March 22, 1960 E. T. JUDGE ET AL 2,929,280

ROLLING MILL PLATFORM

Filed Nov. 15, 1955 6 Sheets-Sheet 1

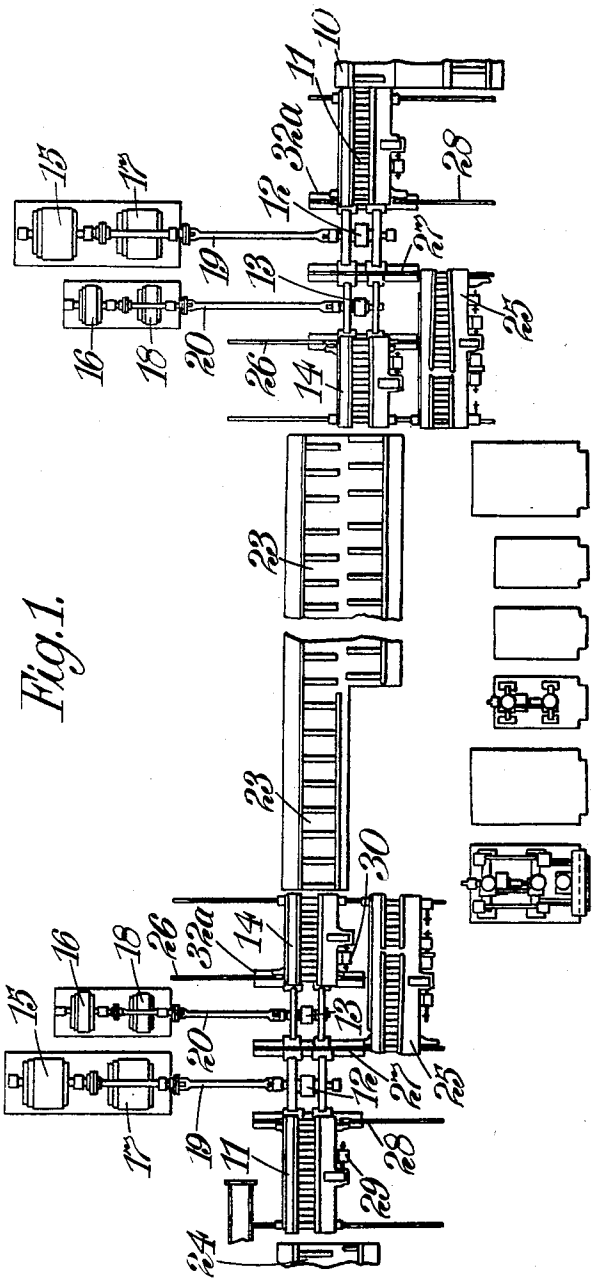

Fig. 1.

