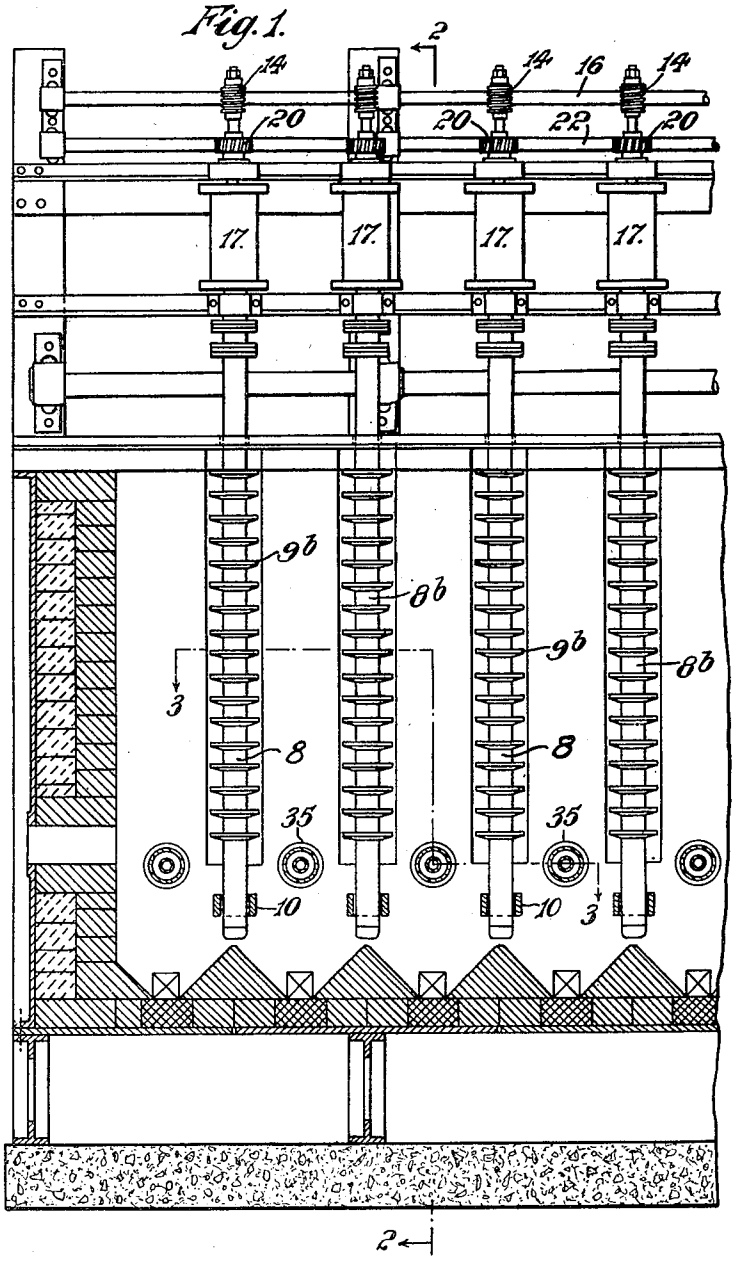
Dec. 9, 1952 J. FALLON 2,620,918

CONVEYER MECHANISM

Filed April 1, 1948 4 Sheets-Sheet 1

Fig. 1.



