April 29, 1969 E. H. BARTEN 3,441,234

REELING-OFF APPARATUS FOR USE IN CONNECTION WITH ONE-WAY ROLLING MILLS

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Fig. 1

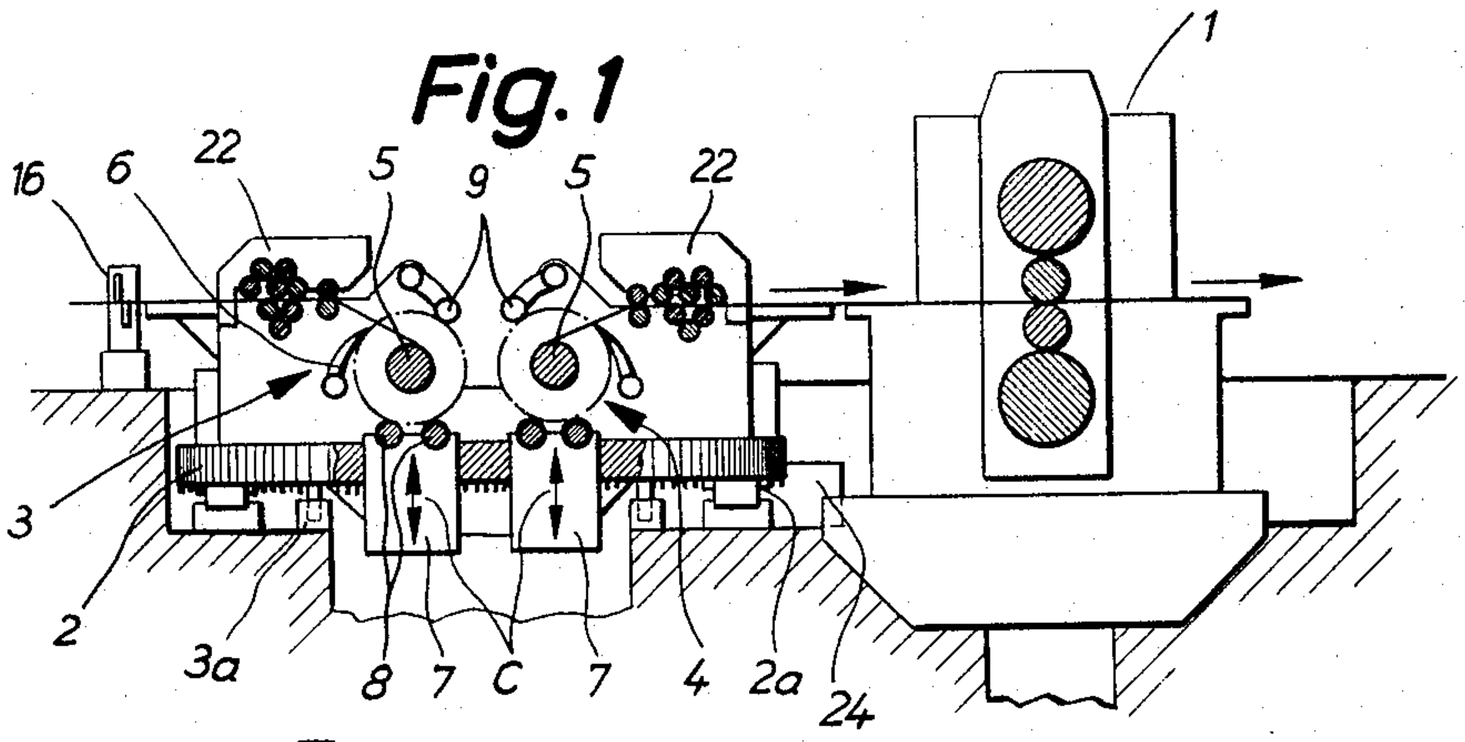
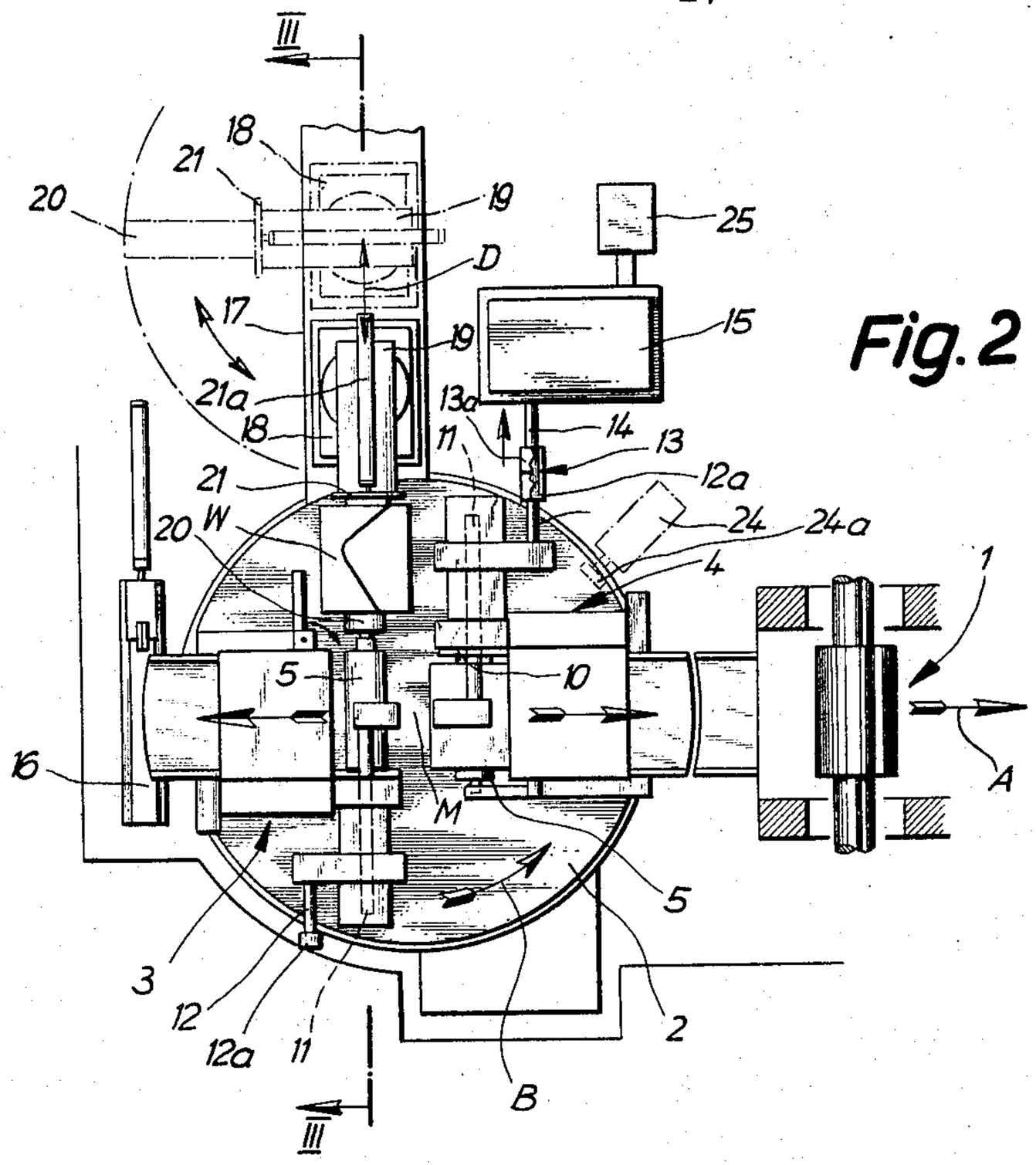


