms intersect the pass plane and serve to couple the two structures through the medium of the roll gap adjustment means, preferably of wedge form also intersecting the pass plane.

The practical advantages of such a mill are as already described above and it will be seen that, in any event, the arrangement is also such that the separating forces due to rolling are balanced within a closed system which includes no ground connections, the forces exerted on the two housing structures being balanced in the coupling provided by the roll gap adjustment means whereby such means is maintained under compression during rolling.

One embodiment of the invention, a steel rod mill, and a particularly advantageous mill arrangement made possible by this invention, will now be described with reference to the accompanying drawings, in which:

FIGURE 1 is a side view of the mill,

FIGURE 2 is the same view of the mill, shown partly in section,

FIGURE 3 is a section on the line III—III of FIGURE 1, and

FIGURE 4 is a section on the line IV—IV of FIGURE 3 showing one only of the roll housings.

FIGURES 5 and 6 show, diagrammatically, two mill arrangements for two-strand rolling.

As shown in the drawings, there are two roll housings, **12, 13** which merge into chocks **14, 15** for the mounting of driving spindles **16, 17** of work rolls **55**. Housing **12** consists of a base **18** having lateral shoulders **19** and a central upward extension or body **20** which is integral with chock **14**. Housing **13** comprises two arms **81** projecting from chock **15** on each side of the central extension **20**, and having lower surfaces **82** which rest on wedges **22** located on the shoulders **19**. As shown in FIGURE 3, the arrangement of shoulders **19**, extension **20**, arms **81** and wedges **22** is symmetrically disposed relative to the plane passing through the roll axes.

Each chock **14, 15** carries the respective driving spindle **16, 17** in two or three bearings as shown in FIGURE 4. The larger bearing **23** which takes the rolling load is located in the chock **14, 15** while the smaller bearing **24**, which takes up bearing clearance, is located in an overhanging backward extension **25, 26** of the chock **14, 15**. There is preferably also provided a third bearing **46** which is provided within an annular member **47** which can be loaded by a piston **48** arranged in a hydraulic pressure chamber **49** in order to help take up clearances in the main bearing **23** and to enable the mill to be completely prestressed.

Each spindle carries a rolling tool **55** which takes the form of a removable sleeve **27** of hard material with a peripheral groove **28** cut therein. The sleeve **27** is held on a mandrel **75** formed in the end of the spindle by a collar **30** which is locked by a nut **31** and lock nut **32** on a threaded bolt **29** secured in the spindle. As will be seen in FIGURE 1, the spindles **16, 17** project inwardly towards one another and the two rolls **55** overlap with the grooves **28** aligned to form a roll hole. Each spindle **16, 17** is carried in cantilever fashion in that each spindle is mounted in its chock at one side only of the roll surface.

Rolling tool separation is effected by the wedges **22**. A threaded rod **33**, which is captive in a block **80** set into the housing **13** but which can rotate about its axis, carries a nut **34** secured to a bridge member (not shown) connecting the wedges **22**. As the rod **33** is turned by a handwheel **35**, the wedges **22** are moved relative to the mounting **13** and thereby adjust the vertical separation of the housings **12, 13** and hence the separation of the rolls **55**. When the desired separation of the rolls **55** has been obtained, the usual chock locking wedges **39** are placed between the two housings. These wedges **39** may be hydraulic chocks and/or may have a specified spring modulus, as may wedges **22**.

The rolls **55** may also be adjusted axially to ensure registration of the rolling grooves with the rolling line. This may conveniently be done by the threaded rod **36** which passes through a central opening **37** in the base **18**. One end of the rod **36** carries a second handwheel **40** while the other end is captive in a trunnion **41** which carries a shaft **42**. Shaft **42** in turn pivotally carries two levers **43** which are also pivoted on a shaft **44** secured in a projecting part **45** of housing **12** and on a pivot **71** to links **72** which are pivoted by pivots **73** to the housing **13**. As handwheel **40** is turned, trunnion **41** moves longitudinally and causes levers **43** to turn on shaft **44**; as a result the housing **13** and wedges **22** are caused to slide on the shoulders **19** and the rolls **55** move axially relative to one another.

Considering the relationship of the particular elements of the above-described mill with the earlier more general discussion of the invention: the locking surfaces referred to are found on the one hand as the shoulders **19** formed in base **18** in housing **12** and on the other hand as the lower surfaces **82** of arms **81** in housing **13**. It will be noted that surfaces **18** face away from their associated roll and its spindle **17**, while shoulders **19** face towards their associated roll and its spindle **16**.