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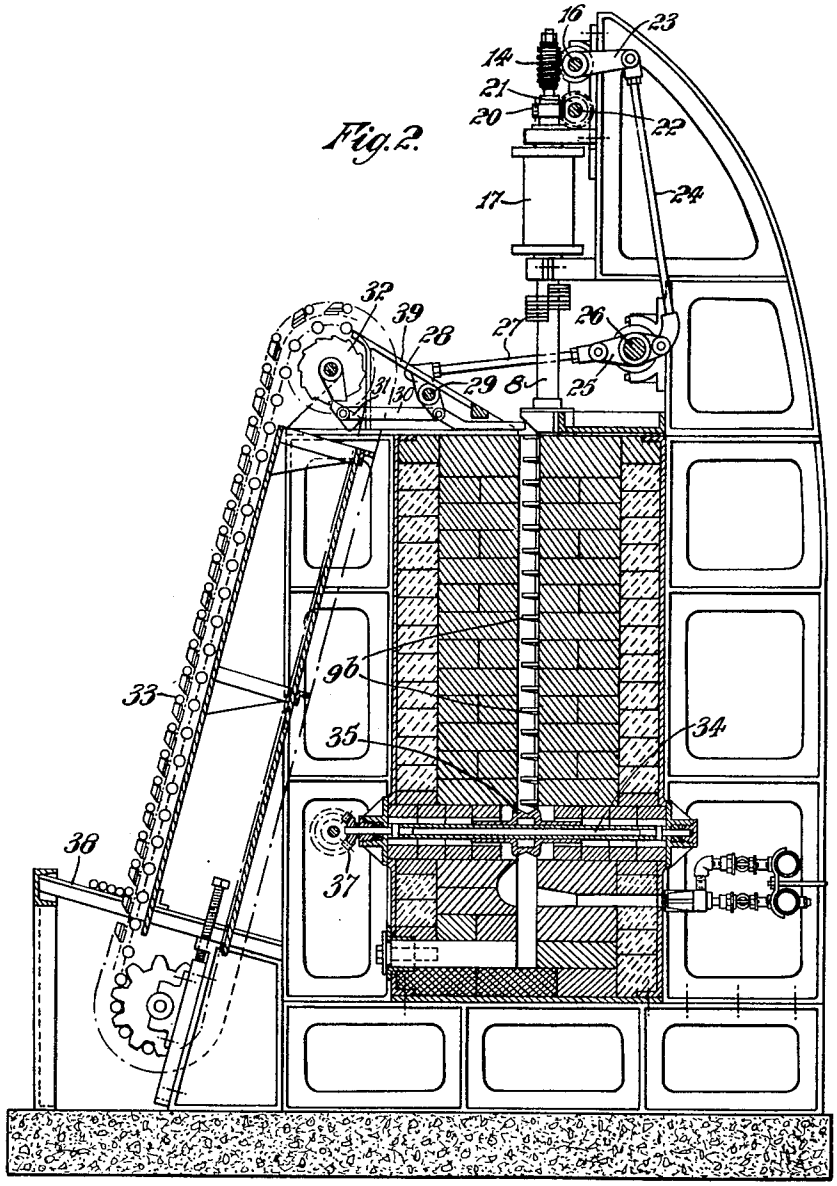
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CONVEYER MECHANISM

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Fig. 2.



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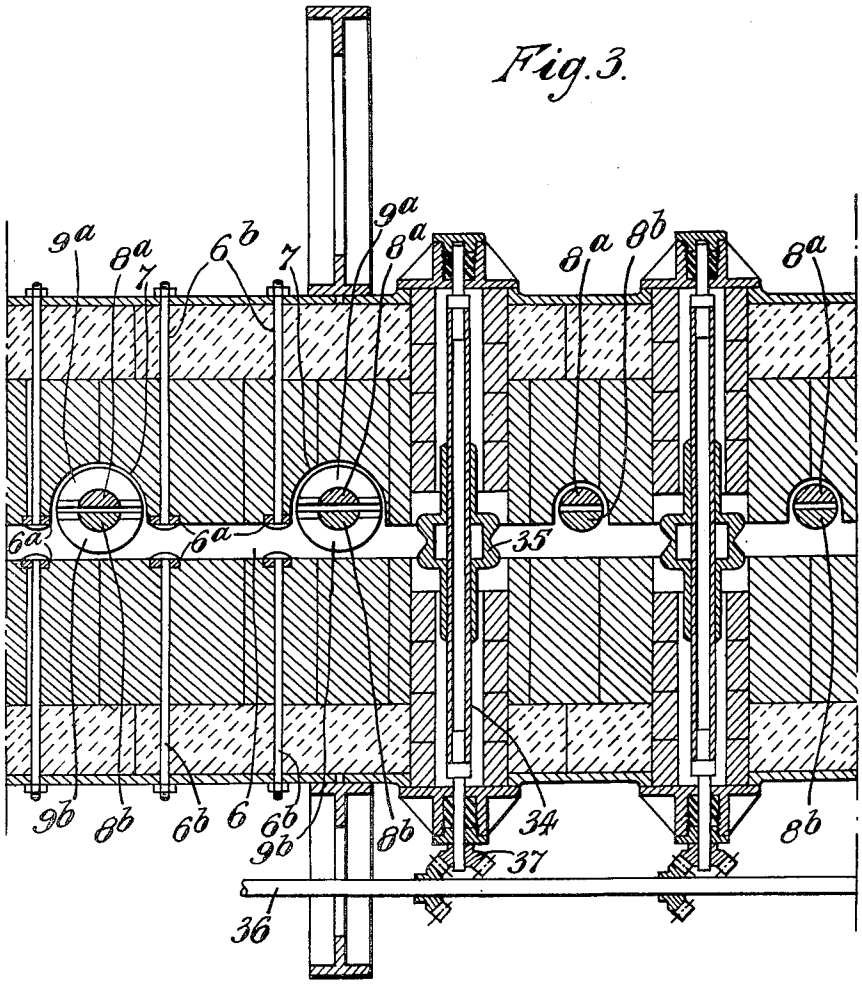
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CONVEYER MECHANISM