INVENTORS
EDWARD T. JUDGE
GEORGE FOSTER

Watson, Cole, Grindle & Watson
ATTORNEYS

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6 Sheets-Sheet 2

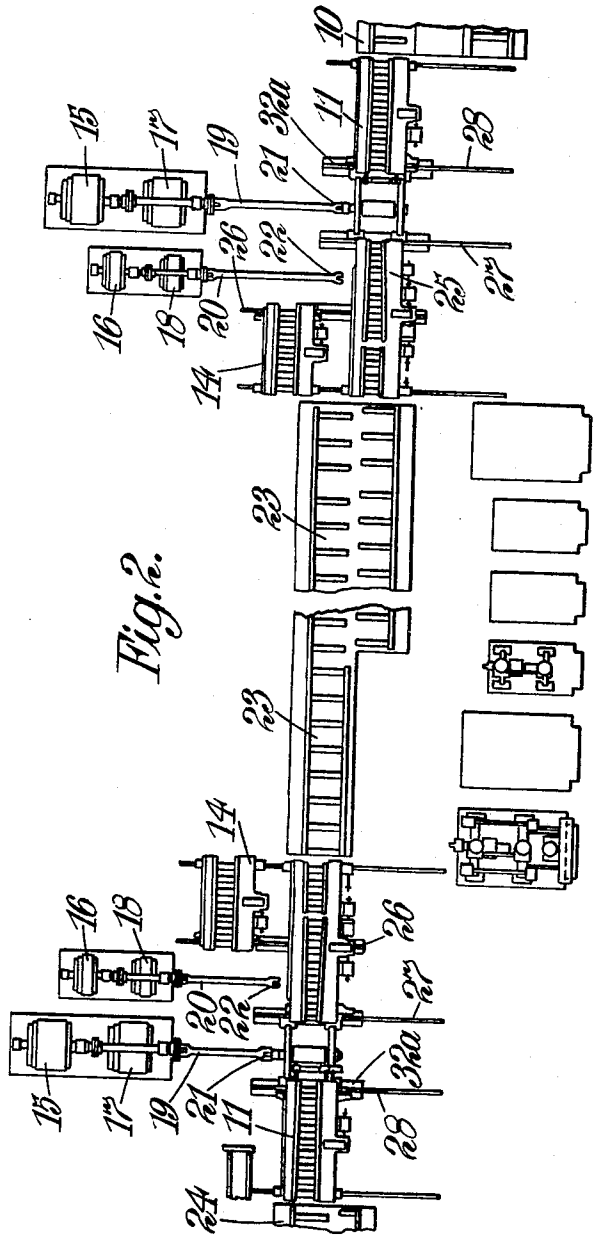

Fig. 2.

INVENTORS
EDWARD T. JUDGE
GEORGE FOSTER

By
Watson, Cole, Grindle & Watson
ATTORNEYS

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ROLLING MILL PLATFORM

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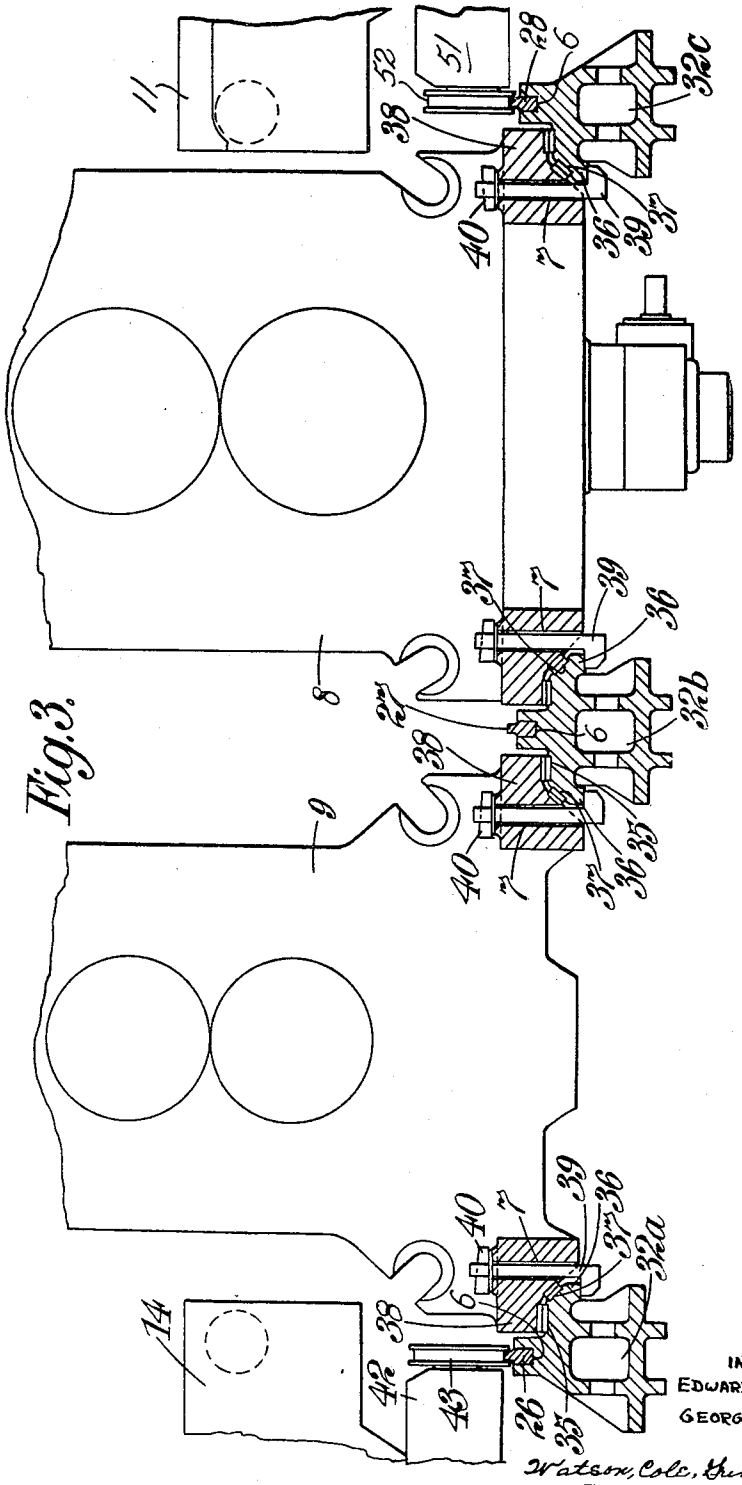

Fig. 3.

