May 29, 1934. G. L. FISK 1,960,307

CONVEYING MEANS FOR MILLS

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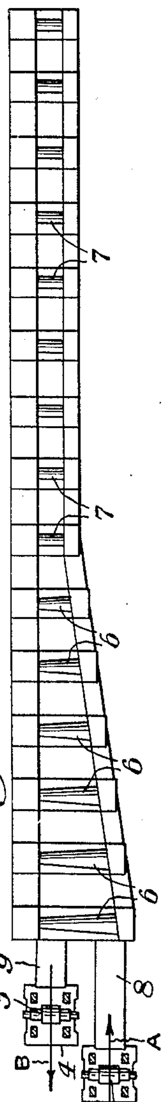

Fig. 1.

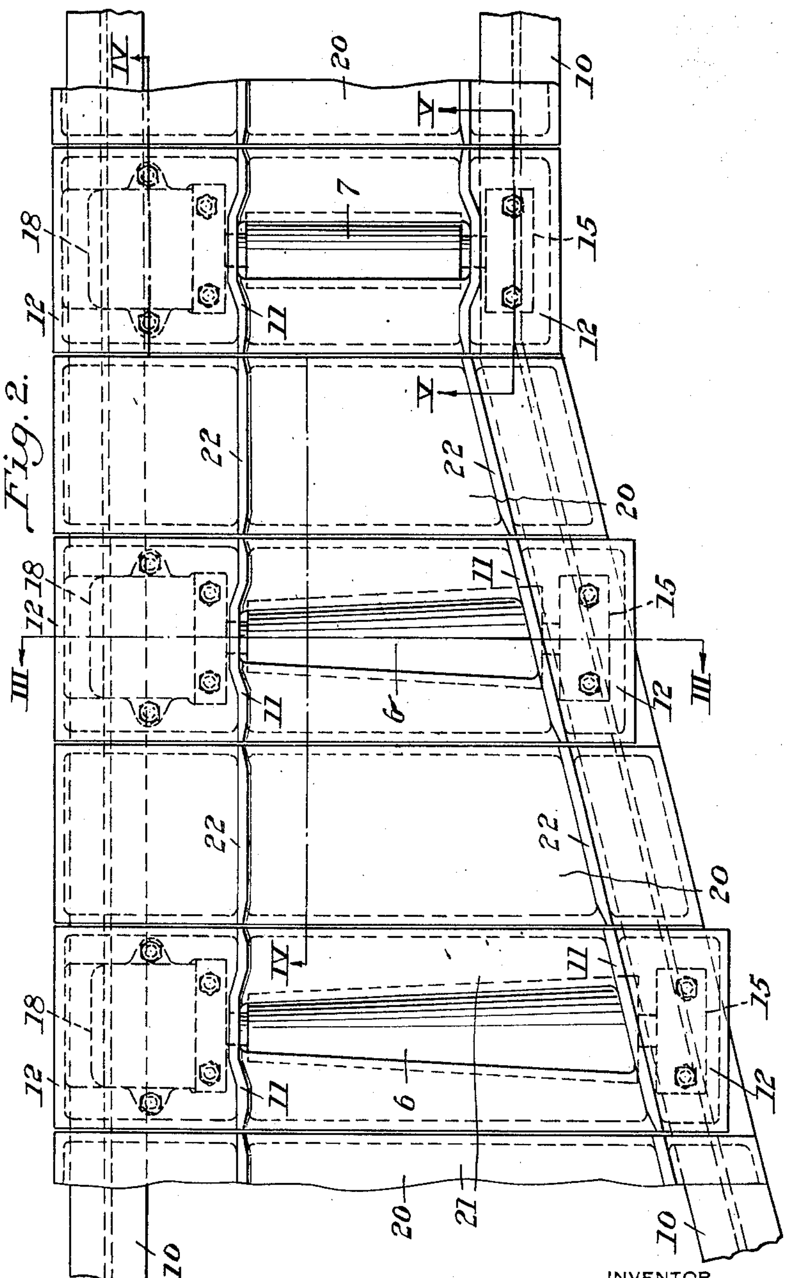

Fig. 2.