Fig. 2



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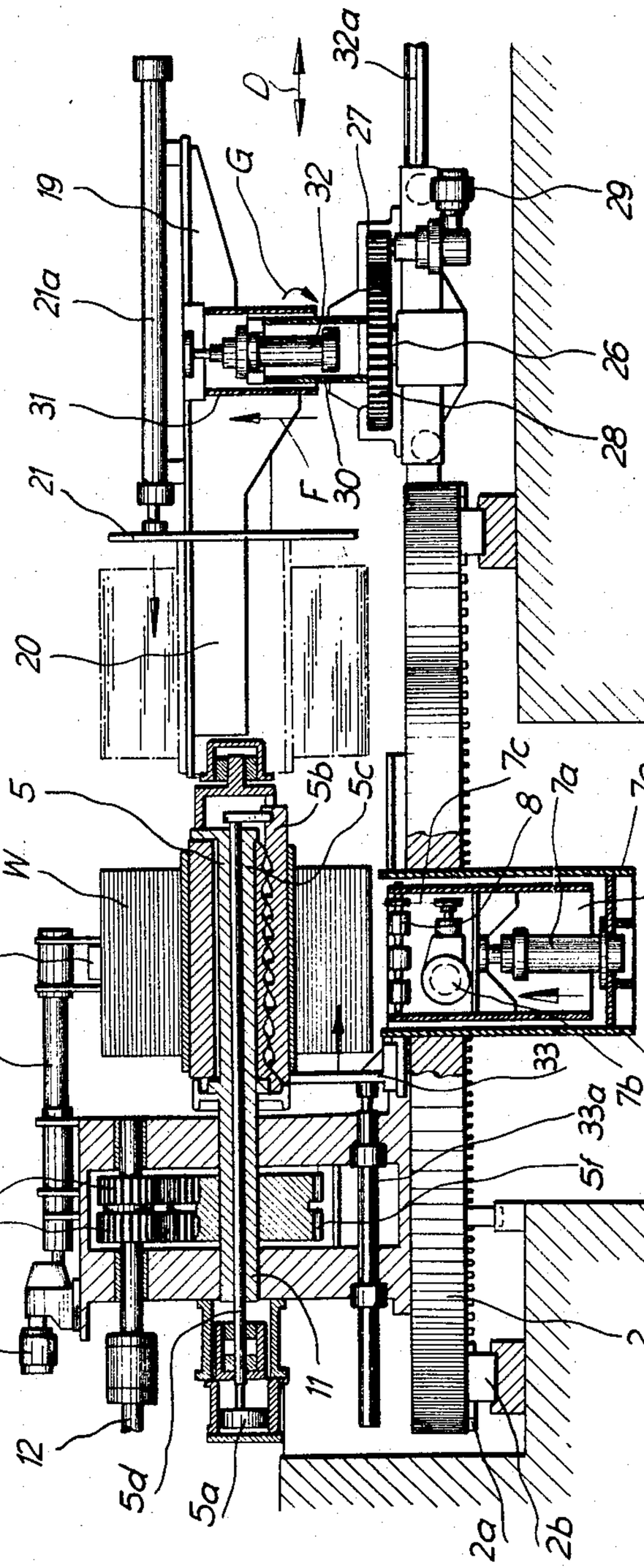
BY