Again, regarding the U-shaped structures referred to above, it will be seen that a first such structure includes spindle **16**, chock **14** as the first U-arm, extension **20** as the U-base and base **18** as the second U-arm: while the second such structure includes spindle **17** and chock **15** as the first U-arm, arms **81** as the second U-arm and the U-base as the junction between chock **15** and arms **81**.

In either event the locking surfaces or second arms are of interleaved form by virtue of the use of two arms **81** disposed on either side of extension **20**, and locked and coupled to respective shoulders **19** through the intermediary of wedges **22**. However in this connection it will be noted that the locking surfaces are to be viewed as including the side faces of extension **20** contacted by the inner side faces of arms **19** in areas indicated at **83** in FIGURE 3 whereby the housings are effectively locked in the direction of the pass line.

It will be observed that, in the construction shown in FIGURES 1 to 4, the length of the path through the housing subject to the separating force is small compared with that in a conventional mill. This is achieved by arranging the interlocking of the housings of the rolls to be as close to the pass line as possible, consistent with proper access to the roll gap; the separating path is then simply from the upper roll **55**, through the housing **12** to the wedge **22** where it is balanced by the downward force applied to the lower roll **55** by the material being rolled and transmitted through the housing **13** to the wedge **22**. By keeping the path of the separating force to a minimum, the elongation of the mill under the action of the separating force is kept small, with the result that variations in the dimensions of the rolled material are reduced.

As the roll spindles are mounted on opposite sides of the pass line through the rolling grooves, access to the working surfaces of the rolling tools is obtained without difficulty. This feature, together with the ease with which the sleeves **27** and hence the profile of the rolling groove may be changed considerably reduces the loss in working time occasioned by a change of tools through wear, or a change in the section of the work to be rolled. The cantilever mounting of the spindles **16, 17** also enables the main bearings **23** for the spindles to be of larger diameter than the diameter of the rolling sleeves **27** so that wear of these bearings is reduced. Additionally, the spindles **16, 17** themselves may have a larger diameter than the work rolls over the major part of their lengths and in particular over the length with the housing and extending to the roll, with a resulting increase in the stiffness of the mill and reduced wear of the working surface. The spindle diameter should of course decrease to match the roll diameter immediately adjacent to the roll, in order to give clearance for the opposing roll. On the other hand, the rolling tool diameters may be kept small so that the mass and cost of the tools are kept to a minimum even when relative costly materials are used on account of their resistance to wear, the roll separating force and rolling

torque are reduced, and a bigger proportion of the rolling squeeze is turned into elongation and a smaller proportion into spread, with a result that the desired elongation of the work may be accomplished in a smaller number of passes. A short rolling tool face may also be achieved to minimize roll mass as before, and to reduce distortion and mill spring due to roll bending, since it allows the roll to be very close to the main bearing.

If a degree of mill spring is required in the mill, the design of the housing or bearings may be altered accordingly.

The end of the roll spindle **16** not carrying the roll **55** is shown in FIGURE 1 as projecting from the chock extension **25** to enable that spindle **16** to be driven. Additionally, the spindle **17** may be driven from the same drive as the spindle **16**; alternatively spindle **17** may be spun by a separate small motor before entry of the work into the roll hole to facilitate that entry, but afterwards allowed to free-wheel. If continuous operation is possible, even the spinner motor becomes unnecessary. It follows that although these spindles and rolls are shown to be of equal size in the figures, in the last-mentioned arrangements the free-wheeling spindle and roll can be made smaller, which further improves accessibility.

The mill described above may be readily modified for two strand working. In this case, the spindle **16** is carried in a pair of heavy bearings, which may have a prestressing bearing, similar to bearing **46**, between them, and has a work roll **55** at each end. The additional roll at the right-hand end of the spindle, as viewed in FIGURE 1, co-operates with a roll carried on a third spindle which is arranged and mounted in a manner analogous to spindle **17**. The spindle **16** may be driven centrally, or all three spindles may be driven, or the two outer spindles may be driven by a small motor only prior to the entry of the work. An advantage of this two-strand mill over previous two-strand mills is that the roll gap and roll alignment for each strand may be adjusted without altering the gap or alignment for the other strand.