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Fig. 3.

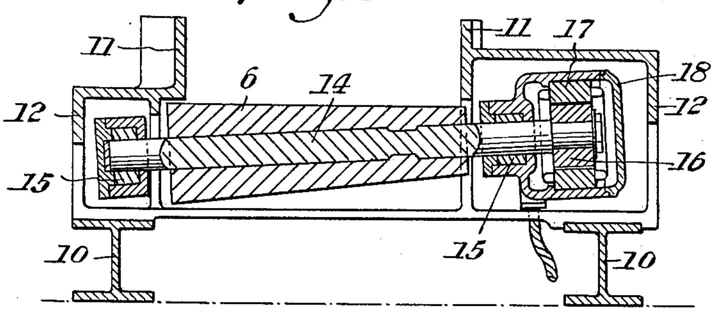


Fig. 4.

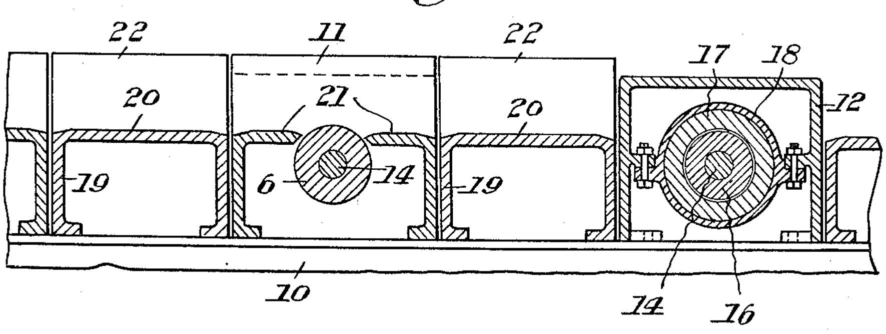
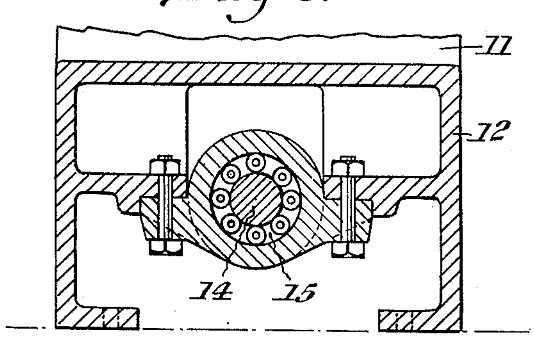


Fig. 5.



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CONVEYING MEANS FOR MILLS

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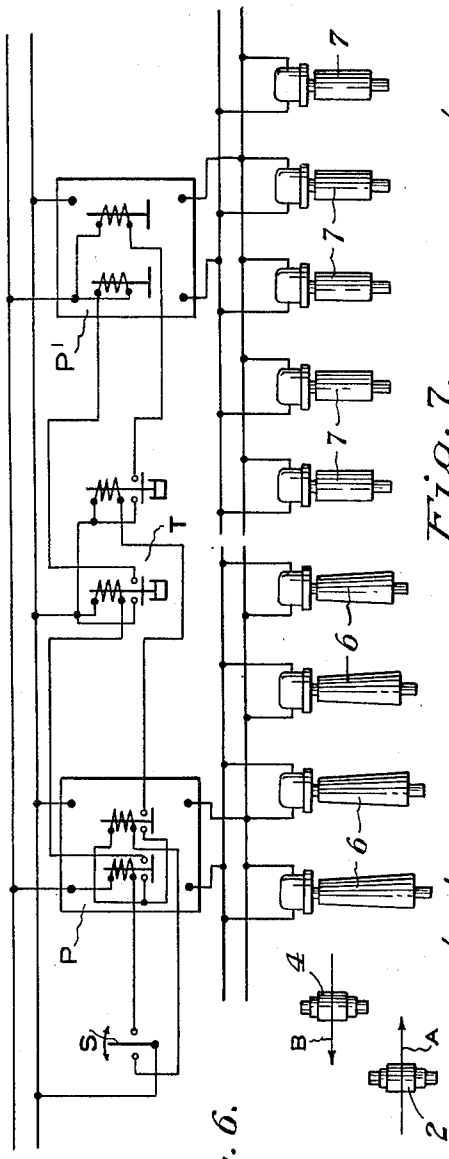

Fig. 6.