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Fig. 3.



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CONVEYER MECHANISM

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Fig. 5.

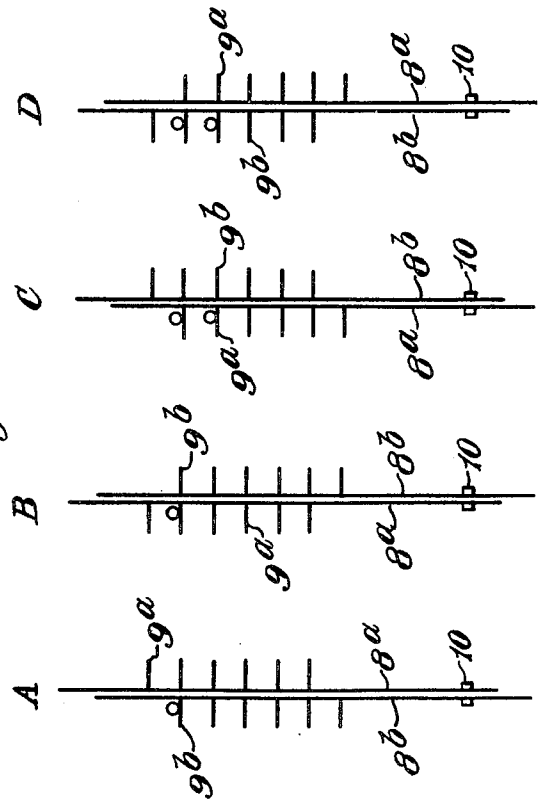
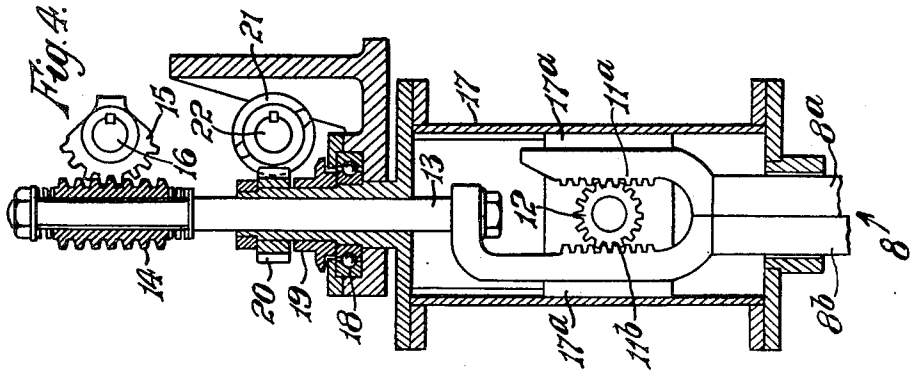


Fig. 4.



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UNITED STATES PATENT OFFICE

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CONVEYER MECHANISM

John Fallon, Smethwick, England

Application April 1, 1948, Serial No. 18,309
In Great Britain November 28, 1947

7 Claims. (Cl. 198—218)

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This invention has reference to improvements in conveyor mechanism and more especially to conveyor mechanism intended to intermittently progress the work through a guided path or chamber say a furnace chamber, the conveyor being adapted for location in a vertical, inclined or horizontal plane as determined by the character of the plant with which the conveyor mechanism is associated. A particular application of this invention is to vertical slot furnaces employed in tube production.

The invention consists of a conveyor mechanism of the kind hereinbefore referred to adapted to provide intermittent progression for the work, characterised by a carrier mechanism adapted for alternative reciprocation and rotational oscillation, the mechanism incorporating a series of spaced ledges adapted to be successively brought into contact with the work during its progress from one end of the conveyor to the other. The invention further resides in details of the conveyor mechanism as will be hereinafter more particularly set forth.