Walter Berkey

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Fig. 3



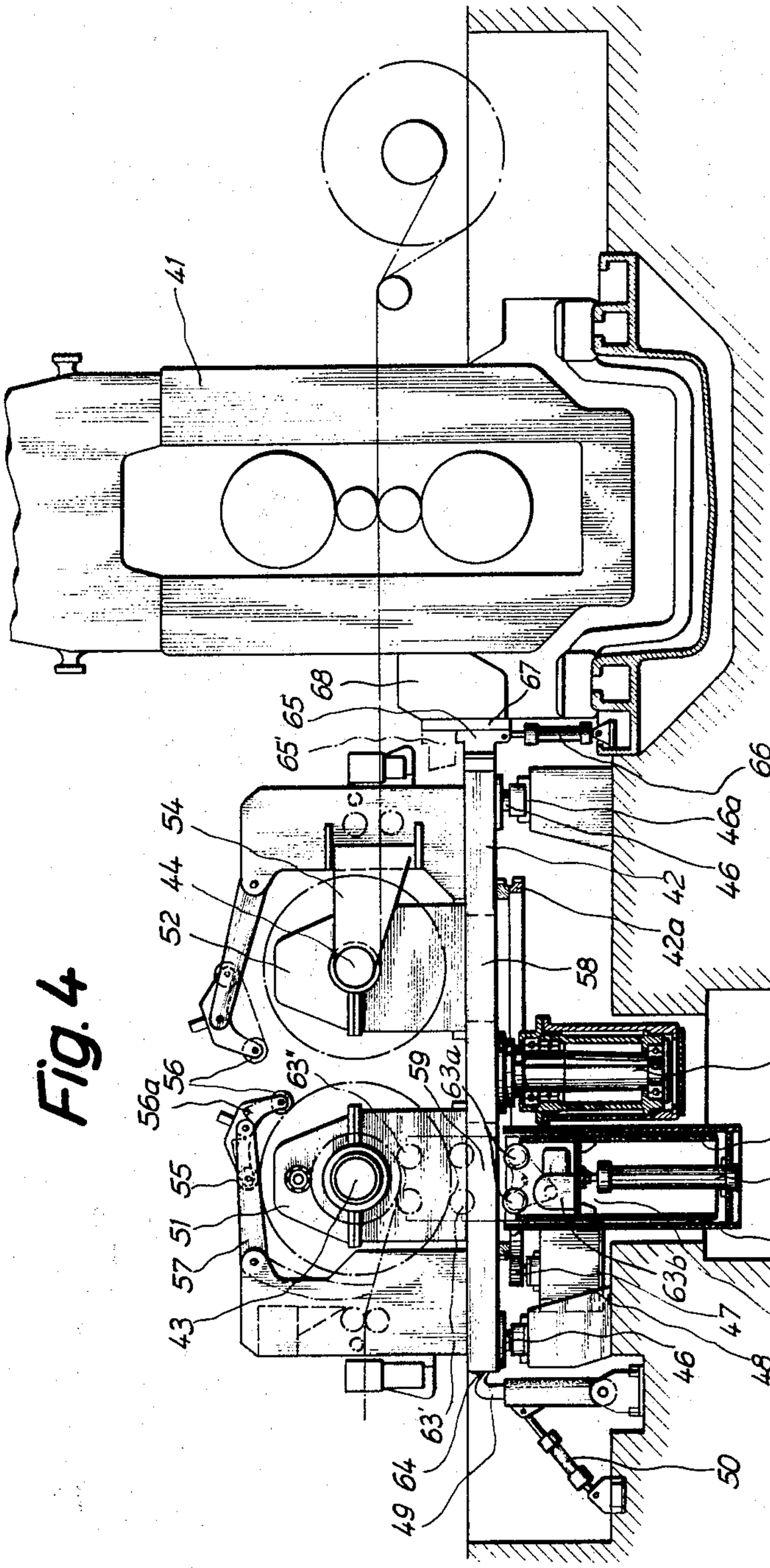
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April 29, 1969 E. H. BARTEN 3,441,234