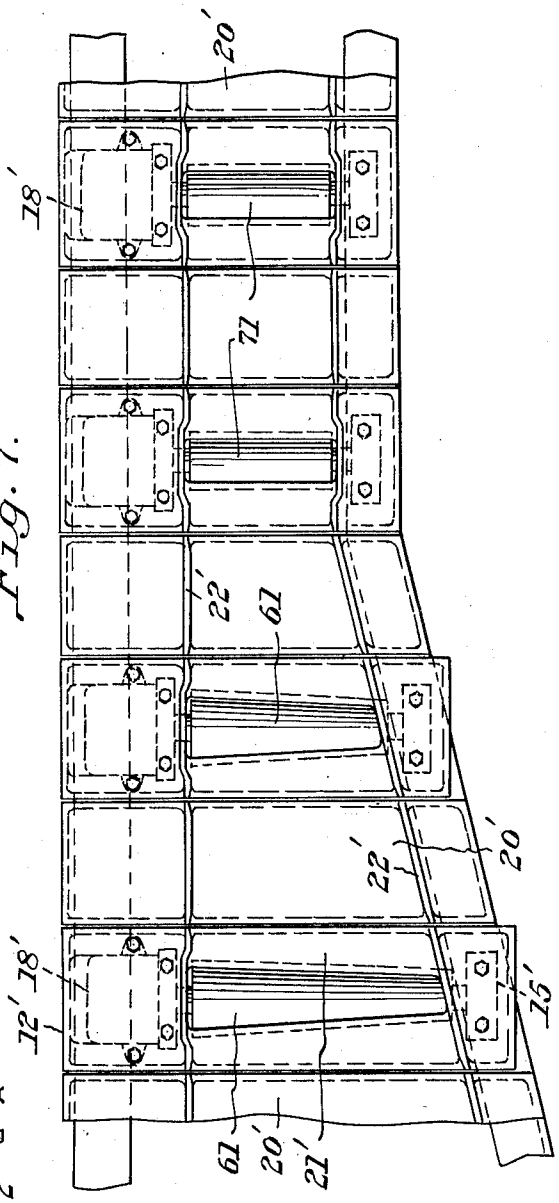

Fig. 7.