FIGURES 5 and 6 show diagrammatically, two further mill arrangements for two-strand rolling. In each of these arrangements two pairs of rolls are provided, one roll of one pair being connected to one roll of the other pair in such a manner that they can be driven by common driving means. This principle can also be applied to multi-strand rolling.

In the past, two-strand rolling mills have suffered from various disadvantages, of which the two most serious are:

(1) The roll gap and roll alignment cannot be adjusted independently for the two stands, as is often desirable, because of differing wear in the roll grooves forming the two strands. In the present invention, the connected rolls of each pair can be mounted rigidly, while the unconnected rolls of each pair can be made independently adjustable.

(2) A mill train for rolling is arranged for each mill to deform the stock in a direction at right angles to the preceding mill. This offers no problem with single strand rolling; the mills are simply arranged with their pass planes at right angles. In two-strand rolling however, it is necessary to twist the strands in order to allow them to pass together through successive mills. This twisting weakens the strands, and opens up any faults present in the strands. The present invention allows the pass lines of the strands to be kept straight and untwisted, and provides a mill which is still cheaper and more convenient and which, thanks to the reduced roll diameter, requires less power to run than two independent mills of the old type.

In the mill arrangement of FIGURE 5, two pairs of rolls **54**, **55** are provided. Independent rolls **55** are mounted in housings **51**, similar to the housing **15** of FIGURE 1, having lugs **57** with downwardly directed locking surfaces coacting with upwardly directed locking surfaces on lugs **56** of main housing **61**. Adjustment means between the locking surfaces are again wedges **22**.

Rolls **54** are provided on the ends of driving spindles **62** mounted in bearings, similar to those shown in FIGURE 4, in main housing **61**. Spindles **62** are connected by a gearing **63**, so that both spindles can be driven together by a motor **60** working through gearing **64**.

This arrangement provides two pass lines, fixed in space one above the other, the rolls being driven from a common motor, but allows the roll gap and roll alignment for each pass line to be adjusted independently. This is also true of the complementary arrangement shown in FIGURE 6.

In FIGURE 6, independent rolls **55** are mounted in housings **52** having lugs **59** with locking surfaces cooperating through adjustment wedges **22**, with locking surfaces on lugs **58** of main housing **65**. The driven rolls **53** are mounted on each end of a common spindle **66**, and are driven through gearing **67** by motor **60**. All the details described in connection with FIGURES 1 to 4 may be included in the mill arrangements of FIGURES 5 and 6. In particular each independent roll **55** is preferably provided with a spinner motor **50** to facilitate the entry of work between the rolls. If desired, however, the rolls **55** may also be connected to the driving means. The arrangement of FIGURE 6 provides two pass lines fixed in space which can be made identical with the pass lines of the FIGURE 5 arrangement. The pass planes of FIGURE 6 are, however, at right angles to the pass planes of FIGURE 5. It will be understood that this may also be attained with the two pass lines lying parallel in a horizontal plane. For this purpose arrangements similar to those of FIGURES 5 and 6 may be provided, but each one being turned on its side.

Other possible arrangements include two complementary stands, each having a main driving spindle with a roll at each end and two independent rolls, for co-operating with the driven rolls. The independent rolls may be arranged diametrically at opposite sides of the main spindle which is inclined to the horizontal at 45°, the roll size and spindle length being such that the two pass lines lie in a horizontal plane and the pass planes are at 45° to the horizontal. The distance apart of each pair of roll axes must then equal the distance apart of the rolls on the main spindle. Successive main spindles will be arranged at right angles. It is also possible to facilitate the arrangement of successive pass planes at right angles by providing a work surface for one or both rolls of each pair which is inclined to the roll axis or by a combination of the above arrangements. A complementary pair, or a succession of complementary pairs of mills may be arranged to form a mill train for two-strand rolling. In this case, the main housings for the driven rolls of each mill may all be combined into a single unit, or train housing, the housing for the independent rolls being made interchangeable so as to reduce spare housings carried in stock and to facilitate major maintenance in situ. The train housing may also house all the attachments required for the entry and exit of the strands into and out of the train, and the guides for the strands between mills.

When one or more complementary pair of mills are provided with a single housing for all the driven rolls, it is further possible for all driven rolls to be driven from the same common motor. This is of greatest use with a single complementary pair of mills.

