July 15, 1924. 1,501,305

E. BOLEY

METHOD OF DRAWING WIRE CONTINUOUSLY

Filed Dec. 27, 1920 3 Sheets-Sheet 1

Fig. 1.

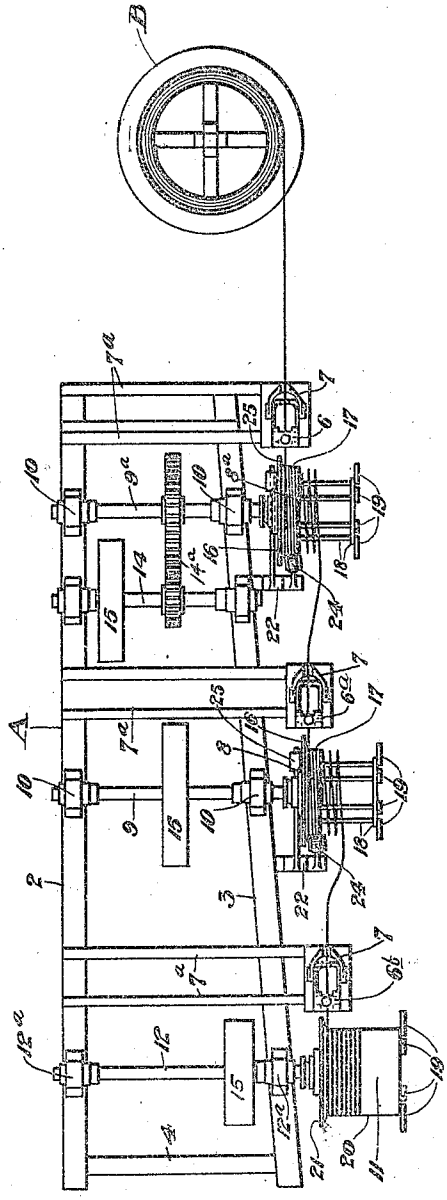
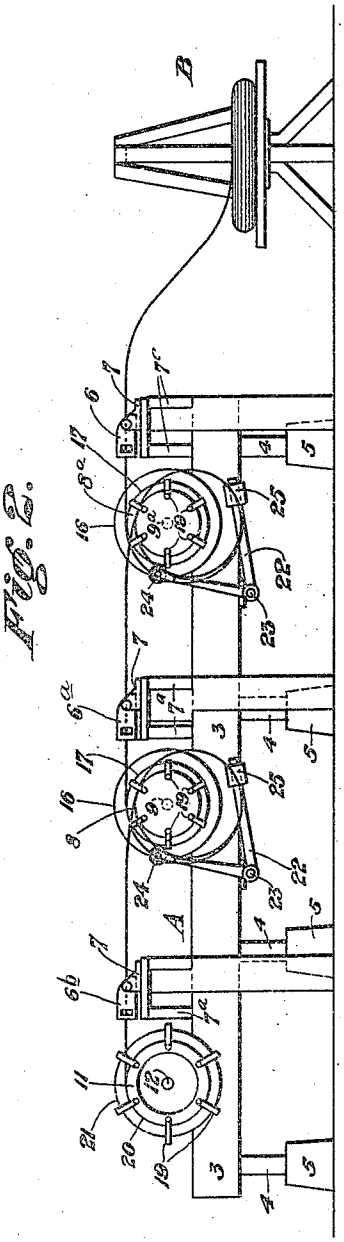


Fig. 2.



Witnesses:
Edwin Trueb

Inventor
Ernst Boley
by D. Anthony Jr. Inc.
his Attorney

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Filed Dec. 27, 1920 3 Sheets-Sheet 2