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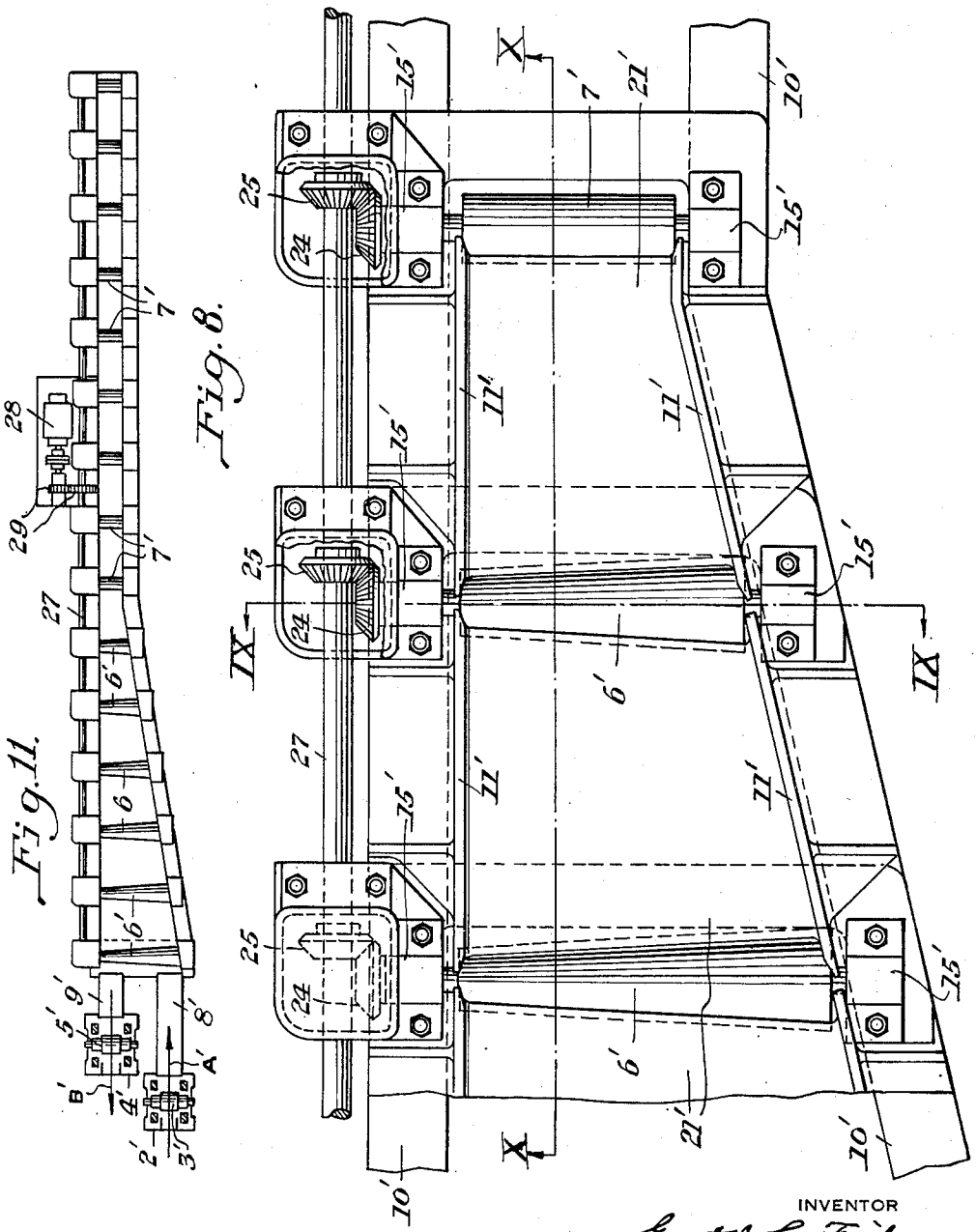

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Fig. 9.

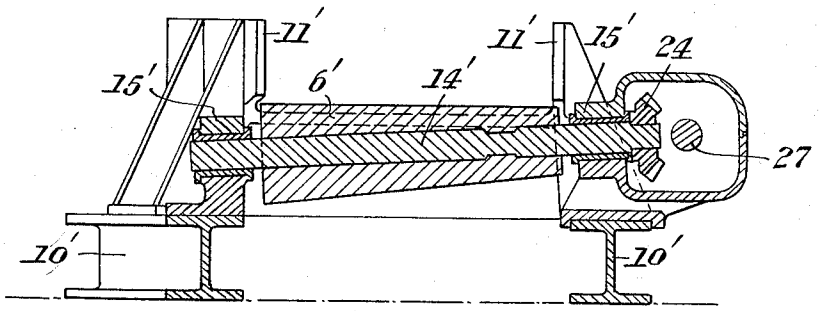
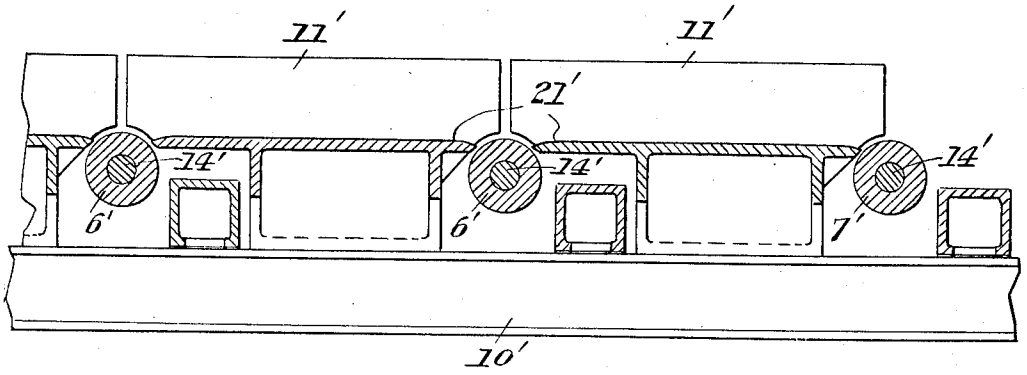