REELING-OFF APPARATUS FOR USE IN CONNECTION WITH ONE-WAY ROLLING MILLS

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Fig. 4



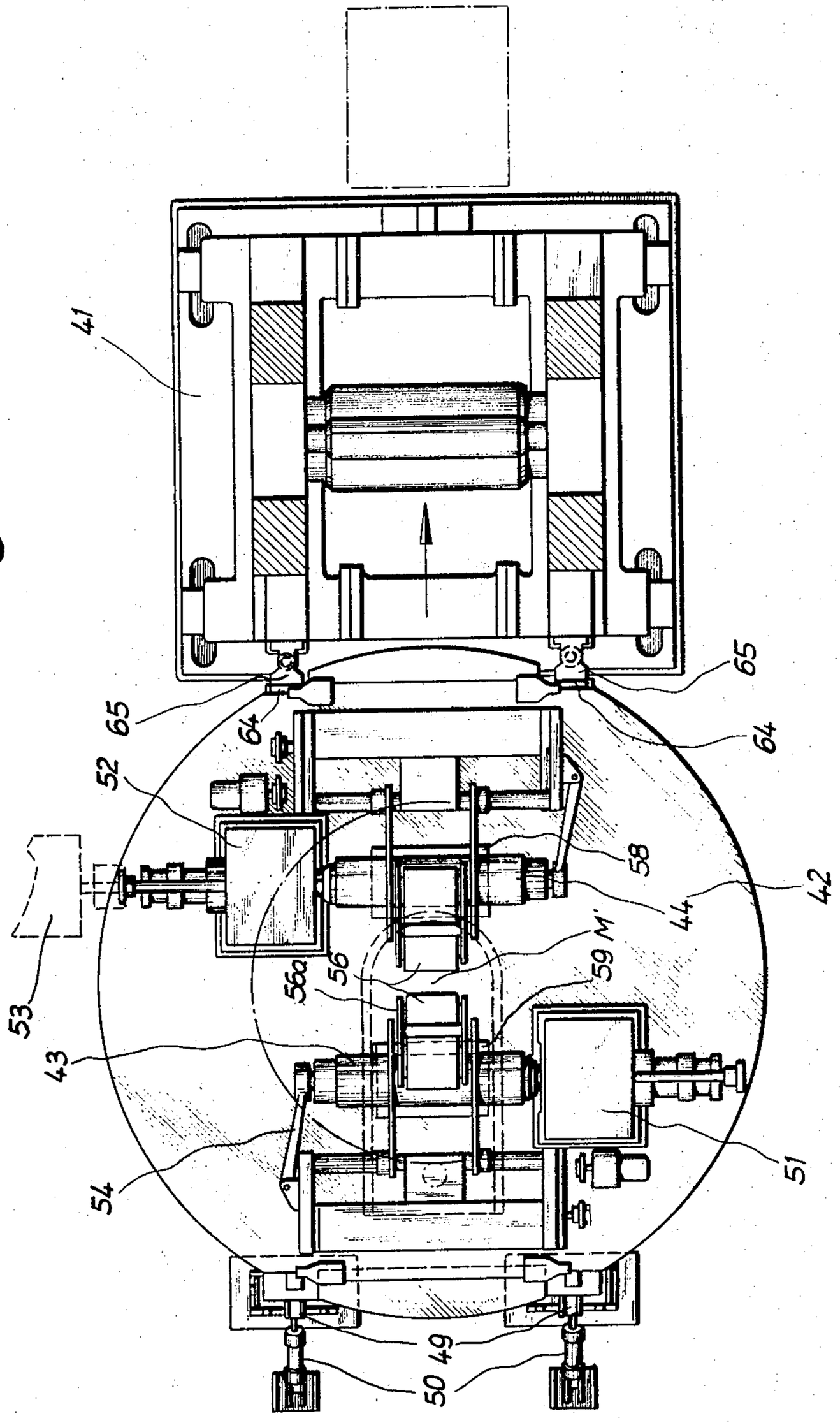
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REELING-OFF APPARATUS FOR USE IN CONNECTION WITH ONE-WAY ROLLING MILLS

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Fig. 5



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REELING-OFF APPARATUS FOR USE IN CONNECTION WITH ONE-WAY ROLLING MILLS

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Int. Cl. B21c *1/00*

U.S. Cl. 242—80

11 Claims

The present invention relates to a reeling-off apparatus on one-way rolling mills for coreless coils and also for coils with a core formed by a reel, in which a turntable with two coil carriers located symmetrically thereon with regard to the center of said turntable is arranged ahead of the rolling stand.