INVENTORS
EDWARD T. JUDGE
GEORGE FOSTER

Watson, Cole, Grindle & Watson
By
ATTORNEYS

March 22, 1960 E. T. JUDGE ET AL 2,929,280

ROLLING MILL PLATFORM

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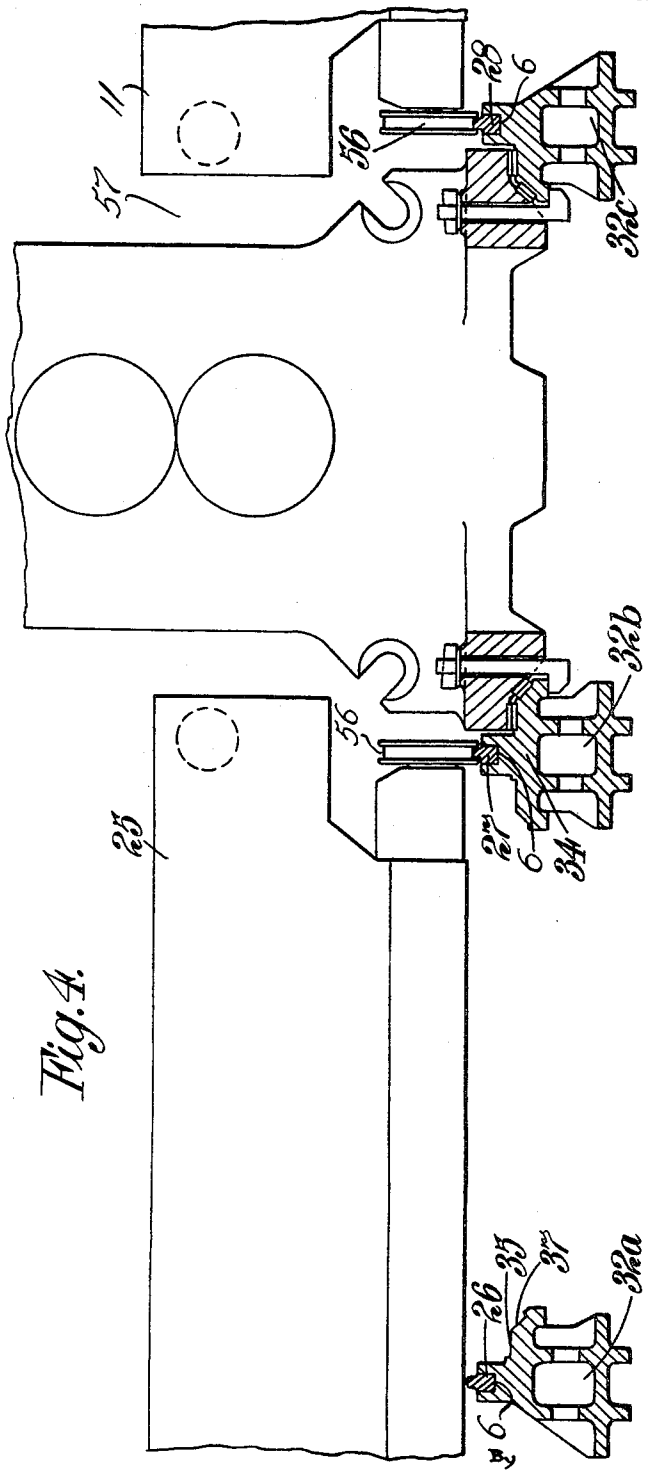

Fig. 4.

INVENTORS
EDWARD T. JUDGE
GEORGE FOSTER
By
Watson, Cole, Grindle & Watson
ATTORNEYS