Fig. 10



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Patented May 29, 1934 1,960,307

UNITED STATES PATENT OFFICE

1,960,307

CONVEYING MEANS FOR MILLS

Gustaf L. Fisk, Pittsburgh, Pa., assignor to Mesta Machine Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application February 23, 1932, Serial No. 594,479

5 Claims. (Cl. 80—48)

The present invention relates broadly to the art of conveying, and more particularly to a new and useful improvement in the construction of conveyors for use in connection with metal rolling, although the invention has utility in connection with the combined lateral and longitudinal movement of different materials.

It is quite customary in the art to which the present invention relates to provide rolling mill stands laterally disposed one with respect to the other and in more or less closely adjacent relationship. With such installations it is frequently desirable to roll material in the rolls of one stand and thereafter transfer the same laterally into line with the rolls of the other stand and effect a feeding movement of the material to the second roll stand. The present invention is herein illustrated in connection with such a mill, and the advantages of the invention will be fully apparent by reference thereto.

In the accompanying drawings wherein I have illustrated certain preferred embodiments of the present invention;

Figure 1 is a diagrammatic top plan view of one embodiment of the present invention;

Figure 2 is a top plan view of a portion of the apparatus illustrated in Figure 1, the view being on an enlarged scale;

Figure 3 is a detail sectional view on the line III—III of Figure 2, looking in the direction of the arrows;

Figure 4 is a longitudinal sectional view on the line IV—IV of Figure 2, looking in the direction of the arrows;

Figure 5 is a detail sectional view on the line V—V of Figure 2, looking in the direction of the arrows;

Figure 6 is a wiring diagram of the circuits for the motors for driving the rollers of the embodiment shown in Figures 1 to 5;

Figure 7 is a view similar to Figure 2 illustrating a different arrangement of the conical rollers;

Figure 8 is a view similar to Figure 2 illustrating a slightly different embodiment of the invention;

Figure 9 is a detail sectional view on the line IX—IX of Figure 8;

Figure 10 is a longitudinal sectional view on the line X—X of Figure 8; and

Figure 11 is a view similar to Figure 1, but illustrating the modified construction of Figures 8, 9 and 10.

In Figure 1 of the drawings there is illustrated an installation constructed in accordance with the present invention and including a rolling mill 2 including rolls 3, and a second rolling mill 4 including rolls 5, the two mills being laterally disposed one with respect to the other and in more or less closely adjacent relationship.

Adapted to cooperate with both of the mills is a conveyor including a plurality of tapered rollers 6 followed by a series of rollers 7 of substantially constant diameter throughout the length thereof. The tapered roller 6 located adjacent the mills 2 and 4 is of the greatest length, and is preferably of such length as to extend beyond the center line of the rolling pass of both of the mills. By reason of this construction it is effective for receiving material being rolled in the mill 2 and passing therethrough in the direction indicated by the arrow A, and to deliver material to the mill 4 for passage therethrough in the direction indicated by the arrow B. Extending between the respective mills and the conveyor are troughs 8 and 9 of suitable construction and effective for supporting the material during its passage to or from the conveyor itself.

By reference more particularly to Figure 3 of the drawings it will be apparent that the conveyor comprises main girders 10. Supported on the girders 10 are side guards 11, which side guards are herein illustrated as forming projections on bearing housings 12 into which housings extend roller shafts 14 for cooperating with bearings 15.

In order that the upper surfaces of the various tapered rollers 6 may lie in a substantially horizontal plane, the shafts 14 are inclined as illustrated in Figure 3. Carried by each of the shafts is a rotor 16 with which cooperates a field winding or stator 17 of a motor 18, whereby each of the shafts 14, and therefore each of the rollers 6 may be individually driven.