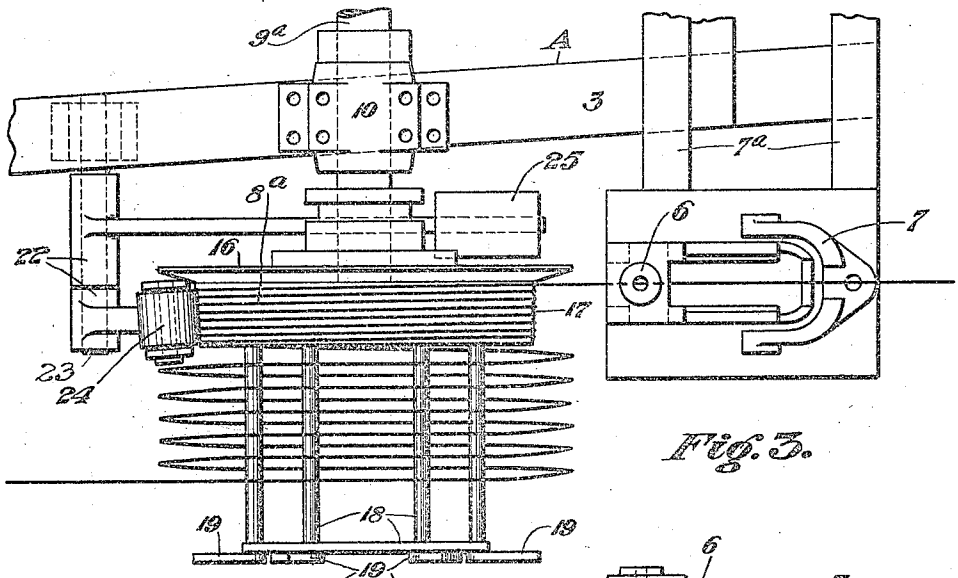


Fig. 3.

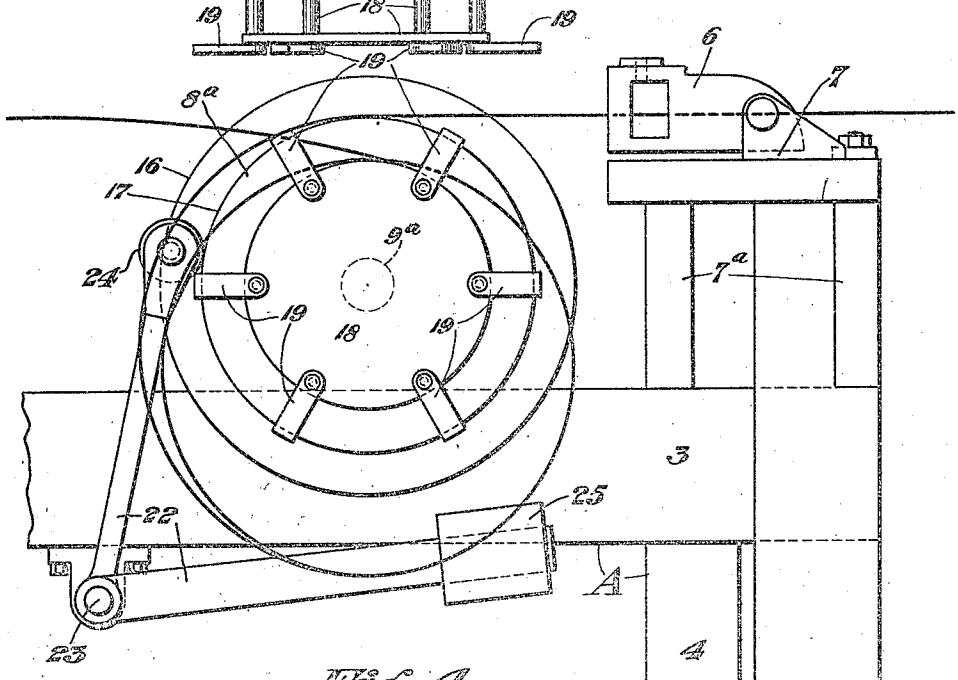


Fig. 4.

Witnesses:
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METHOD OF DRAWING WIRE CONTINUOUSLY

Filed Dec. 27, 1920 3 Sheets-Sheet 3

Fig. 6.