Reeling-off apparatuses with a turntable ahead of the one-way rolling mill are known, in which the turntable has mounted thereon two symmetrically arranged coil carriers while the respective coil carrier which is remote from the rolling stand serves to receive and wind up material received fro another coil carrier which is arranged behind the turntable. The terms ahad of, behind and adjacent are meant with regard to the feeding direction of the material toward the rolling stand.

The heretofore known reeling off devices of the general type mentioned above require a special drive for the rewinding operation in addition to the customary withdrawing means.

It is, therefore, an object of the present invention to provide an improved and simplified reeling-off apparatus for rolling mills.

It is another object of this invention to provide a reeling-off apparatus for rolling mills, which will not require an additional drive for the rewinding of the coil nor additional withdrawing means behind the turntable.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 is a side view partially in section of an arrangement according to the present invention.

FIG. 2 is a top view of the device shown in FIG. 1.

FIG. 3 is a section one line III—III of FIG. 2.

FIGS. 4 and 5 are side and plan views respectively, of a modification showing improvements in the journaling and drive of the turntable and also showing a cradle pertaining to one station of the turntable which is supported independently of the turntable.

The present invention which, as mentioned above, refers to a reeling-off apparatus on one-way rolling mills for coils with and without cores in which a turntable with two symmetrically arranged coil carriers is located ahead of the rolling stand, is characterized in that in longitudinal direction of the coil carriers adjacent the turntable there is provided an arm which is movable as to height, and which is also transversely movable and swingable, and which is provided with removing means for removing a coil thereon. Further, a braking device is provided for that coil carrier adjacent the rolling stand which is adapted to be coupled with the shaft of the respective coil carrier in front of the rolling stand to control the said carrier.

The coil to be supplied to the rolling stand is received by the said transversely movable arm and together therewith is so tilted and moved laterally and in upward direction that the said arm will move to the level and into the direct vicinity of the expansion shaft of that coil carrier which is remote from the rolling stand. When the coil has been placed onto the expansion shaft of

said coil carrier, the coil is opened and the start of the coil is trimmed by shears.

In order to assure that the coil to be placed upon the expansion shaft of that respective coil carrier which is remote from the rolling stand will adopt the desired position with regard to the longitudinal direction of the rollin gstand, each coil carrier is provided with removing means which simultaneously serves as counter bearing. It will be appreciated that in this way, regardless of the width of the coil, the coil will always be placed into the desired position with regard to the longitudinal axis of the rolling stand. This removing means is also employed for removing empty reels from the expansion shaft and moving the same onto the transversely movable arm, if the operation is carried out with coils having a core.

Each coil carrier preferably comprises a coil support adapted to be raised and lowered and equipped with driven members. In addition thereto, each coil carrier has a coil opener. The drive of the coil support as well as of the transporting pair of rollers associated with each coil carrier is mounted on said turntable. In addition to the transporting rollers, depending on the thickness of the coil, a straightening or levelling path may be provided or one or more adjustable bending rollers.

Referring now to the drawing in detail, the arrangement shown therein comprises a rolling stand **1** and a turntable **2** which when looking in the feeding direction indicated by the arrow A (FIG. 2) is located in front of rolling stand **1**. Mounted on turntable **2** and arranged symmetrically with regard to its center point M are two coil carriers **3** and **4**. When turning turntable **2** by 180° in the direction of the arrow B or in opposite direction, always one coil carrier can be located directly in front of rolling stand **1**, whereas the other coil carrier will be located remote from said rolling stand **1**.

Each coil carrier **3**, **4** has an expansion shaft **5**, a coil opener **6** and a coil support **7** which is adapted to be moved upwardly and downwardly in the direction and opposite to the direction of the arrow C. Each coil carrier **3**, **4** also comprises driven rollers **8** and pivotally journalled transporting rollers **9** which, similar to rollers **8**, may be driven by driving means on turntable **2**. Each expansion shaft **5** has associated therewith removing means **10** which simultaneously serves as abutment for the coil placed upon the expansion shaft **5** in order to align the transverse central portion of the coil with the longitudinal central portion of rolling stand **1**.

