April 6, 1965 M. MORGAN ET AL 3,176,385

APPARATUS FOR AND METHOD OF COLLECTING AND DIVIDING ROD INTO BUNDLES

Filed Nov. 13, 1962 5 Sheets-Sheet 1

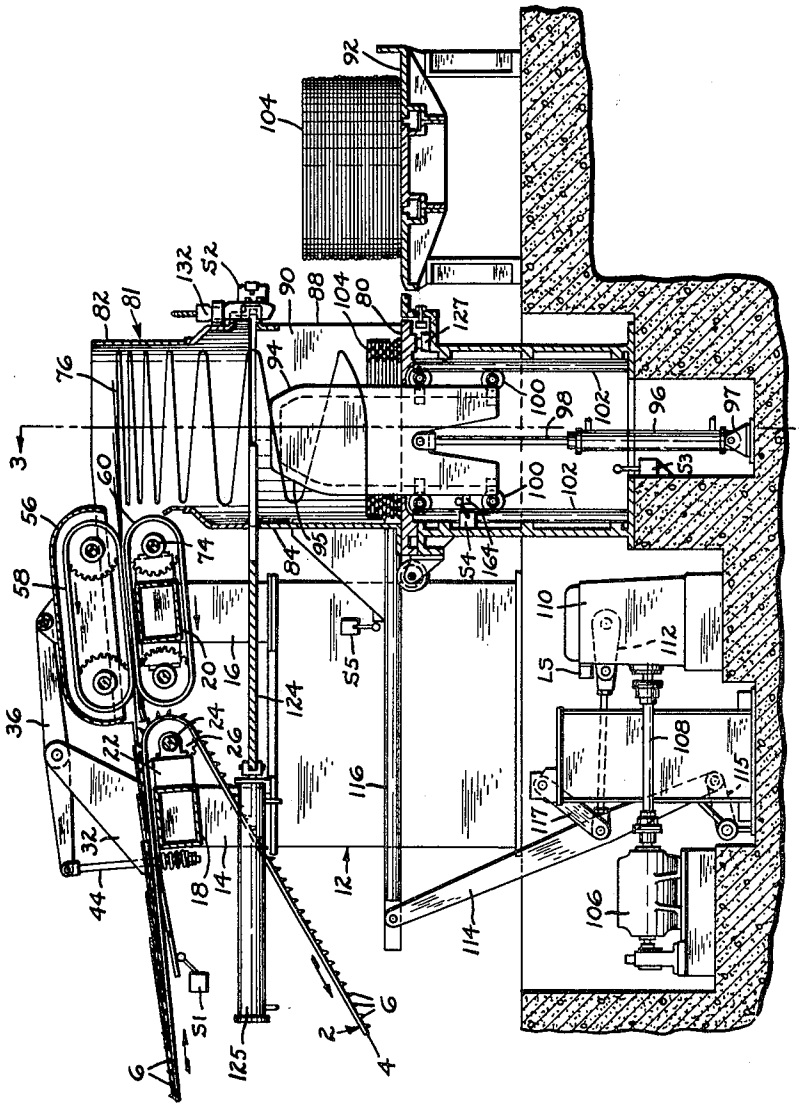

Fig. 1

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Filed Nov. 13, 1962 5 Sheets-Sheet 2