March 22, 1960 E. T. JUDGE ET AL 2,929,280

ROLLING MILL PLATFORM

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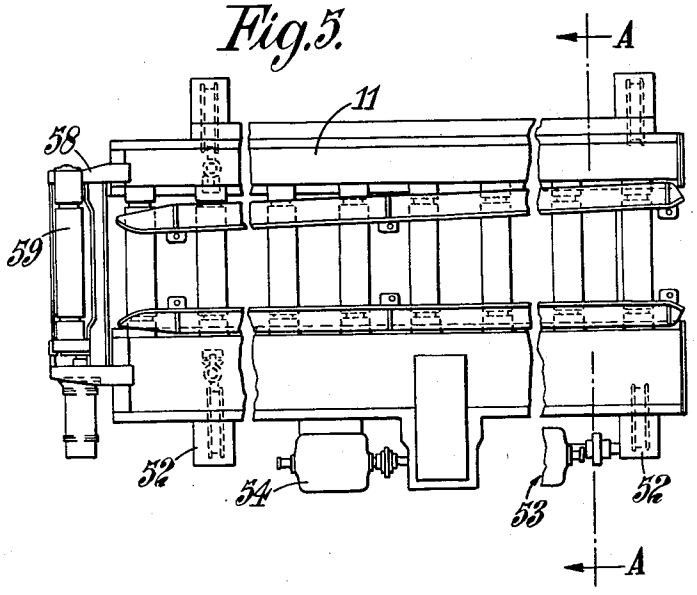
Fig. 5.



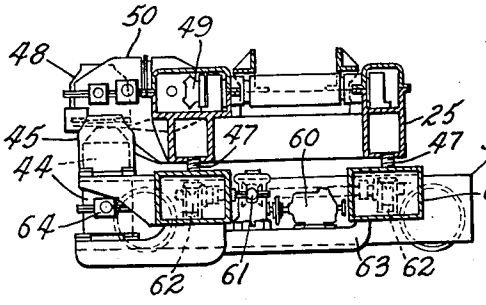


Fig. 6.

Inventors: Edward Thomas Judge and George Foster

By: Watson, Cole, Grindle & Watson
Attys.

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ROLLING MILL PLATFORM

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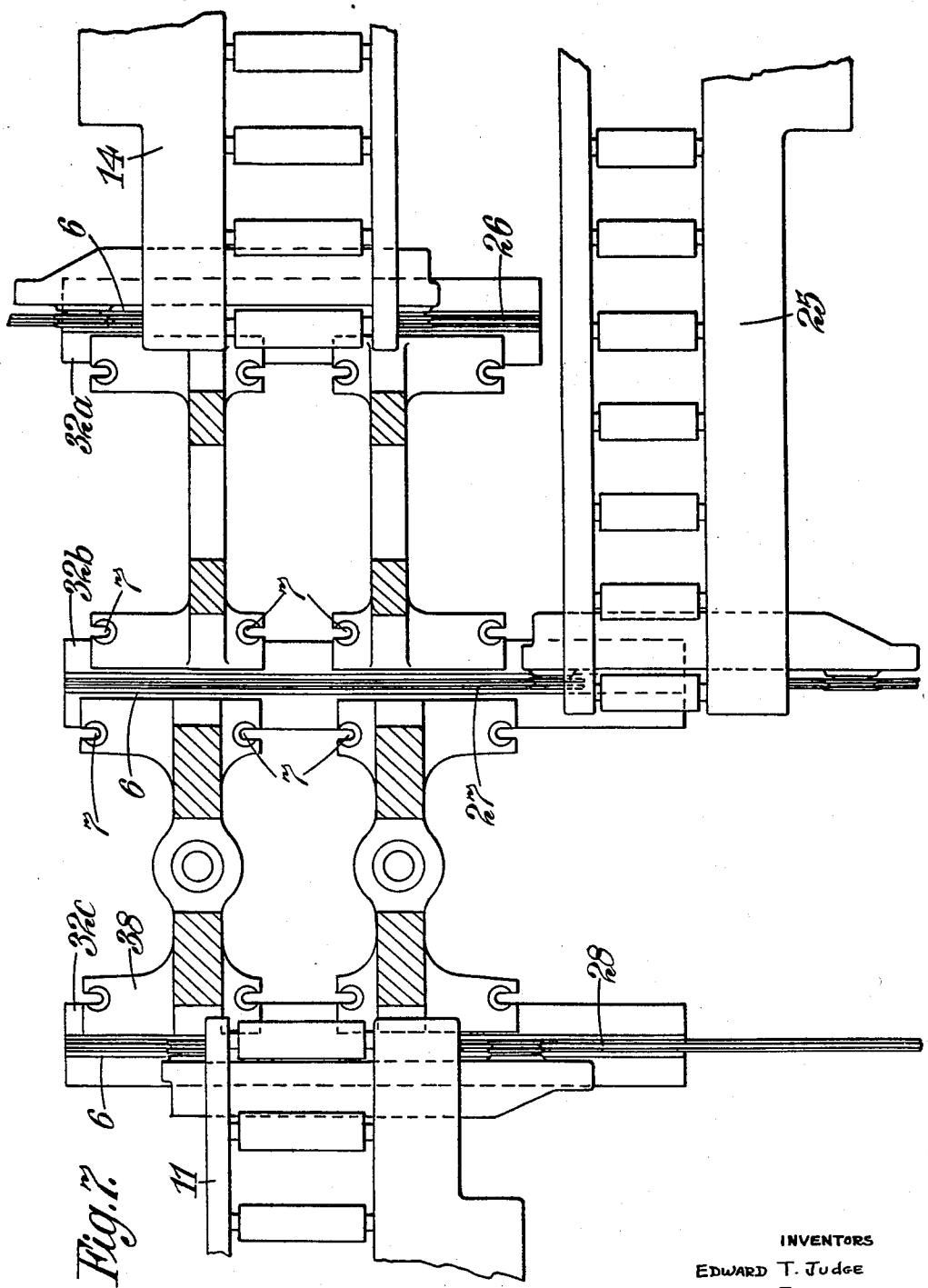