Each expansion shaft **5** has an extension **11** which through gears or the like is operatively connected with a stub shaft **12**. Stub shaft **12** is adapted to be coupled to shaft **14** of a brake generator while the coil carrier occupies a position adjacent rolling stand **1**. This brake generator is in longitudinal direction of that coil carrier which is adjacent the rolling stand **1** arranged stationarily adjacent the turntable **2**. The brake generator comprises transmission gear **15** having the aforementioned shaft **14** and also having connected thereto a brake motor **25**. Member **12***a* on shaft **12** and **13** on shaft **14** effect detachable driving connection of shaft **12** to shaft **14**. Member **12***a* may be a splined end on shaft **12** while member **13** may be a splined sleeve reciprocable on shaft **14**.

Behind turntable **2** and thus adjacent the respective coil carrier **3** which is remote from the rolling stand **1**, there are provided shears **16** in the form of roller shears. These shears are arranged stationarily and if desired may be replaced by a sheet sheers or plate shears.

Also arranged adjacent turntable **2** is a guiding member **17** on which a rotatable frame part **18** is movable in the direction of the arrow D. On this rotatable frame part

there is pivotally journalled a supporting member **19** which is adjustable as to height and carries a transversely movable arm **20**. Supporting member **19** is provided with removing means comprising a piston and cylinder **21***a* and a pusher plate **21**. It will thus be appreciated that arm **20** may from its dot-dash position shown in FIG. 2 be moved into the solid line position thereof and may be turned and adjusted as to height so that it can be aligned with the expansion shaft **5** of the respective coil carrier which is remote from the rolling stand **1**. In this way arm **20** can be aligned with expansion shaft **5** of the respective coil carrier which is remote from the rolling stand **1** so that coil W on arm **20** can by means of pusher plate **21** be moved onto expansion shaft **5** of said last mentioned coil carrier. After the coil opener **6** has been actuated and also rollers **8** and **9** have been actuated, the coil start can be trimmed by shears **16**.

FIG. 3 shows more in detail the construction of the turntable and the parts thereon. In this view it will be seen that turntable **2** has gear teeth or the like at **2***a* by means of which the turntable can be driven in rotation by suitable motor means (not shown)while support means **2***b* support and guide the turntable.

Arresting means, as shown schematically at **3***a*, serve to locate the turntable in its two indexed positions. If the turntable indexes reversibly from one position to the other, simple abutment means will provide for the two turntable locations while if the turntable always indexes in one direction, arresting means **3***a* would include a retractible abutment element. FIGURE 3 also shows that shaft **5** has a radially movable portion **5***b* which can be pushed outwardly to engage the hole in a coil by movement of portion **5***b* along the cam-like member **5***c* in shaft **5**, by the piston **5***a* connected to portion **5***b* by rod **5***d*. Spring means (not shown) could be employed to retract portion **5***b*.

The rollers **9** may be carried by arm means on a shaft **9***a* which is rotatable by motor **9***b* to press rollers **9** against the coil or to retract them from the coil.

The rollers **8**, are connected with the drive motor **7***b* therefor by chain means **7***c*. Rollers **8** and motor **7***b* are mounted in a carriage **7***d* which is vertically movable in frame **7***e* which is fixed to turntable **2**. Fluid motor means **7***a* connected between frame **7***e* and carriage **7***d* is operable for effecting the said vertical movement of the carriage.

FIG. 3 also shows that shaft **5** carries gear means **5***f* which mesh with pinion means **12***b* on shaft **12** so shaft **5** can be placed under the control of the braking mechanism.

FIG. 3 further shows that the removing means **10** comprises piston and cylinder means **33***a* and a pusher plate **33** on the piston. The pusher plate **33** can be positioned, as previously mentioned, by piston and cylinder means **33***a* so as to stop a coil placed on shaft **5** in the proper longitudinal position on the shaft.

In FIG. 3 it will be seen that support arm **20**, which picks up new coils and places them on the turntable, is carried by a sleeve **31** that is vertically movable on a column **30** as indicated by the arrow F by a fluid motor **32**. Column **30** is mounted on rotary base member **28** which has peripheral teeth engaged by a pinion **27** that is driven by a motor **29**. Member **28** is rotatable about a pivot **26** and when motor **29** is energized, the member **28** and all parts supported thereon rotate as indicated by the arrow G. The entire assembly is slidable on stationary support means **32***a* so as to take the motion indicated by arrow D.

In operation, and with reference, in particular, to the modification of FIGS. 1–3, while the coil located on the expansion shaft **5** of that coil carrier **4** which is adjacent stand **1** moves into rolling stand **1**, expansion shaft **5** of the coil carrier **3** which is remote from rolling stand **1** may be loaded with a new coil and the preparations therefor may be carried out, such as straightening, clamping

and opening of the coil, the advance of the coil start and the trimming thereof. When these preparations concerning the coil on coil carrier **3** and the unrolling of the coil of coil carrier **4** have been completed, turntable **2** is rotated by 180° after the rotatable frame part **18** has been moved back into its dot-dash line position. In this instance, it receives a new coil, whereas stub shaft **12** of coil carrier newly moved into the position adjacent rolling stand **1**, is coupled with counter shaft **14** of the transmission by means of member **12***a*, **13**.