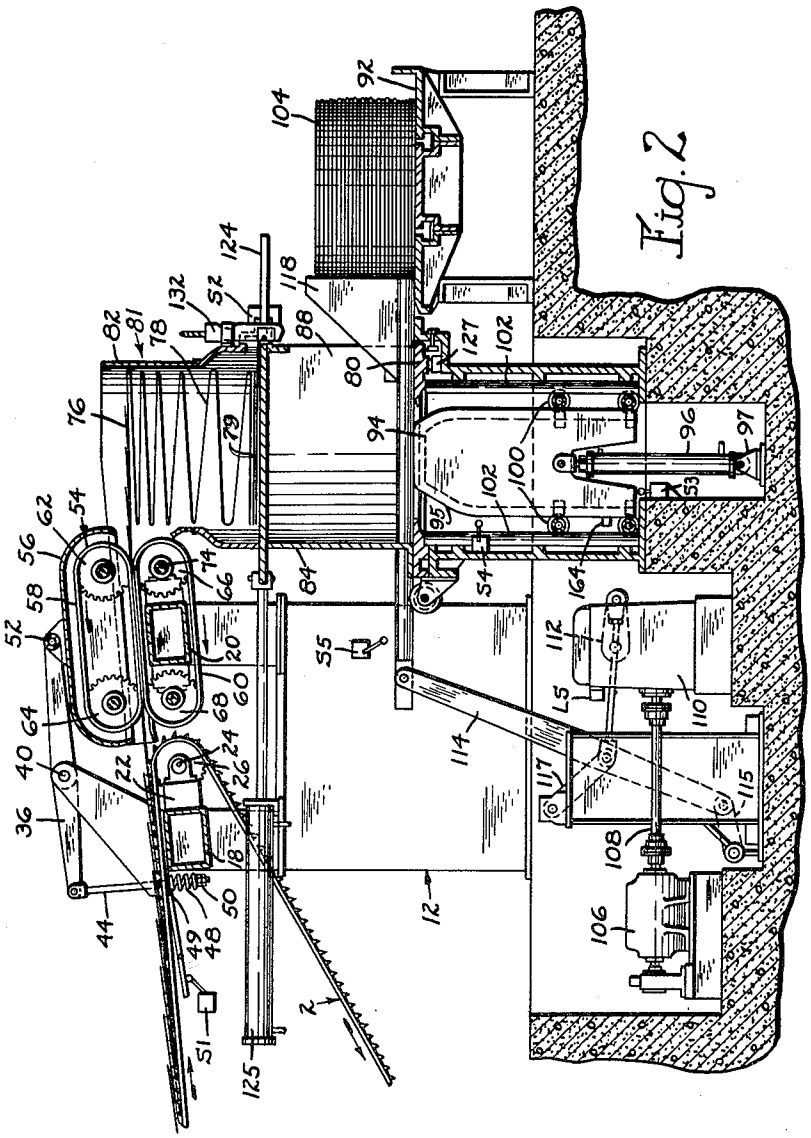

Fig. 2

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APPARATUS FOR AND METHOD OF COLLECTING AND DIVIDING ROD INTO BUNDLES

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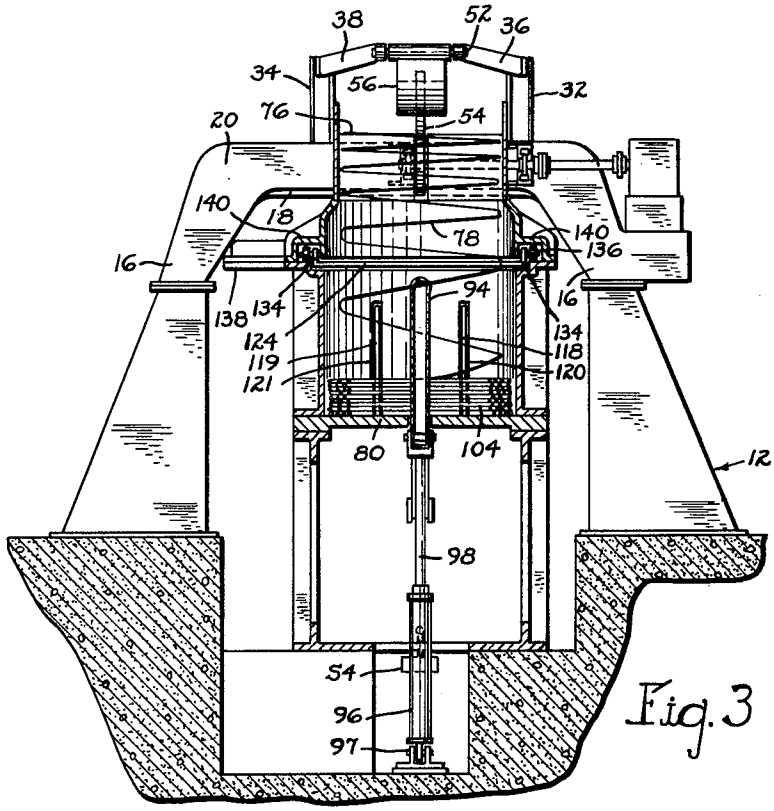

Fig. 3

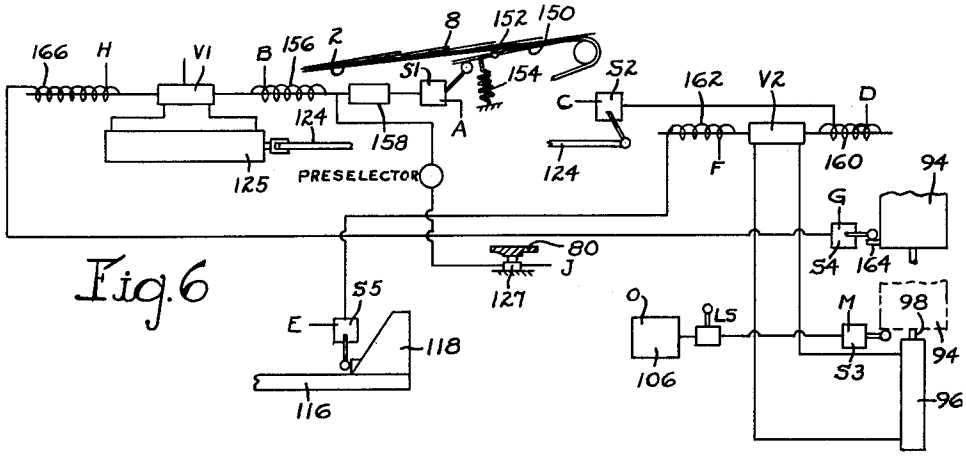

Fig. 6

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APPARATUS FOR AND METHOD OF COLLECTING AND DIVIDING ROD INTO BUNDLES