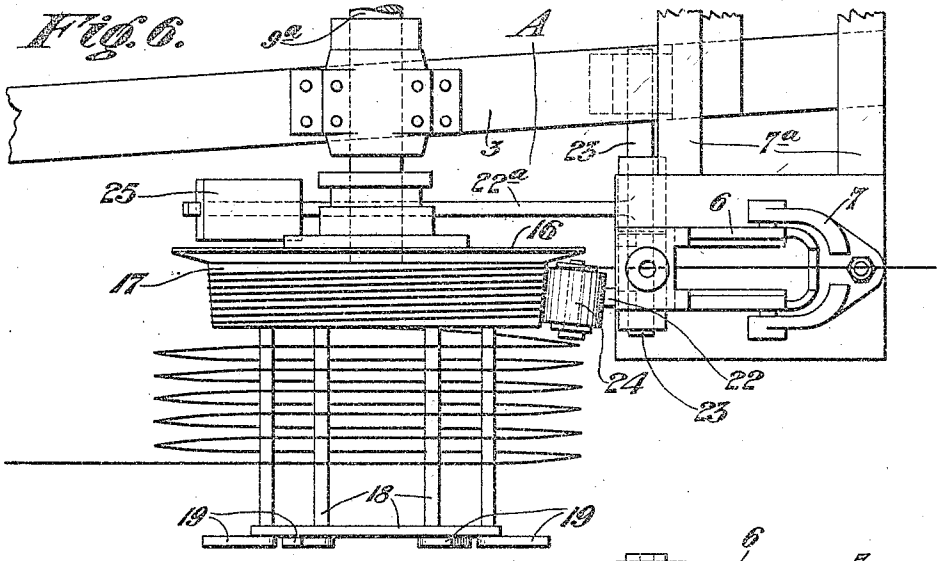


Fig. 7.

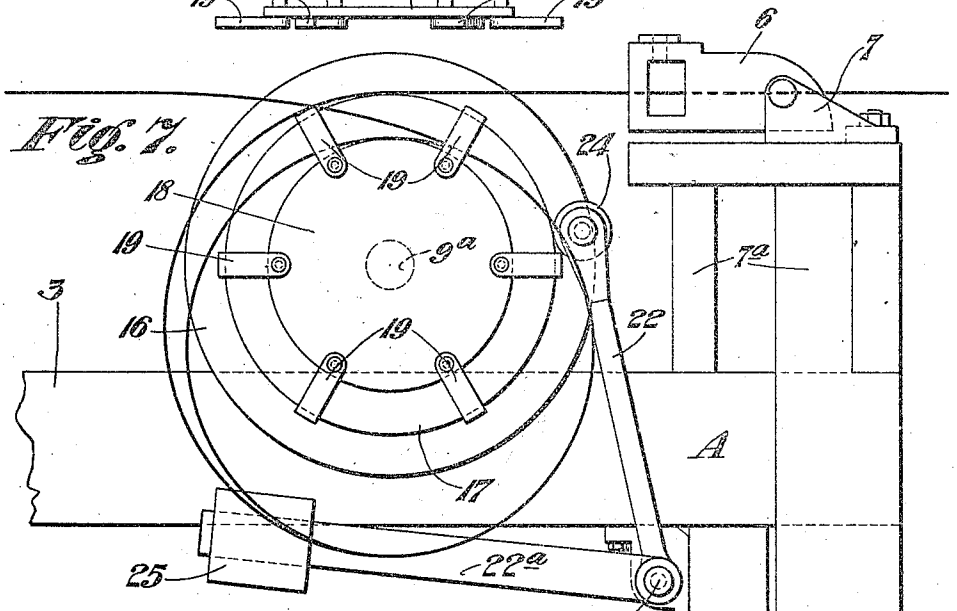
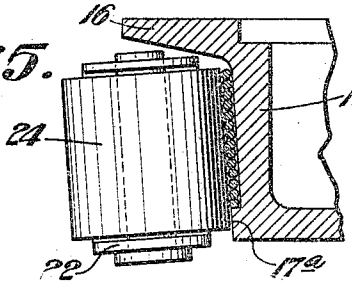


Fig. 5.



Witnesses:
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Inventor:
Ernest Boley
by:
Anthony Dessin
his Attorney

Patented July 15, 1924. 1,501,305

UNITED STATES PATENT OFFICE.