Fig. 7.

INVENTORS
EDWARD T. JUDGE
GEORGE FOSTER

By Watson, Cole, Grindle & Watson
ATTORNEYS

United States Patent Office 2,929,280
Patented Mar. 22, 1960

2,929,280

ROLLING MILL PLATFORM

Edward Thomas Judge, Middlesbrough, and George Foster, Norton on Tees, England, assignors to Dorman, Long & Company Limited, Middlesbrough, England, a company of Great Britain

Application November 15, 1955, Serial No. 547,005

Claims priority, application Great Britain April 2, 1953

7 Claims. (Cl. 80—1)

This application is a continuation-in-part of Serial No. 419,526, filed March 29, 1954, now abandoned.

This invention relates to rolling mill plant, and has for an object to provide a plant which can be readily converted from one, embodying universal mills for rolling special I and H shaped sections to one, embodying standard structural mills for rolling standard sections, joists, channels, angles and the like, thus avoiding the necessity of laying down two separate plants.

The invention is particularly concerned with that section of the plant which operates upon the bloom and hereinafter referred to as the finishing mill section. This section follows the section of the plant where the ingot has been rolled into a bloom and precedes the section of the plant where the finally shaped work is cut to length and transferred to the stock bays.

Both in the case of a plant employing universal beam mills and a plant employing structural mills, a number of mill housings are located at spaced stations, and work supporting tables are arranged between the stations and are provided with driven rollers whereby the work is carried from housing to housing until it reaches the final housing whereafter it is cut to length and delivered to the stock bay.

It will be appreciated that the plant as a whole is extremely costly and covers a considerable area, particularly as heretofore when universal beams are required to be produced as well as channels, angles, and the like, it has been necessary to provide two complete mill plants. The present invention avoids that necessity.

As is known, a universal beam mill stand suitable for rolling special H or I sections comprises a pair of housings, in which two rolls are mounted one above the other with axes parallel and these rolls are substantially larger in diameter than the rolls employed in a standard structural mill stand. In the universal beam mill, the rolls are of such a length in an axial direction between the housings, as to correspond to the distance apart of the flanges of the section being rolled in that particular mill, and two rolls, each mounted to rotate about an upright axis are arranged one opposite one end face of each of two horizontal rolls, and the other arranged opposite the other end face of each horizontal roll. The web portion of the joist is thus formed by rolling between the two horizontal rolls, while the flanges are worked between the end faces of the horizontal rolls and vertical rolls, the gap between all these faces being adjustable. Since the edges of the flanges are not confined during this process, they require to be rolled to length in a separate supplementary mill; for this purpose the work is passed through what is known as an edging mill. This comprises two superimposed horizontal rolls mounted in two housings, and these are of the same order of diameter as the rolls employed in a standard structural mill. The rolls are reduced in diameter at opposite ends, so that the larger part fits snugly between the flanges of the work, but may be clear of the web portion, and the smaller diameter portions of the two rolls engage and control edges of the flanges.