The invention will now be described in its application to a conveyor mechanism for transporting tubes or bars from the upper or charging end of a vertical slot furnace through the chamber to the lower or discharge end thereof, and for a better understanding of the invention reference may be had to the accompanying drawings in which:

Fig. 1 represents a longitudinal sectional elevation through a portion of the furnace embodying a conveyor mechanism in accordance with the present invention.

Fig. 2 is a section on the line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a plan on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is an enlarged fragmentary view of the conveyor operating mechanism, and

Fig. 5 shows diagrammatically a sequence of operations of the conveyor mechanism.

The vertical slot chamber 6 of the furnace is provided in one of its vertical longitudinal walls with a plurality of semi-circular recesses 7 within which are located vertically disposed divided shafts 8, each shaft 8 comprising two spindles 8*a* and 8*b* of semi-circular cross section, the flat faces whereof are in substantial abutment to form the divided circular shaft 8. Each of these spindles 8*a* and 8*b* has securely mounted thereon or formed integral therewith a series of equally spaced semi-circular half-discs 9*a* and 9*b* respectively of a radius slightly less than the radius of the recesses 7. The semi-circular discs serve as work-holders or work-carriers. The lower ends of each pair of semi-circular spindles have

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a slidable mounting within a bearing 10 in the base of the furnace chamber. The walls of the chamber 6 are provided with vertical guides 6*a* proud of the walls for locating the work as will become apparent from the subsequent description. These guide plates are positioned by means of the bolts 6*b*.

Referring now more particularly to Fig. 4 of the drawings, it will be seen that the upper end of each pair of spindles 8*a* and 8*b* are provided with toothed rack bars 11*a* and 11*b* respectively meshing with a common pinion 12 whereby any vertical reciprocatory motion imparted to the spindle 11*b* will impart an equal reciprocal motion in the opposite direction to the spindle 11*a*. The spindle 11*b* is extended upwardly and connected to the lower end of a spindle 13 provided at its upper end with a cylindrical rack 14, the teeth whereof are in mesh with a toothed segment 15 keyed upon a shaft 16 to which an intermittent oscillatory rotational motion is imparted at predetermined intervals for a purpose which will be more fully described hereinafter.

The pinion 12 is journalled within a cylindrical casing 17 which is capable of rotation in bearings 18 and is provided with guideways 17*a* for the spindles 8*a* and 8*b* whereby rotation imparted to the casing 17 is transmitted to the shaft 8. The upper end of the casing 17 is connected to a sleeve 19 upon which is mounted a worm pinion 20 in mesh with a worm-wheel 21 mounted upon a shaft 22, which shaft is intermittently rotated in opposite directions to impart a rotational oscillatory movement to the casing 17 and the shaft 8 through 180°.

The shaft 16 has keyed thereto a laterally projecting arm 23 connected by a link 24 to one end of a rockable lever 25 pivoted at 26, the other end of the lever 25 being connected by a link 27 to one end of a rockable lever 28 pivoted at 29, the other end of this lever 28 being connected to a slide 30 carrying a detent 31 which co-operates with a toothed ratchet wheel 32, so that as will be seen rotational oscillations imparted to the shaft 16 will impart an intermittent rotation to the ratchet wheel 32 which drives an endless conveyor generally designated 33.

Mounted transversely of the base of the furnace are a plurality of shafts 34 carrying grooved rollers 35 situated immediately below the chamber 6 of the furnace; the shafts 34 being continuously driven from a shaft 36 through crown wheels and pinions 37. The shafts 16, 22 and 36 are driven through gearing from a common power source.

In operation the work in the form of tubes or rods is placed upon an inclined table 38 from which they are picked up singly by the conveyor