Filed Nov. 13, 1962 5 Sheets-Sheet 4

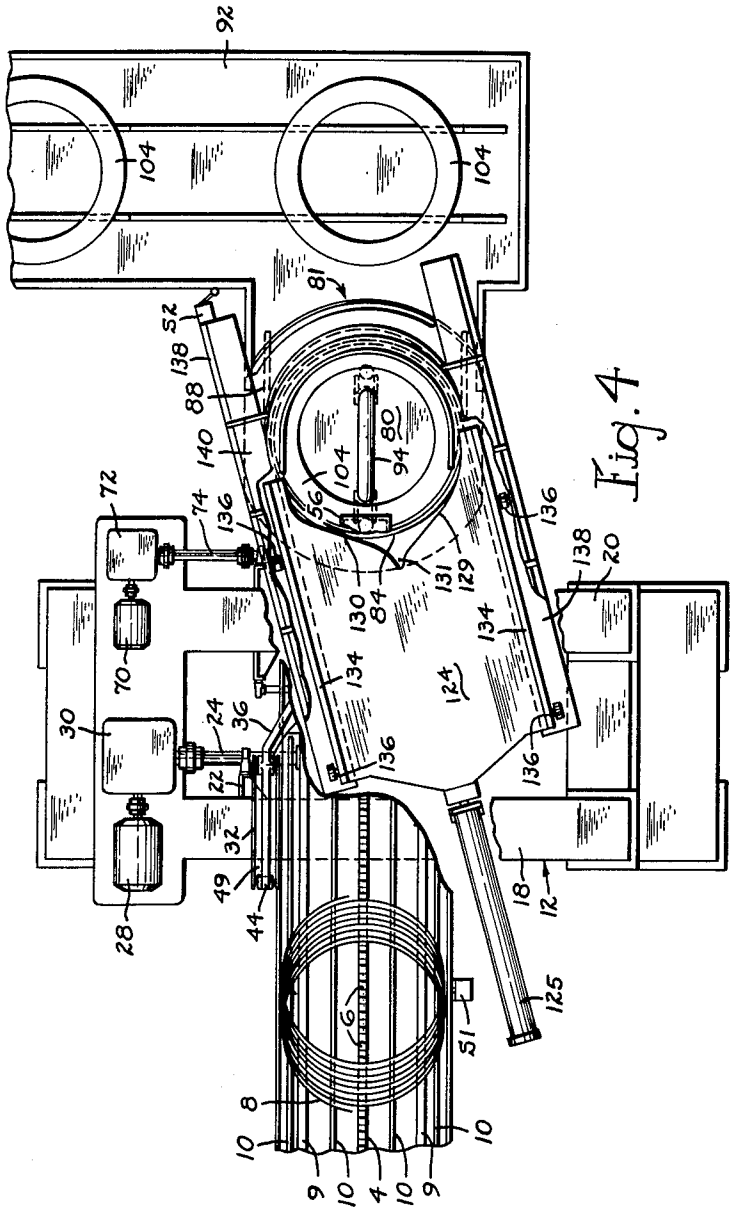

Fig. 4

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Filed Nov. 13, 1962 5 Sheets-Sheet 5

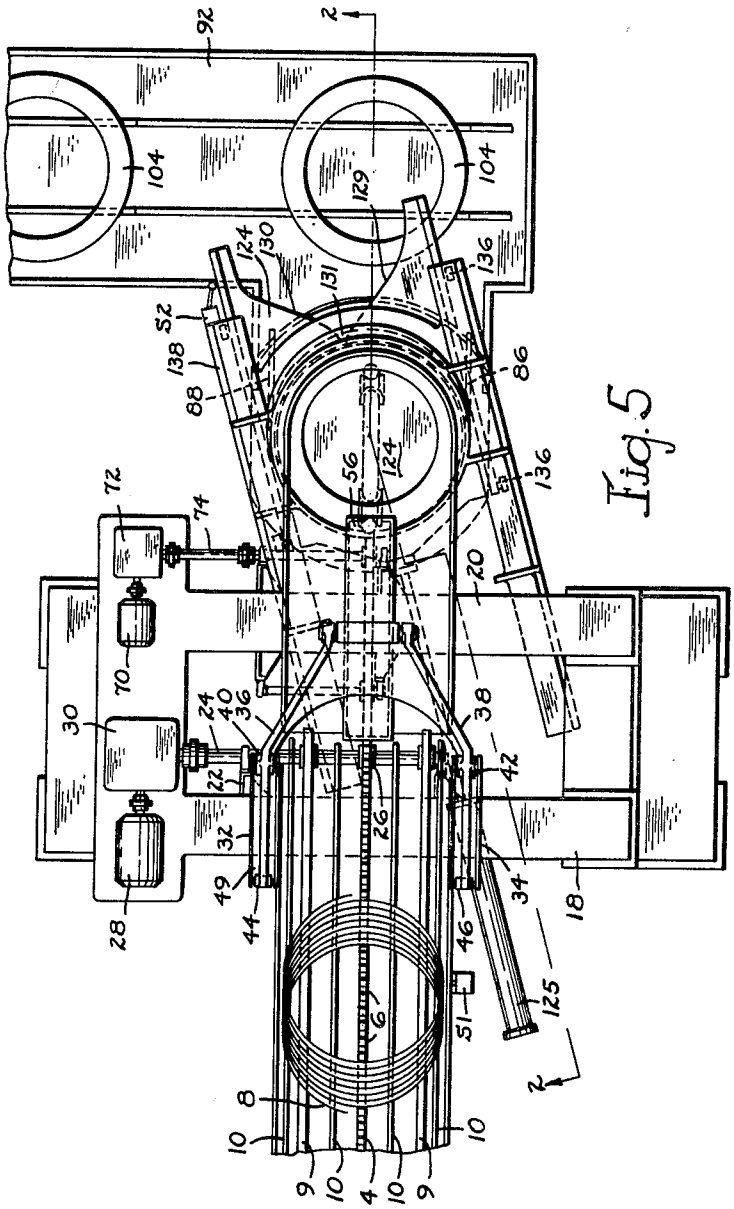

Fig. 5

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APPARATUS FOR AND METHOD OF COLLECTING AND DIVIDING ROD INTO BUNDLES

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Filed Nov. 13, 1962, Ser. No. 237,237
14 Claims. (Cl. 29—417)

This invention relates to the metal working industry and is particularly concerned with a means and method of collecting hot rolled metal rod in coiled formation at the completion of the rolling operation.