A standard structural mill stand comprises a pair of housings in which are rotatably mounted a number of horizontal rolls, one above the other, and having their peripheries shaped in accordance with the required section of the work which is passed between them. It is usual for the rolls to be provided with a number of shaping portions arranged side-by-side and arranged to provide spaces of diminishing area between them, means being provided for shifting the work bodily in a transverse direction after it has been passed backwards and forwards between two of the shaping portions so that it can then be introduced between two other shaping portions. One form of shifting means comprises traversing tables. In the case of a universal beam mill, as the work is passed backwards and forwards between the combined horizontal vertical rolls the said rolls are adjusted towards one another, between the passes, until the web and flange portions of the work are of the required thickness. As indicated above, the rolls of the structural mill are of the same order of diameter as the rolls in an edging mill, but are smaller in diameter than the horizontal rolls employed in the universal beam mill. The power required for driving a universal beam mill is of the same order as that required for driving a standard structural mill, whereas the power required for driving an edging mill is considerably smaller. The dimensions of the stand for a standard structural mill may be substantially the same as that of an edging mill, but considerably smaller than that of a stand for a universal beam mill.

In the specification of application No. 419,526, now abandoned, there is described a finishing mill section for a rolling mill plant comprising a number of mill-housing-supporting-platforms spaced apart along the direction of travel of the work, any of which platforms is adapted to support either a universal beam mill and a two-high edging mill combination or a structural mill. Two roller tables of different lengths are associated with each platform, either of which is adapted to be brought opposite the platform and which shorter table when in position leaves sufficient space on the platform for accommodating a universal mill, and a two-high edging mill combination, and which longer table when in position, overlaps the platform, leaving sufficient space for accommodating a structural mill and additional roller table extending between adjacent platforms. There is also described in the specification the provision of two different horse power driving units associated with each platform, the higher horse power motor being arranged to drive either a universal mill or a structural mill, whereas the lower horse power motor is arranged to drive the two-high edging mill combination. Since the dimensions for the stand of a standard structural mill are usually substantially the same as that of an edging mill but considerably smaller than that of a stand for a universal mill and since the universal mill and structural mill are required to be driven by the same higher horsepower driving unit, in the construction of Patent Application No. 419,526 now abandoned there was provided at each station a base plate so shaped and dimensioned as to provide on one part thereof, two pairs of supporting shoulders for accommodating the different sized bases of the structural and universal mills. The object of the present invention is to avoid the necessity of providing two sets of different securing arrangements opposite the higher horse power driving unit.

According to this invention a finishing mill section for a rolling mill plant comprises a number of mill-housing-supporting-platforms spaced apart along the direction of travel of the work, any of which platforms is provided with two identical locating and securing means spaced

apart in the direction of the travel of the work, each adapted to support either a universal mill or a two high edging mill or a structural mill, which mills have similar sized bases. Two roller tables of different lengths, are associated with each platform, either of which is adapted to be brought opposite the platform, which shorter table when in position leaves sufficient space on the platform for accommodating a universal mill and a two-high edging mill combination and which longer table when in position overlaps the platform leaving sufficient space for accommodating a structural mill and additional roller tables extending between adjacent platforms. There may be provided for use on one side of each station, two exchangeable removable table portions of different lengths so that different sized gaps are formed at said station according to which of the two exchangeable tables are employed. The longer of the two exchangeable tables may be employed as a traversing table.

The removable table portion or portions, may be arranged either on the supply side or on the delivery side of each mill station.

Each of the removable table portions may be provided with a motor for driving its rollers. Each removable table portion may be mounted on a carriage supported on rails by means of wheels, which rails extend transversely to the direction of the travel of the work so as to facilitate their introduction and withdrawal; also in a case where a table is employed as a traversing table it enables the table to be moved between successive passes of the work.

Those rails which are arranged to support the exchangeable tables are arranged to extend on opposite sides of the line of travel of the work, so that the larger of the two table portions may be moved away in one direction and the smaller table portion in the other direction.

In any of the arrangements referred to above, each carriage may be provided with a motor for driving its wheels.

There may be provided at each station, a base plate so shaped and dimensioned that it will accommodate on one part thereof either a stand for a universal mill or a stand for a standard structural mill and so as to accommodate on another part thereof a stand of an edging mill.

In the case where the stands for the universal mill and for the standard structural mill have different sized bases then at the first said location there are provided two alternative means for locating the different sized bases. However, in designing the stands their bases may be arranged to be of the same size whereby only a single locating means is required on the base at the first said location.

A convertible finishing section for a rolling mill plant may thus comprise at each station a standard structural mill, a universal beam mill, and an edging mill, and means for moving said mills into and out of position. Standard equipment may be provided for this purpose, such as an overhead crane.

In order to avoid the necessity of providing separate stands for the edging mill and the standard structural mill, since the dimensions are approximately of the same size, the edging mill roll housings may be so designed as to accommodate either edging mill rolls or structural mill rolls.