Carried by the girders 10 intermediate the housings 12 are supplemental castings 19 forming fillers and providing material supporting surfaces 20 constituting in effect a continuation of the surfaces 21 adjacent the rollers. The castings 19 also carry side guard sections 22 extending in line with and constituting a continuation of the side guards 11.

With a construction of the character described, assuming that the rollers 6 are driven at such a speed that the portions of minimum diameter rotate at the same surface speed as that at which the rollers 7 are driven, it will be apparent that the portions of larger diameter which extend generally in the line of delivery from the trough 8 are rotated at an appreciably faster peripheral speed.

It has been found that there is a tendency for

the material delivered by the mill 2 to accommodate itself to the portions of the conical rolls which have a surface speed approximating its own speed. It has been observed, in operating a conveyor arrangement such as that shown in Fig. 1, that the material delivered by the mill 2, upon coming into contact with the conical rollers 6, is deflected somewhat away from their larger ends, thus facilitating delivery of the material upon the cylindrical rollers 7. Upon completion of the rolling operation in the mill 2 and the complete support of the rolled material by the conveyor, the conveyor may be reversed for feeding the material into the trough 9 and thence into the mill 4. The portions of the rolled material which are furthest away from the mills 2 and 4 will be in contact with roller surfaces which have the slowest surface speed, and the portions of the rolled material which are closest to the mills 2 and 4 will be in contact with roller surfaces which are moving at faster surface speeds. The frictional pull due to these spaced contacts with the rollers will be away from the mills 2 and 4 for those rollers which have slower surface speed than the speed of movement of the rolled material, and will be toward the mills 2 and 4 for those rollers which have greater surface speed than the speed of movement of the rolled material. The result is that the rolled material is swung laterally on the tapered rollers until it extends over the portions of smaller diameter and is in alignment with the trough 9. Since the portions of all of the rollers of the conveyor which are substantially in line with the trough 9 are rotating at substantially the same surface speed, it will be apparent that the effect of the rollers is such as to automatically cause the material to move to and maintain the proper line for delivery to the mill 4.

The lateral movement of the rolled material into alignment with the trough 9 is dependent upon frictional drag upon the trailing portion of the rolled material and frictional contact at the forward portion of the rolled material between this material and roller surfaces which are moving faster than the material. To obtain the desired conditions, the portions of the rollers 6 of larger diameter should be rotating at a surface speed which is faster than the surface speed of the cylindrical rollers 7. A variation of this would be to hold the rollers 7 stationary, and thus provide a drag for the material when the rollers 6 are being rotated in the direction for feeding such material to the mill 4. It will thus be seen that when but a small portion of the material extends far enough along the conveyor to come into contact with the cylindrical rollers 7, the latter may be held stationary or may indeed be replaced by skids or the like.

As a preferred manner of operating the conveyor, the motors driving the rollers 7 are permitted to continue their rotation for a short interval of time when the motors driving the rollers 6 are reversed. Fig. 6 is a wiring diagram illustrating the circuits for the motors driving the several rollers of the conveyor. The operator controls the direction of drive of the conveyor by a main control switch S. The motors driving the conical rollers 6 are all controlled from the panel P, and the motors driving the rollers 7 are all controlled from the panel P'. Each of these panels includes forward and reverse master relays which are under the control of the main switch S. A time delay relay T is interposed between the switch S and the panel P' for bringing about a time interval between the operation of the relays of panel P and the operation of the relays of panel P'. The details of the electrical mechanism diagrammatically illustrated in Fig. 6 are well known, these relays being ordinary articles of commerce; and, therefore, no more detailed illustration or description is deemed necessary.