Each coil carrier may, as illustrated, comprise a straightening path including a plurality of rollers **22** or may have one or more adjustable bending rollers in addition to the transporting roller **9**.

When coils are involved which have a reel as core, the operation is analogous. However, prior to placing a new coil through the intervention of arm **20** onto the respective coil carrier which is to be charged, the empty reel left on the coil carrier previously processed, has to be stipped off expansion shaft **5** by a stripper **10** onto arm **20** and then has to be removed from the latter by means of the pusher plate.

Referring now to the modification of FIGS. 4 and 5, a turntable **42** is rotatably supported adjacent a rolling stand **41**. The material feeds from the turntable to the rolling stand in the direction of arrow E. The turntable has coil supports **43**, **44** symmetrically arranged with respect to center M′ of the turntable.

Turntable **42** is giuded by the king journal **45** and is additionally jornalled on rollers **46** along its marginal portion. The drive of the turntable may be effected by a gear ring **42***a* on the bottom of the turntable which is engaged by pinion **47** driven by a motor **48**. The arrangement may be such that hook-shaped or similar arresting means **49** may be adapted to engage predetermined regions of the marginal portion of the turntable. Arresting mans **49**, of which there are two, are hydraulically actuated by pistons arranged in cylinders **50** and are adapted to be brought into engagement with and out of engagement with said turntable to lock and release the turntable.

Turntable **42** carries one stationary bearing means **51**, **52** each for each of the two coil supports **43**, **44** while means may be provided for coupling that coil support which is located at the rolling stand to a brake means **53** arranged adjacent turntable **42** for purposes of producing a braking force on the coil. The end of each coil support opposite the stationary bearing therefor is held by an arm **54** adapted to be tilted in outward direction to expose the end of the coil. Each coil support has, in addition to a coil opener associated therewith, rollers **55**, **56** journalled in a frame **56***a* which is tiltable on tilting arm **57** which is capable of adapting itself to the changing size of the coil.

Turntable **42** is, underneath each coil support **43**, **44**, provided with a passage **58**, **59**. Between the stationarily arranged motor **48** and the king support **45**, i.e. in the region of the coil support remote from the rolling stand, there is provided a stationary box **60** in which there is guided a second box **61**. This second box is under the influence of fluid motor **62** which is adapted to move a station or carriage **63** arranged in the upper portion of the second box **61** upwardly and downwardly, i.e. into the positions **63′** and **63″** and vice versa. For purposes of placing a coil on coil support **43** or for purposes of withdrawing an empty coil, carriage **63** may be moved in upward direction during which movement it may pass through passages **58** or **59**, respectively.

The carriage **63** includes driven rollers **63***a* which are connected to a drive motor **63***b*. Rollers **63***a* thus perform the function of rollers **8** of the first modification and can, for instance supply power to draw in a web of metal and coil it up in station **43** preparatory to movement of the coil into position adjacent the rolling stand. These rollers also can drive a coil placed in station **43** during opening of the coil.

If it is intended to turn the turntable **42** with coil supports **43, 44**, in order to move a coil placed on the coil support remote from rolling stand **41** into the position adjacent the rolling stand, it is necessary to move station **63** downwardly into the box **60**.

The turntable according to the present invention with the parts arranged thereon is, due to the arrangement of station **63** which is independent of the turntable, lighter than heretofore known embodiments. In order to obtain an exact fixing of the working position and a proper support of the turntable with regard to the rolling stand, the turntable is provided with inclined marginal portions **64** arranged at recesses along the circumference of the turntable while the rolling stand is provided with corresponding small blocks **65** which, by means of fluid motor means **66**, are movable along a guiding means **67** in upward and downward direction in such a way that each small block **65** is adapted to be moved from the position indicated in FIG. 4 in solid lines into position **65'** indicated in dot-dash lines, and vice versa.

In the position indicated in solid lines, the small block assures that the turntable is braced with regard to the extension **68** fixed to the rolling stand. For purposes of turning the turntable, each block is brought in its disengaged position indicated at **65'**. In view of the inclined marginal portion **64**, the turntable is, in the vicinity of blocks **65**, pressed onto the corresponding roller support **46***a*.

On that side which faces away from the rolling stand, the two cylinders **50** together with the arresting or clamp means **49** perform a corresponding bracing of the turntable against the supporting rollers **46** connected to the foundation.