The present practice of forming hot rolled rods into coils at the end of the rolling operation requires the use of a laying reel. For each strand of metal rolled, it is now necessary to provide two laying reels in which to collect the rod in coil form. The two reels are required because the leading end of the next following rod is so close to the trailing end of the preceding rod that the laying reel cannot be cleared of the coil formed from the preceding rod in time to receive the following rod. Therefore, a switch is included in the line so that the leading end of the next following rod will be directed to an adjacent empty laying reel. While this second laying reel is coiling the next rod, the coil produced in the first reel is pushed therefrom by conventional means, whereby the first laying reel is then ready to receive the next following rod. Thus as production continues, successive rods are switched from one to the other of the two laying reels. These two laying reels occupy considerable area and are expensive. No way is known in the industry whereby closely following successive rods may be coiled at the same position to eliminate the necessity of a second laying reel.

The present invention is designed to collect all of the coils formed from a succession of rods coming from a single strand at a single location. The construction is such that after the first coil has been completed the initial rings of the second coil will be collected for a short time at a temporary position above the first completed coil. As soon as the first completed coil has been pushed from its collecting table position, the temporary supporting means is withdrawn, permitting the initial rings collected therein to fall by gravity to the main coil collecting table.

In order that this arrangement of equipment and method of procedure may function as contemplated, it is preferable that the hot rolled rod on leaving the last stand of the rod will first be laid in a continuous series of non-concentric rings on a continuously moving conveyor. However, in another form of the invention which will be claimed in a separate application the rod rings may be delivered directly at the collecting station by a laying head positioned directly thereabove. In the present construction utilizing the conveyor as the delivery means, the rings thereon may be subjected to a gaseous or liquid treating medium, if desired, or they may merely be subjected to the surrounding atmosphere. Treatment of the rod rings on the conveyor is not, however, any part of the present invention. It is merely necessary that the conveyor advance the non-concentric convolutions to the collecting station at a proper rate and attitude so that the collecting operation may proceed steadily.

The invention further contemplates the provision of means whereby coils of selected weights may be formed. That is to say, if the rod is being rolled from a 1200 pound billet, for example, it might be desirable to collect the rolled rod in four coils of 300 pounds each. The mechanism that will hereinafter be disclosed includes weighing mechanism which functions in cooperation with a cut-off device whereby a predetermined weight of coiled rod may

be severed from the following rod. The weight of the cut-off coil may be varied at will so that, for example, two 600 pound coils or six 200 pound coils could be prepared from a 1200 pound billet. In other cases, the rod formed from the entire billet may be collected without any sub-division. In all cases, however, immediately upon the rear end of the rod reaching and completing a coil, temporary supporting means preferably in the form of a generally horizontal plate is advanced to a position over the completed coil so that until the completed coil has been pushed away from the main collecting table the leading rings of the next oncoming rod will be temporarily collected on the intermediate supporting plate. Then as soon as the first coil has been pushed out of the way, the intermediate supporting plate is withdrawn and the coils collected thereon will fall by gravity to the main collecting area and all succeeding rings will be deposited thereon until the entire or sub-divided rod has been coiled.

When a rod is to be sub-divided into smaller weight coils, the actuation of the automatic weighing device and the shifting of the intermediate supporting plate not only achieves temporary collection of subsequent rings but also forces the rod into a shear which immediately severs the convolution at the plate in such manner that the lower part of the convolution falls readily to form the top or last ring of the weighed coil. The other end of the severed ring becomes the leading end of the succeeding coil.

Another object of the invention is to provide a ring accelerator which is positioned immediately between the end of the conveyor and the collecting station. This accelerator grips the non-concentric convolutions as they leave the conveyor, advancing them at a greater speed and at the same time holding each convolution in substantially horizontal position until the moment of release above the coil forming station. By the use of the accelerator, each ring of the coil is ejected into the coil assembling means at the correct horizontal velocity and attitude so that it will descend in proper helical configuration to produce a proper coil. The accelerator thus makes it possible to run the main conveyor at any selected speed without affecting the optimum delivery of the rings to the coil collecting station.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which:

FIG. 1 is a side elevation of a preferred form of the invention showing the rings leaving the accelerator and falling through the coil forming unit to the main coil assembling table;

FIG. 2 is a view similar to FIG. 1 but with the intermediate supporting plate in operative position and the just-formed coil ejected from the coil assembling table;

FIG. 3 is a vertical section taken on the line 3—3 of FIG. 1;

FIG. 4 is a plan view of the machine with the parts in the position shown in FIG. 1 but with the structure above the intermediate supporting plate broken away to show more clearly the nature of the plate;

FIG. 5 is a plan view of FIG. 2 showing the intermediate supporting plate in coil collecting position; and

FIG. 6 shows the relation of the various actuating controls.

Referring now to the several figures, there is provided a steadily moving conveyor 2 which comprises a chain 4 having a series of upwardly extending teeth 6 of such height that they will effectively engage the non-concentric overlapping rod rings residing thereon. The non-concentric rod rings are indicated at 8, and these rings have been deposited on the conveyor by a laying head (not shown) at a suitable preceding position over the conveyor.

The rings also rest on smooth conveying chains 9 and stationary smooth tracks 10 which together provide adequate support so that no bending of the ring will occur as it advances along the conveyor under the influence of the moving teeth 6.