It is apparent, therefore, that when the conical rollers 6 are reversed to deliver material to the mill 4, the motors driving the rollers 7 continue their rotation for a predetermined interval of time after the motors driving the tapered rollers 6 begin to rotate these rollers in the reverse direction. This causes a quick lateral movement of the portion of the rolled material resting on the tapered rollers; and the material is thus expeditiously brought into alignment with the trough 9. By this time, predetermined interval of time has elapsed, and the panel P' acts to reverse the motors driving the rollers 7. Rollers 6 and 7 thus cooperate to deliver the material to mill 4, the rollers 7 having a surface speed approximately the same as the surface speed of the smaller ends of the conical rollers 6.

In Fig. 7 there is illustrated a different arrangement of the conical rollers of the conveyor, the principal difference being that the conical rollers are disposed with their larger ends adjacent the trough to which the material is to be delivered. In the embodiment shown in this figure of the drawings, the rollers 61 are driven at an angular rate somewhat slower than the angular rate of the cylindrical rollers 71. With this arrangement, as with the one shown in Fig. 2, the material will pass along the conveyor from the first mill until substantially all of the material is supported by the rollers 61 and 71. Upon reversing the direction of rotation of the rollers, the portion of the material supported by the conical rollers 61 will be shifted laterally so as to bring the material into alignment with the second mill; and the rollers 61 and 71 will then cooperate to deliver the material to the second mill.

In Figures 8, 9, 10 and 11 there is illustrated a slightly modified embodiment of the invention characterized principally by the fact that the shafts 14' of the rollers 6' and 7' carry bevel gears 24 which mesh with similar gears 25 on jack shaft 27 adapted to be driven by a motor 28 through reduction gears 29. Apart from this difference, and the constructional differences incident thereto, the two installations are substantially similar and both embody the same advantages of operation.

The advantages of the present invention arise from the provision of a conveyor including tapered rollers whereby different portions of the rollers travel at different surface speeds in combination with substantially cylindrical rollers. Such a combination of rollers results in causing the material being rolled, which material may constitute a rod, bar, or the like, to shift laterally across the tapered rollers and into alignment with the path of discharge from the conveyor. The reversing of the direction of rotation of the rollers of the conveyor will be effective for automatically swinging the portion of the material which was trailing (and is now to lead) into the desired position for delivery in the desired direction.

While I have herein illustrated and described certain preferred embodiments of my invention, it will be understood that changes in the con-

struction and arrangement of the parts may be made without departing either from the spirit of the invention or the scope of my broader claims.

I claim:

1. A conveying system, including a series of rollers having a loading station and a delivery station at the same end of said series and offset with respect to each other, certain of said rollers being tapered and certain thereof being substantially cylindrical, and means for driving said rollers, said driving means including reversing means for reversing the direction of rotation of the rollers and for reversing the tapered prior to the reversal of the cylindrical.

2. A conveying system including a series of rollers having a loading station and a delivery station at the same end of said series, the rollers adjacent said end of said series being tapered and the other rollers being cylindrical, means for driving the rollers and means for reversing the direction of drive of the rollers, said reversing means reversing the tapered rollers a predetermined interval of time prior to the reversal of the cylindrical rollers.

3. A conveying system including a series of rollers having a loading station and a delivery station at the same end of said series and offset with respect to each other, certain of said rollers being tapered and certain thereof being substantially cylindrical, reversible motors for driving said rollers and means for controlling said motors, said controlling means including a time delay device for effecting the reversing of the tapered rollers prior to the reversal of the cylindrical.

4. In a conveyor, a series of rollers narrowing to a throat, said series of rollers having at its wider end laterally spaced stations for receiving and discharging material, means for guiding material from said receiving station into said throat, and means for driving the rollers in one direction during receipt of material and in the opposite direction during discharge of the material, said rollers being conical to afford more rapid translatory motion for material in contact with larger diameter portions of the rollers, whereby the material is swung laterally into alinement with the discharge station.

5. In a conveyor, a converging portion and a portion extending from the throat of the converging portion, said converging portion having at its wider end laterally spaced stations for receiving and discharging material, a plurality of tapered rolls journaled within said converging portion, a series of rolls journaled in the portion extending from said throat, and means for driving said rolls, said driving means including reversing means for reversing the direction of rotation of the tapered rolls in the converging portion prior to the reversal of the rolls journalled in said extending portion.

GUSTAF L. FISK.