The operation of the modification of FIGS. 4 and 5 is the same as described above for FIGS. 1–3 except for the carriage **63** in FIGS. 4 and 5 having the rollers **63***a* which is stationary instead of being movable with the turntable as in the case of the modification of FIGS. 1–3.

It is of course, to be understood that the present invention is, by no means, limited to the particular arrangement shown in the drawing but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In combination with a rolling stand, an apparatus for reeling off coils to be fed into said rolling stand, said apparatus comprising: a turntable arranged ahead of said rolling stand when looking in the direction in which coils are fed into said rolling stand, two coil supports each being adapted to receive a coil, said coil supports being arranged on said turntable on opposite sides of the axis of rotation thereof and symmetrically with regard to said axis, the arrangement being such that when one of said coil supports is adjacent said rolling stand the other one of said coil supports is remote from said stand, each of said coil supports having a rotatable shaft operable to support the respective coil, and supporting means arranged adjacent that coil support which is remote from said stand for receiving a coil and transferring the same to the respective adjacent coil support.

2. An arrangement according to claim **1**, which includes separate means operatively connected to said supporting means for respectively turning the same and moving it in vertical direction.

3. An arrangement according to claim **1**, in which each of said coil supports includes an expendable substantially cylindrical member adapted to receive a coil and equipped with stripper means for a coil and also serving as an abutment therefor.

4. An arrangement according to claim **1**, in which each coil support includes means for engaging the coil thereon from beneath to rotate the coil and is also provided with coil opening means.

5. In combination with a rolling stand, an apparatus for reeling off coils to be fed into said rolling stand, said apparatus comprising: a turntable arranged ahead of said

rolling stand when looking in the direction in which coils are fed into said rolling stand, two coil supports each being adapted to receive a coil, said coil supports being arranged on said turntable on opposite sides of the axis of rotation thereof and symmetrically with regard to said axis, the arrangement being such that when one of said coil supports is adjacent said rolling stand the other one of said coil supports is remote from said stand, two pairs of transport rollers respectively associated with said coil supports and drivingly connected to said turntable, and supporting means arranged adjacent that coil support which is remote from said stand for receiving a coil and transferring the same to the respective adjacent coil support.

6. An arrangement according to claim **1**, which includes shears arranged behind said turntable adjacent that respective coil support which is remote from said stand.

7. In combination with a rolling stand; a turntable rotatably mounted on a vertical axis at the entrance side of said stand, a pair of coil supports on said turntable symmetrically positioned thereon on opposite sides of the axis of rotation of the turntable, said turntable being indexable to position either one of said coil supports adjacent said stand while the other is remote from said stand, said turntable having an opening therein under each coil support, and a station positioned beneath the turntable and under the opening of the said other coil support which is remote from the stand and including a carriage vertically reciprocable through the said opening and having driven roller means at the upper end thereof to engage beneath a coil in the said coil support remote from the stand.

8. In combination with a rolling stand; a turntable rotatably mounted on a vertical axis at the entrance side of said stand, a pair of coil supports on said turntable symmetrically positioned thereon on opposite sides of the axis of rotation of the turntable, said turntable being indexable to position either one of said coil supports adjacent said stand while the other is remote from said stand, said turntable having an opening therein under each coil support, and a station positioned beneath the turntable and under the opening of the said other coil support which is remote from the stand and including a carriage vertically reciprocable through the said opening and having driven roller means at the upper end thereof to engage beneath a coil in the said coil support remote from the stand, said station also including a stationarily mounted frame, and means in the frame slidably engaging said carriage for guiding it in its said reciprocal movement.

9. In combination with a rolling stand; a turntable rotatably mounted on a vertical axis at the entrance side of said stand, a pair of coil supports on said turntable symmetrically positioned thereon on opposite sides of the axis of rotation of the turntable, said turntable being indexable to position either one of said coil supports adjacent said stand while the other is remote from said stand, said turntable having an opening therein under each coil support, and a station positioned beneath the turntable and under the opening of the said other coil support which is remote from the stand and including a carriage vertically reciprocable through the said opening and having driven roller means at the upper end thereof to engage beneath a coil in the said coil support remote from the stand, and clamp means stationarily mounted adjacent the periphery of said turntable operable to engage said turntable in the indexed positions thereof and to clamp and hold said turntable fixed relative to said stand.

10. The combination according to claim **9** in which said clamp means includes vertically reciprocable wedge block means on the side of said turntable adjacent said stand, and said turntable having inclined regions on the periphery thereof which register with said wedge block means in the indexed positions of said turntable and which

are engageable by said wedge block means upon reciprocation thereof.

11. The combination according to claim **10** in which said clamp means comprises further clamp elements located on the side of said turntable remote from said stand, said further clamp elements also being engageable with the turntable in clamping holding relation thereto in the indexed positions of said turntable.

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