A supporting structure generally indicated at 12 includes suitable spaced uprights 14 and 16 on both sides of the conveyor carrying transverse beams 18 and 20. Beam 18 has secured thereto a bearing support 22 which carries transverse shaft 24 to which are affixed sprockets 26 for driving chains 4 and 9. Shaft 24 is driven by the conveyor motor 28 through reduction gear 30. Beam 18 also has secured on its upper part a pair of spaced supports 32 and 34. Each of these supports has a lever 36 and 38 pivotally mounted thereon at 40 and 42 respectively. The left ends of levers 36 and 38 are held in position by tension members 44 and 46 which are constantly urged downwardly by compression springs 48 interposed between the under side of plates 49 and nuts 50.

The righthand ends of levers 36 and 38 are connected by an elongated pin 52 from which hangs the accelerating tractor 54. This tractor consists of a protective hood 56 and two endless chains 58 and 60. The upper chain 58 is carried by sprockets 62 and 64, while the lower chain is carried by sprockets 66 and 68. The lower chain 60 is positively driven by tractor chain motor 70 acting through reduction gears 72 and 74.

Spring 48 is adjusted so that the upper chain 58 rests sufficiently tightly on lower chain 60 to afford a positive grip on the rings 8 as they advance from the end of conveyor 2 into the nip of chains 58 and 60. The linear speed of travel of chains 58 and 60 is, in the usual case, greater than the speed of conveyor 2 so that the rings passing through the tractor chain unit 54 are not only held firmly therebetween in overlapping stretched-out relation but also are accelerated to the best speed for delivery to the coil assembly position.

Because of the tight grip applied by the chains 58 and 60 to the overlapping rings of rod as they advance therethrough, it is believed apparent that when each ring is finally released from engagement with the tractor chain unit and the next following overlapping ring it will still be in a substantially horizontal position as indicated by ring 76 shown in FIGS. 1, 2 and 3. Thereafter as gravity becomes effective, the falling rings stretch into a helical arrangement as shown at 78 to deposit themselves at random on the collecting table 80. It will be noted that when the rings are initially released at the collecting station 81, they are within the confines of a generally curved vertical baffle to limit forward movement of the rings. This may take the form of a semi-circular wall 82 of slightly larger dimensions than the diameter of the rings. This wall 82 then increases in diameter as at 84, where it is continuous circumferentially. The wall 84 at the rear extends downward to table 80, and at its lower part is semi-circular with forwardly extending parallel sides 86 and 88 which form an opening 90 through which the completed coil may be ejected to a conventional conveyor 92.

In order that the rings of the coil may collect themselves and grow vertically with correct wall dimensions, a vertically movable interior ring guiding means 94, preferably in the form of a tongue, is provided which extends upwardly through a suitable opening in collecting table 80. The purpose of the tongue is to provide means which acts in cooperation with wall 84 to cause the assembly of a coil of correct dimensions. The coil wall dimension is readily controlled by having vertical edge 95 a proper distance from wall 84. Under the limitations provided by the wall and tongue, it is obvious that the random fall of the rings will result in the coil assuming a configuration acceptable to the trade.

Tongue 94 is actuated by a double acting cylinder 96 pivotally mounted at 97 and having suitable air line connections to drive the piston 98 down and then up at the required times. Tongue 94 is guided by grooved rollers 100 rolling on vertical posts 102. When the assembly of the required sized coil of rod 104 has been completed within the confines of wall 84 on table 80, suitable control mechanism automatically actuates cylinder 96, causing tongue 94 to drop from the position of FIGS. 1 and 3 to the position of FIG. 2. As soon as the tongue is below the level of table 80, another control actuated by the descending tongue puts motor 106 in operation. This motor, acting through shaft 108 and gear box 110, causes a single revolution of crank arm 112 to pull the lever 114 mounted on swinging links 115 and 117 from the position of FIG. 1 to that of FIG. 2. Lever 114 is connected to two parallel pusher arms 116 which have on their ends vertical plates 118 and 119 which move through slots 120 and 121 (see FIG. 3) to push the collected coil 104 from the collecting table 80 to the conveyor 92. As soon as the lever 114 has resumed its position as in FIG. 1, the motor circuit 106 is broken and cylinder 96 is actuated by suitable valve means to drive piston 98 upwardly to return tongue 94 to the position of FIGS. 1 and 3, where it awaits the rings of the next coil.

The intermediate supporting plate is shown at 124. In its operation, one of two situations is present. The first situation is that in which coil 104 is to constitute all of the rod formed from a billet. In such case, the rings 8 will pile up on collecting table 80 until the entire coil is complete. The top level of the coil will be below the top of tongue 94. As soon as the last ring of the coil has been deposited thereon, a suitable control causes actuation of the two-way air cylinder 125 to drive the piston therein and the attached intermediate supporting plate 124 to the right at high speed so that it divides the lower coil collecting area from the upper area formed by the semi-cylindrical wall 82. The intermediate supporting plate 124 is shown in its ring intercepting position in FIGS. 2 and 5. When in this position, it is obvious as shown in FIG. 2 that the leading convolutions of the next rod coming from the mill will begin to pile up on this plate. The purpose of this arrangement is to give the vertical pusher plates 118 and 119 adequate time to push the first completed coil from table 80 to conveyor 92. As soon as the coil has been pushed from its position on table 80 to the conveyor 92 and pusher plates 118 and 119 have retracted, suitable controls cause tongue 94 to rise and on reaching upmost position plate 124 is withdrawn by reversal of the valve controlling air cylinder 125. With the plate 124 pulled back to the position shown in FIGS. 1 and 4, those leading rings indicated at 79 that have been collected on the plate 124 as shown in FIG. 2 then immediately drop down to the position shown in FIG. 1. The coil collecting operation then continues until the next coil has been fully assembled on table 80.