There may be located at each station, two power units, one of sufficient power for driving either the universal beam mill or the standard structural mill, while the other unit is of lesser power and is arranged to drive the edging mill, and means are provided for coupling and uncoupling said units to and from their respective mills.

The following is a description of one form of convertible mill, according to the invention, reference being made to the accompanying drawings, in which:

Figure 1 is a plan view showing the general layout of the finishing section of a rolling mill plant and showing a universal beam mill and an edging mill at each of two stations;

Figure 2 is a similar view to Figure 1 but showing the plant set up with standard structural mills;

Figure 3 is a part vertical section and part side elevation of the mechanism at one station of the plant set up for a universal beam mill and edging mill to the right of Fig. 1;

Figure 4 is a similar view to Figure 3 showing the set up at a station for a standard structural mill;

Figure 5 is a plan view of the roller table on one side of the mill stand for the set up shown in Figure 4;

Figure 6 is a section on the line A—A of Figure 5; and

Figure 7 is a plan view on an enlarged scale of a mill-housing-supporting-platform showing the base portions of a universal mill stand and edging mill stand in position and represents the left hand end of Figure 1.

Referring to Figure 1 the work in the form of a bloom partly formed into a joist shape is conveyed from the right hand end of the figure by the roller table **10** on to a table **11** which moves the work to the left through a universal mill **12**, and thence through an edging mill **13** on to another roller table **14** the direction of the rollers on the two tables **11** and **14** being periodically reversed so that the work is passed backwards and forwards through the two mills, the rolls of which are adjusted between passes so as gradually to reduce the section of the work.

There are provided at each station two power units, one comprising motors **15** and **17** for driving respectively the upper and lower rolls of either a universal mill or a structural mill through driving shafts, only one of which **19** appears in the drawing, and the other power unit comprising two motors **16** and **18** which drive respectively the upper and lower rolls of an edging mill through driving shafts, only one of which **20** is shown. The driving shafts are provided with detachable couplings the top ones of which **21** and **22**, are shown in Fig. 2. When the required reduction at this station has been effected, the work is passed on to the roller tables **23**, whence it passes to a feed table **14** of identical construction as the previously mentioned table **14**, then through another edging mill **13**, which in this case is arranged on the right hand side of the universal mill **12**, and which work then passes through **12** and on to the table **11**, which is of identical construction but differently handed to previously mentioned table **11**. Again in this instance, the rollers of the two tables **11** and **14** are periodically reversed so that the work is passed backwards and forwards through the two mills. After the work has been reduced to the required size, it is passed onto the roller table **24** and then to a locality where the work is cut to length whereafter it is passed to cooling beds and thence to stock bays.

As will be seen, a further roller table **25** is also provided at each station to one side of the roller table **14** and of a greater length than that table. The ends of the tables **14** and **25** nearer the conveyor table **23** are arranged in line, so that the longer table **25** projects beyond the edging mill **13**. The table **14** is mounted on rails **26**, extending to one side of the conveyor table **23**, whereas the table **25** is supported on rails **27** extending to the other side of the conveyor table. The tables **11** are supported on further rails **28**. As indicated later, the tables **11**, **14** and **25** are supported by wheels driven respectively by motors **53**, **45** and **45''**.

As previously explained, the edging mill **13** can have its rolls replaced by rolls suitable for a structural mill, thus when a conversion is required to be made from the set up shown in Figure 1 to that shown in Figure 2, the couplings **21** and **22** are released, the universal mill **12** is lifted out of position and deposited at a suitable location, and the edging mill now converted to a structural mill is lifted into the place of the universal mill. The table **14** is moved to one side and the table **25** is arranged to take its place when the plant is ready for operation.