ERNST BOLEY, OF CLEVELAND, OHIO, ASSIGNOR TO THE AMERICAN STEEL AND WIRE COMPANY OF NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF DRAWING WIRE CONTINUOUSLY.

Application filed December 27, 1920. Serial No. 433,282.

To all whom it may concern:

Be it known that I, ERNST BOLEY, a citizen of the United States, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Methods of Drawing Wire Continuously, of which the following is a specification.

This invention relates to continuously drawing wire through two or more dies, and has for its principal object the provision of an upward method, whereby a rod or wire is continuously and simultaneously drawn through a plurality of successive dies, and wherein the danger of breaking the wire is avoided and overcome.

Another object of the invention is to provide a method applicable to existing plants, without material change in the arrangement or construction thereof.

The difficulties experienced in continuously drawing wire, particularly wire of the larger sizes, have been so great that in the method in general use heretofore each bundle of rods or wire is uncoiled, pulled through a single drawing die as uncoiled and is then again coiled into a bundle, these steps being carried out with each reduction in the size or gage of the rod or wire.

My improved method provides for forming a certain amount of slack or loose wire after each die from which the wire is fed to the next succeeding die, thereby providing a means for compensating for any irregular feeding of the wire through either die and avoiding undue tension on the rod or wire being drawn.

With my improved method the wire draw blocks are positively driven at regular speeds at all times, and a very simple and effective mechanism is provided to provide and care for sufficient slack in the wire between the successive drawing operations, as will be apparent from the following drawings which illustrate one form of mechanism for carrying out my invention.

In the drawings, Figure 1 is a plan showing a wire bench having a series of three die boxes and three draw blocks thereon for continuously drawing wire adapted for use in practicing my invention.

Figure 2 is a side elevation thereof.

Figure 3 is an enlarged plan of a portion of the draw bench showing one die box and draw block with means for frictionally holding a part of the coils of wire taut on the block.

Figure 4 is a side elevation of the portion of the apparatus shown in Figure 3.

Figure 5 is a detail plan of a portion of a draw block, showing a modification in the construction of the draw block.

Figure 6 is an enlarged detail plan showing a portion of the draw bench with the pressure roller located on the right hand of the vertical center line of the draw blocks.

Figure 7 is a side elevation of the apparatus shown in Figure 6.

Referring particularly to the drawings, the letter A designates generally the frame of the draw bench which is of less width at its rear end than at its forward end, and is composed of longitudinal side members 2 and 3 secured to cross supports 4 which are mounted on bases 5. The side member 3 is set with relation to the member 2, on an outwardly and forwardly diverging angle, for a purpose to be explained hereinafter.

Die boxes 6, 6^a and 6^b of any known design, are pivotally mounted on the supports 7, the die box supports 7 being fastened to the overhanging ends of the cross arms 7^a of the frame A, each die box extending outwardly the same distance beyond the side member 3 of the draw bench frame.

In front of the rearmost die box 6 is a draw block 8^a which is on one end of a shaft 9^a journaled in bearings 10 on the members 2 and 3, and immediately forward of the intermediate die box 6^a is a draw block 8 which is keyed or otherwise fastened on one end of a shaft 9 mounted in bearings 10 on the side members 2 and 3. In front of the intermediate die box 6^b is a take-up block 11 which is keyed to the overhanging end of a shaft 12 which is journaled in bearings 12^a on the frame members 2 and 3.

The rearmost shaft 9^a is connected by reducing gearing to a countershaft 14 to reduce the speed of the block 8^a, and the shafts 14, 9 and 12 are each provided with a driving pulley 15, these pulleys being connected by a belt (not shown) to a suitable prime mover. However, the pulleys are of different diameters so that each successive shaft, and consequently the block keyed

thereon, will be rotated at a somewhat greater speed than the preceding one, to to take up as nearly as possible the extra length of the wire, due to the elongation caused by drawing through the preceding die. Each of the blocks extends the same distance beyond the side member 3.