The other circumstance in which the intermediate supporting plate 124 comes into use is when the rod is to be severed into two or more parts to make a plurality of coils, each of a desired weight. To accomplish this, there is provided in the collecting table 80 an automatic weighing device 127 which is a unit of known construction and does not need to be described in detail herein. As the coil builds up on table 80, the weighing device will close a circuit when a given weight of coiled rod has been collected thereon. This puts the air cylinder 125 in operation to slide intermediate supporting plate 124 rapidly to the right from the position shown in FIG. 1 to the position shown in FIGS. 2 and 5. When this movement of plate 124 occurs, it will be understood that rod rings 8 are still descending steadily and continuously in the manner shown in FIGS. 1 and 3. Hence the leading edge of plate 124 as may be seen in FIGS. 4 and 5 is so shaped at 129 and 130 that it will enter readily between two successive falling continuous helical rings and then, as it slides across the space through which the rings are falling to fully closed

position as shown in FIGS. 2 and 5, a short section of the rod will be trapped at notch 131 in such manner that one side of the ring adjacent the notch is above plate 124 and the other side of the ring adjacent the notch is below plate 124. With the rod trapped in this manner in notch 131, plate 124 pushes the rod far enough so that it enters the mouth of shear 132 which is shown in FIG. 2. This shear may run continuously or be set in motion by movement of the plate or rod or otherwise. However, as soon as the rod enters the shear, the shear will function to cut the rod. This permits that part of the rod below plate 124 to fall down as the last convolution of the coil that has been weighed by the weighing device. At the same time the oncoming rings dropping from tractor chain unit 54 continue their initial assembly on the upper side of plate 124.

The already explained sequence of operations then goes into effect, namely, the tongue 94 drops and the pusher plates 118 and 119 come into operation to force the coil 104 from table 80 to conveyor 92. Then as soon as the pushers have retracted and the tongue has ascended to the position of FIG. 1, the intermediate supporting plate 124 is withdrawn and those rings of the rod that have been collected thereon fall at once to table 80, resting, of course, on the automatic weighing device. When this next coil has reached the required weight, then the same series of operations is repeated. In this way, a plurality of coils of substantially equal weight may be produced from a large billet.

In FIG. 4, the structure above the intermediate collecting plate 124 has been broken away and portions of the guides in which the plate slides have likewise been broken away to permit a better understanding of the construction of this essential element.

On referring to FIGS. 3, 4 and 5, the plate 124 has at its sides upturned flanges 134, each of which carries a pair of spaced rollers 136 which ride on a lower carrier plate 138. An upper cover plate 140 provides both a suitable housing for the rollers and acts as a guide to prevent the plate from shifting from the horizontal. By this construction, it will be understood that the plate 124 is readily movable by air cylinder 125 in a horizontal direction and at the necessary linear speed to enable the plate 124 to enter successfully between descending ring convolutions. It is, of course, important that when plate 124 enters between adjacent convolutions, the part of the ring that becomes trapped in notch 131 must be that part on the far side of the ring. Since the rings of the coil are falling at random, the leading edge configuration 129, 130 of plate 124 must be such that it will enter freely between two convolutions of the descending helix. Such result has been accomplished by the configuration disclosed herein when the plate is moved at sufficient velocity to cross the coil collecting area in about ¼ second.

If through mischance any of the non-concentric convolutions of rod advancing on conveyor 2 should be thrown out of alignment or jammed in any way between the chains of the tractor chain unit 54, which event thus far has not occurred in the operation of this machine, the levers 36 and 38 makes it possible to quickly lift the upper chain 58 from the lower chain 60 for a distance adequate to free any rods that may be causing trouble in the area.

Means for controlling the operation of the various elements in proper sequence will now be described. Referring to FIG. 6, there is shown a short section of the conveyor 2 on which rest the overlapping non-concentric rings which are advancing steadily toward assembling position. A feeler 150 pivoted at 152 is held down as the rings continuously pass thereover. As soon as the last ring has passed beyond feeler 150, a spring 154 moves feeler 150 counterclockwise to close switch S1. This establishes a circuit AB through solenoid 156 to move valve V1 to a position to admit compressed air to cylinder 125 to drive the piston and plate 124 to the right to cut-off position across the coil collecting station 81. A time delay unit 158 is utilized so that actuation of cylinder 125 does not occur until the last of the rings 8 has had an opportunity to drop down to final position on the top of coil 104 on table 80.

A switch S2 is mounted on the outer end of plate guide 138 (see FIG. 5) where the switch lever will intercept the end of plate 124 as it arrives in ring intercepting position. As soon as switch S2 is closed, a circuit CD is established through a solenoid 160 which moves valve V2 to a position to cause compressed air to be introduced into air cylinder 96 to drive the piston 98 downwardly, thereby moving tongue 94 from its up position within coil 104 to down position as shown in FIG. 2 where the upper end of the tongue is below table 80. As tongue 94 reaches down position, it engages and closes a switch S3 (see FIG. 2) which in turn functions in conventional manner to establish motor circuit MD. Motor 106 continues in operation to move the lever 114 and associated coil pushers 118 and 119 through one complete cycle, driving the coil on table 80 to its position at the right on conveyor 92 and returning the pushers to their starting position shown in FIG. 1. A limit switch LS is suitably related to crank arm 112 so that as the arm completes 360° of rotation the circuit through motor 106 will be broken, thus stopping the motor with the pushers in withdrawn position.