Referring now to Figure 3, this shows the set-up of

the mechanism at the station to the right of Figure 1. As will be seen at this station three separate frame members 32*a*, 32*b*, and 32*c* are inset in concrete to form a supporting platform. The members are provided with sockets 6 for accommodating respectively one rail of each pair of rails 26, 27, 28. The members are so shaped as to provide countersunk supporting shoulders 35 and inwardly directed flanges 36. The upper edges of the flanges are chamfered at 37. On one side of the frame is supported an edging mill stand 9 and on the other side a universal mill stand 8. Both the stands are provided with similar sized bases having feet 38 which are shaped to rest on the shoulders 35 and chamfered portions 37. Hooked shaped bolts 39 extend through holes 7 in the feet and engage the underside of the flanges 36 and their upper ends are provided with clamping cotters 40. To the left of the edging mill stand in Figure 3 there is disposed a carriage 42 for the roller table 14 which carriage is mounted by means of wheels 43 on rails 26 which extend across and are inset in a socket formed in one of the end members 32*a* of the platform. The wheels are arranged to be driven through gearing 44 from the motor 45 mounted on the carriage (see Figure 6). One end of the roller table 14 remote from the housing 9 is pivotally connected on a horizontal axis to the carriage 42, and which carriage is provided at the other end with a screw jack 47 (see Figure 6) engaging the underside of the table frame whereby the height of the end of the table adjacent the edging mill stand may be adjusted. The table has mounted upon it a motor 48 which drives the various rollers through a bevel gearing 49, and through a reduction gearbox 50. Each roller table 11 is likewise supported on a carriage 51 (see Figure 3) having wheels 52 mounted on the rails 28 and these wheels are driven by a motor 53 seen in Figure 5, whereas the rollers on the table are driven by the motor 54 carried by the table.

As in the case of the roller table 14, the table 11 is pivotally mounted on a horizontal axis at one end of the carriage and provided with a screw jack 47 at the other end.

As will be seen from Figure 4 the stand for the universal mill has been removed, and either the stand of the edging mill which has been converted to one for a standard structural mill, or a conventional structural mill, is placed in position of the universal mill stand. The table 14 has been moved to one side and the table 25 takes its place, this table is supported on a carriage provided with wheels 56 which run on the rails 27.

As in the case of the other tables, it is pivotally carried on a horizontal axis at one end of the carriage, and is provided with a screw jack 47 at the other end; similarly the assemblage is provided with two motors 45 and 48, the former driving the supporting wheels 56 and the latter driving the rollers.

As will be seen from Figure 4 the table 25 extends over that part of the base plate which previously supported the stand for the edging mill so that its end is now closely adjacent the stand which has been moved to the new position; on the other hand, since structural mill stand is considerably narrower than the stand for the universal mill, which it has replaced, a substantial gap 57 is left between it and the adjacent end of the roller table 11, and it may be of advantage in certain instances to provide a mounting 58 from which a roller 59 (Figure 5) can be readily introduced to fill the gap.

As will be seen from Figure 6, the screw jacks 47 may be arranged to be actuated by a third motor 60 connected to them through a suitable gearbox 61 and transmission 62. The motor may be mounted on a cross member 63 spanning the main frame member 64 of the carriage.

The positions of the mill stands and carriages are reversed at the left hand of the station of Figure 1 as best seen in Figure 7.

What we claim is:

1. A unitary supporting platform for two rolling mill housings comprising three separate elongated frame members fixed apart in parallel relationship, the center one of which members is formed along the center thereof with locating means for a rail and on both sides thereof with locating means for base portions of the two mill housings and each of which outer frame members is also provided with locating means for a rail and on the inner side of said locating means additional locating means for one of said housings.

2. A unitary supporting platform for two mill housings according to claim 1 wherein the locating means for each of said rails comprises a socket formed in an upper face of each frame member.

3. A unitary supporting platform for two mill housings according to claim 1 wherein each locating means for a base portion of a mill housing comprises an upwardly facing shoulder one side of which is chamfered.

4. A unitary supporting platform for two mill housings according to claim 1 wherein each locating means for a base portion of a mill housing is formed on a flange extending laterally away from the locating means for a rail.

5. A unitary supporting platform for two rolling mill housings in accordance with claim 1, including a rail located on said center member between said mill housing located means, and a rail secured to each of the other members.

6. A unitary supporting platform for a rolling mill housing comprising an elongated member, a rail mounted along the center of said member, a pair of surfaces on either side of said rail for supporting a rolling mill housing and a second pair of surfaces beneath said first mentioned pair of surfaces for locking engagement with said mill housing.

7. A supporting platform for rolling mill housings and work supporting tables comprising three separate elongated frame members fixed apart in parallel relationship, each frame member having a rail mounted thereon, the center frame member being formed on both sides with locating means for base portions of the mill housings, the outer frame member being formed on one side with locating means for the base portions of mill housings, each locating means including a flat portion and a beveled portion, the housing locating means in a side frame member co-operating with the nearest housing locating means on the center frame member to support a mill housing, the housing locating means on said last mentioned side frame member co-operating with the rail on said side frame member to support the near end of a work supporting table in close proximity to one side of said mill housing, the housing locating means on the center frame member co-operating with the rail on said center frame member to support the near end of a work supporting table in close proximity to the other side of said mill housing.

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