The blocks 8 and 8ª have an outwardly flaring rim or flange portion 16, circular face portion 17, and a reduced spindle portion 18. The face portion 17 has a slight taper away from the rim (preferably about one degree), and the outer edge of this face portion preferably will be provided with a flange 17ª projecting slightly beyond the conical face portion 17 so as to a slight extent retard and prevent the coils of wire wrapped upon the face portion from slipping out from under the pressure roller 24 until the proper time. (See Figure 5.) This projecting flange may be formed integral as shown or may be otherwise formed thereon. The spindle portion is preferably of skeleton construction and of appreciably less diameter than the face portion 17.

The take-up block 11 is of the usual construction, comprising an outwardly tapered body portion 20, having a rim or flange 21 at its rear or inner end.

Retaining lugs 19 which are pivotally mounted on the outer ends of the blocks 8 are provided to temporarily hold the wire in position.

Bell cranks 22 are pivotally mounted on stub shafts 23, secured on the frame member 3, one for each of the blocks 8, 8ª. The vertical arm of the bell crank 22 has a pressure roller 24 on the upper end thereof, and a counterweight 25 on the outer end of the horizontal arm, the counterweight crank arms being adapted to hold the roller 24 against the surface 17 of the blocks 8 and 8ª with considerable pressure. Adjusting the counterweight on the arm will regulate the amount of pressure.

The rollers 24 are set at an angle to the transverse axis of the bell cranks 22, so that only their outer edge engages the surface 17 of the blocks 8.

The position of the pressure rolls 24 and associated parts 22, 23 and 25 relative to the blocks 8 may be reversed so as to have the pressure roller 24 on the opposite side of the vertical axis of the blocks 8 and 8ª when found or considered necessary or desirable as is shown in Figures 6 and 7, and obviously two pressure rollers, one on each side of the vertical axis of the draw blocks, may be used.

As the wire is drawn through the dies in the die boxes 6, 6ª, it is given a few wraps around the surface 17 of the blocks 8, and 8ª, each coil of wire laying behind the one previously made, and by reason of the taper of the face 17 of the conical blocks each successive wrap will be pushed outwardly until it falls from the face 17 to the spindle 18 where it will hang, forming a loose coil.

The wire is fed from the loose coils on the spindles 18 to the next succeeding die which, because of the angular position of the frame member 3, is in line to receive it and permit a tangential or straight pull or feed on the wire through the die.

The block 11 is arranged to have the end of the wire secured thereto, and is adapted to have a multiplicity of layers wrapped thereon so as to form the drawn wire into a coil or bundle.

The drawing of wire in accordance with my improved method is as follows.

The rod to be drawn, which has been previously cleaned of scale, is mounted on the spool or reel B at the rear of the draw bench A, and is drawn through the first die box which reduces its diameter. As the wire emerges from the die it is wrapped on the surface 17 of the block 8 and held taut by the pressure roller 24, each additional wrap or coil falling behind the previously formed coil and pushing it forward along the tapered surface until said surface is completely covered, after which each additional wrap or coil will push one of the previously taut wraps or coils off onto the spindle portion 18, forming loose wraps or coils. After a plurality of loose wraps or coils are formed, the wire is fed from the loose coils through the next succeeding die, and again drawn to reduce its diameter, while the remainder of the wire is still being drawn through the first die.

As the wire emerges from the second die it is wrapped on the surface 17 of the next block 8 and held taut by the pressure roller 24, until the surface is completely covered, after which each additional wrap or coil will push one of the previously formed coils off the surface 17 to the spindle portion, forming loose coils thereon. After a plurality of loose coils are formed, the wire is fed from the loose coils through the next succeeding die and again drawn to reduce its diameter, while other portions in the length of the wire is still being drawn through the other dies.

It will be apparent that these operations may be repeated until the desired size is obtained.

The wire as it emerges from the last die is wrapped on the take-up block 11 and held taut by securing its end to the block. After the wire is drawn and all wrapped on the block 11, the so formed bundle or coil of drawn wire is bound and then removed from the block.

It will be particularly noted that I do not wish to be limited to the structure of drawing bench shown and described. Nor do I wish to be limited to the number of dies used, since various numbers may be used

without departing from the scope of my invention as defined in the appended claims.