Another switch S5 is located on the machine in such position that upon return of pusher 118 to the withdrawn position of FIG. 1 the switch S5 will be actuated to establish a circuit EF through solenoid 162 which will cause reversal of valve V2 to permit compressed air to enter the lower end of air cylinder 96, thereby driving tongue 94 from down to up position. When tongue 94 is about to reach up position, a finger 164 on the tongue engages a switch S4 to establish a circuit GH through solenoid 166 which causes reversal of valve V1 permitting air to enter the right end of cylinder 125, thereby to withdraw plate 124 from the coil collecting position shown in FIG. 2 to its inoperative position shown in FIG. 1.

While the foregoing operations were taking place, the leading rings of the next rod being laid on the conveyor 2 were moved by the conveyor and the accelerating tractor 54 to the collecting station 81 to fall to initial temporary ring collecting position on the intermediate supporting plate 124. Thus upon withdrawal of plate 124, those rings already collected fall at once to the main coil collecting table 80. In this manner, successive coils formed from whole billets are collected on table 80 and then pushed off to conveyor 92. The sequence of operations just explained continues automatically until the rolling operations are suspended.

When the rod is to be sub-divided into a plurality of coils, then an additional circuit controlled by the automatic weighing device is brought into use. Thus when the coil builds up on table 80 to the desired weight and while switch S1 is still open because feeler 150 is held down by the rings still passing thereover, an alternative circuit JB is established through solenoid 156 to put valve V1 into position to cause plate 124 to slide to the right in operative position across the collecting station 81. This movement of plate 124 occurs instantly upon the predetermined weight of coil having been assembled on table 80. The rod part on the far side of the intercepted convolution nests in notch 131 and is forthwith carried into shear 132 and severed. This occurs substantially simultaneously with the actuation if switch S2 which causes descent of tongue 94 after which the coil may be pushed to the conveyor by the pusher plates 118 and 119. Thereafter the series of operations is the same as that described with respect to the full coil.

When the last rings of the rod that is being sub-divided pass beyond feeler 150, then switch S1 closes and plate 124 is shifted to its operative position across the collecting station under the influence of the circuit AB that includes the time delay 158. With respect to the last coil coming from the subdivided rod, the sequence of opera-

tions is the same as that utilized in the case of coils formed from an entire billet.

It is our intention to cover all changes and modifications of the examples of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

We claim:

1. Means for collecting a succession of non-concentric rod rings advancing on a conveyor into a coil, said means comprising a collecting station adjacent the end of said conveyor and into which said rings are successively delivered by said conveyor, a collecting table therebelow, an intermediate ring intercepting means movable across said station at a position between said table and conveyor delivery point, means for moving an assembled coil laterally from said table while said intermediate ring intercepting means is in position across said station, and means for withdrawing said ring intercepting means after said moving means has withdrawn from said table to inoperative position, whereby rings of the next coil that may have assembled on said ring intercepting means may fall to said table for continued assembly of the next coil.

2. The means set forth in claim 1, and a vertically movable interior coil guiding means, means for moving said guiding means from an upper position in which the upper end thereof is below said intercepting means and high enough to help in controlling the formation of said coil to a lower position in which the upper end of said guiding means is below said table in a position in which it will not interfere with the lateral movement of said coil by said moving means.

3. A machine for collecting in a coil a succession of continuous non-concentric rings, said machine comprising a conveyor, a collecting station having its upper end adjacent the delivery point from said conveyor, a coil collecting table, intercepting means between said table and conveyor for introduction between two successive falling rings, means for severing said intercepted rings whereby the coil below said intercepting means becomes complete and the rings behind said point of severance collect on the upper side of said intercepting means, means for removing the completed coil from said table, and means for removing the intercepting means after removal of said completed coil from said table, whereby those rings collected on said intercepting means may fall to said table and continue to collect there in a coil.

4. Means for collecting in a coil a succession of non-concentric overlapping rings being delivered by a continuously moving conveyor, said means comprising a collecting station and a tractor chain unit interposed between the end of said conveyor and said station, said tractor chain unit including means for gripping the non-concentric overlapping rings fed to it by said conveyor and accelerating the horizontal speed of said rings and for holding each successive ring in a generally horizontal position until freed by said tractor chain unit, whereby each said successive freed ring may drop in a generally helical formation about a vertical axis onto said table.

5. Means for collecting a succession of overlapping non-concentric rings of rolled rod into a coil, said means comprising a first conveyor, a second conveyor positioned in series with said first conveyor and running at a faster linear speed than said first conveyor whereby the movement of said rings is accelerated by said second conveyor, said second conveyor including means for holding each successive ring in a generally horizontal position until freed by said second conveyor holding means, a collecting station having a collecting table at the bottom thereof whereby said successive rings falling from said second conveyor may collect as a coil on said table, and an intermediate coil intercepting means located between said table and said second conveyor movable horizontally to temporarily segregate the rings below said intercepting means from those above said intercepting means.