The use of an integral train housing for one or more complementary pairs of mills, described above for two-strand rolling, can also be applied to single strand rolling.

As will be appreciated, the mill as described and illustrated includes the following features:

(1) The shaping and driving functions of each roll are preformed by separate elements. One of these elements is a rolling tool in the form of a sleeve or a disc, with the rolling surface or groove disposed circumferentially.

The other element is a driving spindle supported in not less than two bearings. The two elements are detachably joined, the joint being situated at one extremity of the driving spindle and all the bearings being situated on the same side of the rolling tool. The nature of the joint is such that the outside diameter of the rolling tool need not be greater than the largest diameter of the driving spindle. Indeed, the rolling tool diameter is chosen as small as is desirable in the interests of efficient shaping of the stock and low rolling force and torque; and the spindle is proportioned for maximum flexural stiffness and efficient bearing support.

The width of the rolling tools is made no more than is needed to accommodate one working groove, so that the line of action of the rolling force is situated in closest proximity to the line of reaction of the nearest bearing, in the interests of least deflection of the axes of the rolling tools, particularly by bending of the spindle.

(2) When assembled in the mill, the two driving spindles are placed one on either side of the plane containing the rolling tools and the rolled stock between them. This arrangement, which will be referred to as the "juxtaposed cantilever system," makes it possible for the diameters of the rolling tools to be made independent of the diameters of the driving spindles.

(3) The housings in which the two spindles are mounted are each provided with lugs which are situated on the same side of the plane which contains the axis of the rolled stock and which is parallel to the axes of the spindles. These lugs project in the general direction of the rolling tool so as to pierce the plane at right angles to the axes of the rolling tools and containing the axis of the rolled stock between them. Furthermore, the lugs of the two housings are proportioned so as to prevent the relative movement of the housings under the action of the roll separating forces and, at the same time, to place the points of application of the roll separating forces and of the reactions to them in closest proximity, whereby the stretch or spring of the housings is minimised.

The mill additionally includes the following subsidiary features:

(i) The use of a subsidiary spindle bearing with tightening-up or pre-stressing element for the elimination of all play in the main spindle bearings, in particular when rolling narrow strip, in order to counteract tilting of the rolls under the action of the roll separating forces.

(ii) The use of a material possessing the very highest resistance to wear in the manufacture of the rolling tools, irrespective of its flexural properties. Examples are: ceramics, cermets, sintered hard carbides, high alloy steel, and other hard wearing alloys (e.g. stellites) used in cast form. In all these cases the rolling groove can be incorporated in the forming process (casting or sintering), so that the conventional time-consuming and costly pass turning or grinding operations are dispensed with.

(iii) The use of spacing elements inserted between the lugs of the mating housings, having a specified spring modulus.

The combination of these design principles enables the following to be achieved:

(1) Good accessibility to the stock being rolled;
(2) Easy changing of rolling tools without disturbing the driving spindles;
(3) Rolling line fixed in space so that guides need not be realigned after a change of rolling tools;
(4) Negligible bending deflection of driving spindles and negligible housing stretch;
(5) Optimum diameter of rolling tool for efficient rolling;
(6) Small mass of rolling tool making possible the use of costly, hard wearing materials;
(7) Compactness of mill, coupled with the ease of providing precision three-dimensional alignment of the two mating tools;
(8) Independent adjustment of rolling grooves for each strand of a twin-strand mill, by which means it is further possible to roll simultaneously certain combinations of different sections, or of identical sections in different materials;
(9) High output, twist-free rolling through the "vertical-horizontal" alternation of twin-strand stands.

I claim:

1. A rolling mill comprising two pairs of work rolls to define two roll gaps therebetween, a common spindle carrying one roll of each pair mounted in an overhanging manner at either end of the spindle, a central housing in which the spindle is mounted, separate housings in which the other rolls of each pair are mounted in overhanging manner, said separate housings each having a fixedly secured part interleaving with a part of the central housing, the abutting surfaces of the interleaving parts of the separate housings being disposed in planes intersecting the pass planes of said two roll gaps, and wedge adjustment means between the interleaving parts corresponding to each pair of rolls for independent adjustment of each pair of rolls for roll gap and alignment.