I claim:—

1. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping the drawn wire upon a draw block, forming a plurality of taut and a plurality of loose coils thereon and feeding portions of the wire from said loose coils through a second die while drawings other portions of the wire through said first die, and wrapping the wire after drawing through said second die on a suitable block and thereby forming a bundle or coil of the drawn wire.

2. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping the drawn wire upon a draw block to form a plurality of taut and a plurality of loose coils, feeding portions of the wire from said loose coils through a second die while drawing other portions through said first die, wrapping the wire as drawn through said second die upon a draw block to form a second series of taut and loose coils, and feeding portions of the wire from said last formed loose coils through a third die while drawing other portions of the wire through said first and second dies.

3. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping a plurality of coils of the drawn wire upon a draw block, frictionally holding part of said coils taut upon said block while permitting other coils to loosen and hang loosely on said block, continuously adding to said taut coils and simultaneously releasing other of said taut coils to form loose coils during the drawing operations, feeding the wire from said loose coils through a second and smaller die and coiling the drawn wire emerging from said second die into a bundle or coil.

4. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping a plurality of coils of said wire upon a draw block, frictionally holding some of said coils taut upon said block and allowing the remaining coils to hang loosely thereon, continuously adding to said taut coils and releasing other of said taut coils to form loose coils during the drawing operation, drawing the wire from said loose coils through a second die while continuously drawing another portion thereof through said first die, and again wrapping said wire upon a block to form taut and loose coils, and continuing said operations until the desired size of wire is obtained, and finally wrapping said wire upon a take-up block for binding into coils or bundles.

5. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping a plurality of coils of said drawn wire upon a draw block, frictionally holding some of said coils taut thereon and allowing the remaining coils to hang loosely upon said block, continuously adding to and releasing the taut coils to form loose coils during the drawing operation, drawing the wire from said loose coils through a second die of smaller diameter while drawing another portion thereof through said first die, wrapping a plurality of coils of the wire drawn through said second die upon a draw block, frictionally holding some of said coils taut upon said block and allowing others to hang loosely upon said block, continuously adding and releasing other of said taut coils to form loose coils during the drawing operation, and drawing the wire from said last named loose coils through a third die of smaller diameter than said second die, while the wire is being drawn through said first and second dies.

6. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping a plurality of coils of the drawn wire upon a draw block, frictionally holding some of said coils taut upon said block and allowing the remaining coils to hang loosely thereon, continuously adding to said taut coils and releasing other of said taut coils and thereby form loose coils during the drawing operation, drawing the wire from said loose coils through a second die of smaller diameter while continuously drawing through said first die, wrapping a plurality of coils of said wire after being drawn through said second die upon a draw block, frictionally holding some of said coils taut upon said block and allowing the remaining coils to hang loosely upon said block, continuously adding to said taut coils and releasing other of said taut coils to form loose coils during the drawing operation, drawing the wire from said last named loose coils through a third die of less diameter than said first or second dies, while continuously drawing through said first and second dies, and wrapping said wire as it is drawn through said third die on a suitable block.

7. The method of continuously drawing wire which consists in drawing the wire through a die, wrapping a plurality of coils of said drawn wire upon a draw block, frictionally holding some of said coils taut upon said block and allowing the remaining coils to hang loosely thereon, drawing said wire from said loose coils through a second die while continuously drawing through said first die, and wrapping the wire as it is drawn through said second die upon a suitable block to form a bundle or coil of finished wire.

8. The method of continuously drawing

wire which consists in simultaneously drawing different portions of a wire through a plurality of drawing dies, coiling the drawn wire on a draw block between said dies and applying yielding pressure to an intermediate point in the length of the wire coiled on the draw block, to thereby maintain a series of taut and loose coils on the draw block during the wire drawing operations.

9. The method of continuously drawing wire which consists in simultaneously drawing different portions of a wire through a plurality of drawing dies, coiling the drawn wire on a draw block between said dies, and applying yielding pressure to an intermediate point in the length of the wire coiled on the draw block, to thereby permit uncoiling of the wire wrapped around the draw block at a speed varying from the speed of coiling during the wire drawing operations.