33 and fed down an inclined chute 39 to the uppermost half-disc of the conveyor mechanism which is disposed within the vertical slot chamber. When this feeding operation takes place the conveyor mechanism is in the position shown in Fig. 5 designated A or C. Assuming that it is in the position designated A, the rod or tube is supported upon the uppermost half-disc 9b of the spindle 8b. The shaft 21 is now rotated to turn the shaft 8 into the position shown at B and by virtue of the fact that the tube or rod owing to it abutting against the locating guides 6a cannot rotate with the half-disc 9b, the second half-disc 9a in sequence is led under the tube or rod to act as its support. Through the agency of the rotational oscillation of the shaft 16 the spindles 8a and 8b are now reciprocated relative to one another, each shaft being reciprocated through a distance equal to the spacing between the half-discs 9a or 9b, which movement results in the conveyor mechanism being moved to the position shown at C; at this time another rod or tube is fed on to the uppermost half-disc of the shaft 8a. Another rotational oscillation through 180° in the opposite direction to that already described is now imparted to the shaft 8 which results in the transference of the first tube or rod on to the third half-disc 9b. In this manner the work is intermittently fed downwardly through the furnace chamber 6 until it is discharged from the conveyor at a position equivalent to B or D on to the rollers 35 which are continuously rotating and therefore convey the tube or rod longitudinally from one end of the furnace. The fact that the shaft 8 is intermittently rotationally oscillated backwards and forwards through 180° instead of being intermittently rotated through 180° prevents the work being moved longitudinally of the furnace in one direction during its transference onto successive half-discs.

It will be appreciated that the number of shafts 8 and associated discs 9a and 9b is dependent upon the length of the furnace which in turn would be dependent upon the length of the work for which it was adapted to be used.

I claim:

1. A conveyor mechanism for the intermittent progression of work comprising, in combination, a pair of vertically extending semi-cylindrical spindles mated as a split shaft, a series of evenly spaced work carriers on the outer side of each of said spindles, a rotary housing having axial bearings slidingly and non-rotatably mounting said spindles, means including differential means engaged between said spindles for alternately reciprocating said spindles relative to said housing and in opposite phase, means for oscillating said housing 180°, drive means engaging said reciprocating means and said oscillating means in timed relationship whereby said housing is rotated 180° each time said spindles reach the limit of reciprocation, and a guide for maintaining the work in a vertical plane adjacent said shafts and engaged with the work carriers.

2. In a conveyor mechanism according to claim 1, reciprocating means comprising inwardly directed, spaced vertical racks one on the upper end of each of said spindles, a pinion rotatably mounted in said housing on horizontal axes between said racks and engaged with both of said racks, an extension on the upper end of the first one of said spindles and means engaged with said extension for reciprocating the first one of said spindles relative to said housing.

3. In a conveyor mechanism according to claim 2, means for oscillating the shaft comprising, in combination, a bearing for mounting said housing for rotatable movement, a worm gear mounted on said housing, a horizontal oscillating shaft extending perpendicularly to and adjacent said housing and a worm keyed on said oscillating shaft and meshed with said worm gear, said oscillating shaft being driven by the drive means.

4. In a conveyor mechanism according to claim 2 the improvement in means for reciprocating said spindles that comprises a cylindrical rack on the upper extension on the first of the spindles, a horizontal oscillating shaft extending perpendicularly to and adjacent said rack, and a pinion keyed to said oscillating shaft and engaged in said rack, said oscillating shaft being driven by the drive means.

5. A conveyor mechanism for the intermittent progression of work comprising in combination, a pair of spindles mated as a split shaft with a flat surface of each juxtaposed to the other, a plurality of work-holders on each spindle, said work-holders being spaced at uniform intervals along each spindle, means for rotatively oscillating said pair of spindles to alternately present the work-holders to the work, and differential means connecting said spindles and adapted to reciprocate said spindles to alternately register the work-holders of one spindle with the work-holders of the other spindle.

6. A conveyor mechanism for the intermittent progression of work comprising, in combination, a pair of spindles mated as a split shaft with a flat surface of each juxtaposed to the other, a plurality of work-holders on each spindle, said work-holders being spaced at uniform intervals along each spindle, means for rotatively oscillating the pair of shafts through a semi-revolution to alternately present the work-holders to the work, a rack attached longitudinally to each spindle, a pinion meshing with each rack, and means for reciprocating one of said spindles whereby the spindles are oppositely longitudinally reciprocated to successively match the work-holders for successive transfer of the work.

7. A conveyor mechanism for the intermittent progression of work comprising, in combination, a pair of spindles in close side by side relation, a plurality of work-holders on each spindle, a rotary housing supporting one end of each spindle, a bearing supporting the other ends of the spindles, means for oscillating the rotary housing through a semi-revolution, a differential mechanism mounted in the rotary housing and connecting the spindles of the pair to longitudinally drive one spindle oppositely to the other, and means for longitudinally driving said spindles as the rotary oscillating means reverses at each end of its stroke, whereby the work-holders on the pair of spindles register in one combination during a first rotation of the housing and register in a second combination during the reverse rotation of the housing to produce intermittent progression of the work past the work-holders.

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