6. Means for collecting a succession of non-concentric continuous rod rings to form a coil of rod, said means comprising a collecting station, the upper part of said station being generally in the form of a semi-circular upper element for stopping forward movement of said rings, said element open at the other side to receive incoming rings, the lower part of said station being generally in the form of a semi-circular lower element of larger diameter than the first said element and open at the opposite side below the semi-circular upper element, and means in the form of a horizontally movable coil intercepting means passable into and out of said station for temporarily dividing said station into an upper part in which incoming rings may temporarily collect on said intercepting means and a lower part from which a completed coil may be removed while the rings are collecting in the upper part on said intercepting means.

7. Means for collecting a succession of continuous non-concentric rings being fed to said means by a conveyor, said means comprising a generally cylindrical vertical collecting station including vertical elements for guiding the downward fall of rings in helical formation, a coil collecting table at the bottom of said station, a tongue movable up and down through the center of said table, an intermediate supporting plate movable horizontally into and out of said station above said table at a level above the uppermost position of said tongue, a horizontally movable coil pusher entering through the lower part of said station on the same side as said conveyor, and means for causing operation of said pusher only when said tongue is below said coil collecting table and said intermediate supporting plate is in position above said table.

8. Means for delivering a succession of continuous non-concentric overlapping rings of rod to a collecting station, said means comprising a first conveyor, an accelerating conveyor positioned between the end of said first conveyor and said station, said accelerating conveyor comprising a pair of superposed continuous flexible elements, means for driving the opposed faces of said elements in the direction of ring travel on said first conveyor, means for applying a sufficient compressive force to said facing elements whereby when said succession of rings is delivered from said first conveyor to said accelerating conveyor said elements will grip said rings therebetween and deliver the rings successively to said station, said elements acting to hold each successive ring in a substantially horizontal position until released at the top of said station.

9. Means for assembling overlapping non-concentric rings of rod positioned on a moving conveyor into a rod coil, said means comprising a collecting station at the end of said conveyor, the ring receiving area at the top of said station having a diameter slightly greater than the average diameter of each rod ring, the diameter of the station at the bottom part being at least equal to the outside diameter of the required coil, a coil assembly table at the bottom of said station, means for increasing the rate of travel of said rings before the rings are successively discharged from the end of said conveyor into said station, means for supporting the trailing part of each ring while the ring is being moved into said ring receiving area so that each ring when released by said supporting means will fall into said station and down onto said table in a generally helical configuration to assemble on said table with the preceding and following rings as a coil of rod.

10. The means set forth in claim 9, and means intermediate the end of said conveyor and said table for interrupting the descent of said rings through said station, whereby subsequent rings will assemble on said interrupting means, means for severing those rings already assembled on said table from the rings assembling on said interrupting means, means for removing the coil from said table, and means for removing the said interrupting means whereby the rings thereon may drop to the said table for continued assembly thereon.

11. The method of assembling a succession of rods

from a rod mill into a succession of coils formed successively at the same location, said method comprising the steps of positioning said rod in a series of overlapping non-concentric rings, moving said rings continuously to a position above a coil assembly table, releasing said rings one at a time in generally horizontal position to fall by gravity in helical form to collect as a coil on said table and then removing said coil from said table while simultaneously preventing descent of the leading rings of the next following rod to said table until after the said coil is clear of said table.

12. The method of assembling a plurality of coils of rod made from a single billet, said method comprising the steps of positioning said rod in a series of overlapping non-concentric rings, moving said rings continuously to a position above a coil assembly table, releasing said rings one at a time in generally horizontal position to fall by gravity in helical form to collect as a coil on said table, stopping the descent of said rings after a predetermined weight of rings has collected on said table, severing said rod at the level where descent of said rings has been stopped whereby the coil on said table becomes independent of the following rings, removing said coil from said table, then allowing said stopped rings to drop to said table to resume assembly of said rings as a coil, again stopping the descent of said rings after a predetermined weight of rings has again collected on said table, again severing said rod as aforesaid, removing the coil then on the table, and repeating the aforesaid steps until all of the rod from said single billet has been coiled, sub-divided, and removed from said table.

13. A machine for collecting in a coil a succession of continuous non-concentric rings, said machine comprising a conveyor, a collecting station having its upper end adjacent the delivery point from said conveyor, a coil collecting table, intercepting means between said table and conveyor for introduction between two successive falling rings, means for actuating said intercepting means to a position between successive falling rings when a predetermined weight of rings has collected on said table, means for severing said intercepted rings whereby the coil below said intercepting means becomes complete and the rings

behind said point of severance collect on the upper side of said intercepting means, means for removing the completed coil from said table, and means for removing the intercepting means after removal of said completed coil from said table, whereby those rings collected on said intercepting means may fall to said table and continue to collect there in a coil.

14. A machine for collecting in a coil a succession of continuous non-concentric rings, said machine comprising a conveyor, a collecting station having its upper end adjacent the delivery point from said conveyor, a coil collecting table, intercepting means between said table and conveyor for introduction between two successive falling rings, means for actuating said intercepting means to a position between successive falling rings when a predetermined weight of rings has collected on said table, means for severing said intercepted rings whereby the coil below said intercepting means becomes complete and the rings behind said point of severance collect on the upper side of said intercepting means, vertically movable guide means extending upwardly through said table to assist in the correct formation of said coil, means for moving said guide means out of line with said coil after the last ring of said coil has dropped thereon, means for removing the completed coil from said table, means for restoring said guide means to a position to assist in proper subsequent coil formation prior to removal of said intercepting means, and means for removing the intercepting means after removal of said completed coil from said table, whereby those rings collected on said intercepting means may fall to said table and continue to collect there in a coil.

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