10. The method of continuously drawing wire which consists in simultaneously drawing different portions of a wire through a plurality of drawing dies, coiling the drawn wire on a draw block between said dies, wrapping the wire on said draw block in a series of taut and loose coils and applying pressure to an intermediate point in the length of the wire coiled on the draw block in maintaining the taut and loose coils on successively drawn portions of the wire in coiling the wire on said draw block.

11. The method of continuously drawing wire which consists in simultaneously drawing different portions of a wire through a plurality of drawing dies, coiling the drawn wire on a draw block between said dies, wrapping the wire on said draw block in a series of taut and loose coils, applying pressure to an intermediate point in the length of the wire coiled on the draw block in maintaining the taut and loose coils on successively drawn portions of the wire in coiling the wire on said draw block and removing the wire tangentially in uncoiling it from the draw block.

12. The method of continuously drawing wire which consists in simultaneously drawing different portions of a wire through a plurality of drawing dies, coiling the drawn wire on a draw block between said dies, wrapping the wire on said draw block in a series of taut and loose coils, applying pressure to an intermediate point in the length of the wire coiled on the draw block in maintaining the taut and loose coils on successively drawn portions of the wire in coiling the wire on said draw block and removing the wire axially and tangentially in uncoiling it from the draw block.

13. The method of continuously drawing wire which consists in simultaneously drawing separated portions of the wire through a plurality of dies, wrapping the drawn wire upon draw blocks on the exit side of said dies, forming the drawn wire into a series of taut and loose coils on said draw blocks and frictionally holding the wire coiled on said draw blocks intermediate the ends of the coiled wire to thereby maintain the taut coils on said draw block and permit removal of the wire forming the loose coils.

14. The method of continuously drawing wire which consists in simultaneously drawing separated portions of the wire through a plurality of dies, wrapping the drawn wire upon draw blocks on the exit side of said dies, forming the drawn wire into a series of taut and loose coils on said draw blocks and frictionally holding the wire coiled on said draw blocks intermediate the ends of the coiled wire to thereby maintain the taut coils on said draw block and permit removal of the wire forming the loose coils, at a speed independent of that of which the drawn wire is formed in to the taut coils.

15. The method of continuously drawing wire which consists in simultaneously drawing separated portions of the wire through a plurality of dies, wrapping the drawn wire upon draw blocks on the exit side of said dies, forming the drawn wire into a series of taut and loose coils on said draw blocks and frictionally holding the wire coiled on said draw blocks intermediate the ends of the coiled wire to thereby maintain the taut coils on said draw block and permit removal of the wire forming the loose coils tangentially and at a speed independent of that of which the drawn wire is formed into the taut coils.

16. The method of continuously drawing wire which consists in simultaneously drawing separated portions of the wire through a plurality of dies, wrapping the drawn wire upon draw blocks on the exit side of said dies, forming the drawn wire into a series of taut and loose coils on said draw blocks and frictionally holding the wire coiled on said draw blocks intermediate the ends of the coiled wire to thereby maintain the taut coils on said draw block and permit removal of the wire forming the loose coils tangentially and at a speed varying from that at which the drawn wire is formed into the taut coils.

17. The method of continuously drawing wire which consists in simultaneously drawing separated portions of the wire through a plurality of dies, wrapping the drawn wire upon draw blocks on the exit side of said dies, forming the drawn wire into a series of taut and loose coils on said draw blocks and frictionally holding the wire coiled on said draw blocks intermediate the ends of the coiled wire to thereby maintain the taut coils on said draw block and permit removal of the wire forming the

loose coils tangentially and at speeds faster and slower than that at which the taut coils are formed on the draw blocks.

18. The method of continuously drawing wire which consists in simultaneously drawing the wire through a plurality of dies, wrapping the drawn wire upon draw blocks, frictionally holding part of said coils taut upon said blocks while the remaining coils hang loosely thereon, uncoiling the loosely coiled wire tangentially from said block and drawing the uncoiled wire through a second die.

In testimony whereof, I have hereunto signed my name.

ERNST BOLEY.