2. A rolling mill comprising: two generally U-shaped roll housing structures, one such structure being located with both its U-arms disposed between and adjacent the U-arms of the other structure; a first pair of corresponding adjacent U-arms, one from each structure, respectively, mounted in overhung manner, a roll, a roll chock and a spindle mounting said roll and said chock supported on each of said adjacent U-arms; the remaining, second pair of corresponding adjacent U-arms being interleaved transverse their longitudinal axes and longitudinally intersecting the pass plane of the mill as defined by said rolls; a wedge bearing longitudinally between said second pair of U-arms and intersecting the pass plane; and means for adjusting the longitudinal position of said wedge to effect variation of the roll gap.

3. A rolling mill according to claim **2** wherein each roll chock comprises a plurality of bearings in which the respective roll spindle is mounted, and loading means loading at least one of said bearings in each chock to take up clearances in the other bearings and so prestress the mill.

4. A rolling mill according to claim **2**, wherein each roll chock includes a first bearing and a second bearing in which the respective spindle is mounted, the first bearing being disposed closely adjacent the overhung roll carried by the respective spindle and the second bearing being disposed on the side of the first bearing remote from said roll, and pressure means exerting pressure upon said second bearing for prestressing the same.

5. A rolling mill according to claim **4**, wherein each of said roll chocks further includes an annual member encompassing the respective spindle and housing the respective second bearing, and wherein said pressure means comprise a hydraulic pressure means including a piston exerting radially directed pressure upon the annular member to effect prestressing of the second bearing.

6. A rolling mill comprising: a first generally U-shaped roll housing structure formed by a first U-arm including an overhung roll and chock and spindle therefor, a U-base member fixably connected with the chock, and a second U-arm fixably connected with the U-base member and having two shoulders facing the first U-arm one on each side of the U-base; a second generally U-shaped structure disposed in opposition to the first such structure and formed by a first U-arm including an overhung roll and chock and spindle therefor which first U-arm is located between the U-arms of the first structure and adjacent the first U-arm thereof whereby the rolls co-operate for rolling, a U-base member fixably connected to the

chock, and a bifurcated second U-arm integral with the U-base member each of the bifurcated arms being located adjacent a different one of the shoulders of the first structure and embracing the U-base member thereof; two wedges bearing one each between a different one of said shoulders and the bifurcated arm associated therewith; and common means for adjusting said two wedges to adjust the gap between the co-operating rolls, the arrangement being such that each of said second arms and wedges intersects the pass plane of the mill as defined by said rolls.

7. A rolling mill according to claim 6 wherein each chock includes three bearings in which the respective roll spindle is mounted, the three bearings being disposed around the chock successively along its axis relative to the spindle with a first bearing located closely adjacent the overhung roll carried by the spindle, a second bearing located adjacent the end of the spindle remote from the roll, and a third bearing located intermediate said first and second bearings, and wherein hydraulic pressure means prestress said third bearing.

8. A rolling mill comprising a first roll, a first housing mounting said roll and having a first locking surface facing toward said roll, a second roll, a second housing mounting the second roll and interleaved with the first housing, said second housing having a second locking surface facing away from said second roll, the second roll and second surface being interleaved between the first roll and the first surface in positions in which the rolls cooperate for rolling and the locking surfaces oppose each other, wedge adjustment means arranged between opposed locking surfaces for adjusting the housings relative to one another and bearing against said surfaces in order to lock the housings against the separating force developed between the rolls during rolling, said surfaces and said wedge adjustment means connection intersecting the pass plane in which the separating force is developed during a rolling operation.

9. A twin-strand rolling mill comprising a pair of mills, each of which mills includes two generally U-shaped roll

housing structures, a first one of such structures being located with both its U-arms disposed between and in opposition to the U-arms of the second one of such structures, a first pair of corresponding adjacent U-arms, one from each structure, being mounted in an overhung manner, each of said adjacent U-arms supporting the roll, the associated roll chock and the spindle of the respective mill, the second pairs of corresponding adjacent U-arms of the two housing structures longitudinally intersecting the respective pass plane, a wedge bearing longitudinally between each second pair of corresponding arms and longitudinally intersecting the respective pass plane, and means for independently adjusting the longitudinal positions of said wedges to effect independent variation of the roll gaps; the two U-shaped roll housing structures of each pair being interleaved one with another to prevent separation in the direction of the pass line, the two pairs of U-shaped housing structures defining parallel pass planes, and one pair of corresponding second U-shaped housing structures being fixedly interconnected for mounting on a common foundation.

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