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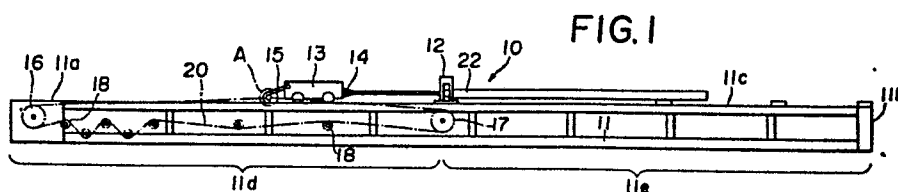
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64 **Apparatus for and method of drawing wire.**

57 Apparatus for drawing a wire includes an elongated frame 11. A carriage 13 is mounted on the frame 11 for movement therealong. A chuck 14 is mounted on the frame 11 for holding one end of the wire 22. A drawing die 12 is mounted on the carriage 13 for passing the wire 22 therethrough. A drive device 20 is operatively connected to the carriage 13 for moving it along the frame 11 away from the chuck 14 to pull the wire 22 through the die 12, thereby reducing the cross-section of the wire 22. There is also disclosed a method of drawing a wire.



"APPARATUS FOR AND METHOD OF DRAWING WIRE"

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an apparatus for and a method of  
5 drawing a wire to reduce a cross-section thereof.

Prior Art

One conventional wire drawing apparatus 10 shown in FIG.1  
comprises a horizontal elongated frame 11 having front and rear  
ends 11a and 11b, such wire drawing apparatus being commonly  
10 referred to as "drawbench" in the trade. A drawing die 12 is  
detachably mounted on the top 11c of the frame 11 and disposed  
intermediate opposite ends thereof. A carriage 13 is mounted  
on the top 11c of the frame 11 for reciprocable movement along  
a drawing section 11d of the frame 11 extending between the  
15 drawing die 12 and the front end 11a.

A chuck 14 is fixedly secured to one end of the carriage  
13 directed toward the drawing die 12. A hook member 15 is  
mounted on the other end of the carriage 13 for vertical  
pivotal movement. A drive pulley 16 is rotatably mounted on  
20 the front end 11a of the frame 11 while a driven pulley 17 is  
rotatably mounted on the frame 11 at a position below the  
drawing die 12. A plurality of guide rollers 18 are rotatably  
mounted on the frame 11 and disposed between the drive and  
driven pulleys 16 and 17. An endless chain 20 extends around

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the drive and driven pulleys 16 and 17 and guided by the guide rollers 18. The drive pulley 16 is operatively connected to a motor (not shown) for being driven for rotation. The endless chain 20 is composed of longitudinally disposed links 20a and transverse pins 20b as shown in FIG.2. The hook member 15 is adapted to be engaged with a selected one of the pins 20b of the endless chain 20.

For drawing a wire 22, one end of the wire 22 is first processed into a tapered shape, and the wire 22 is placed on the top 11c of a delivery section 11e of the frame 11 with the tapered end passed through a hole of the drawing die 12. Then, the tapered end passing through the drawing die 12 is clamped by the chuck 14. Then, the hook member 15 is pivotally moved downwardly to engage with the pin 20b of the endless chain 20 disposed below the hook member 15, as shown in FIG.3. The endless chain 20 is driven by the motor to move around the drive and driven pulleys 16 and 17 to move the carriage 13 along the frame 11 toward the front end 11a thereof, so that the wire 22 is pulled through the drawing die 12 to reduce the diameter thereof at a predetermined rate. Then, the wire 22 is detached from the chuck 14. Then, the drawing die 12 is replaced by another die having a hole smaller in diameter than the hole of the die 12. Then, one end of the wire 22 is processed to reduce its diameter so that the reduced or tapered end can be passed through the drawing die. The second drawing operation is carried out according to the above-mentioned procedure. Usually, the wire is drawn several times in this

manner, using drawing dies having holes of different diameters. Thus, the wire is reduced in diameter or cross-section at a predetermined rate each time the drawing operation is carried out. When a wire having a diameter of 20 mm is to be reduced to a diameter of 4 mm at a reduction rate of 20 %, the drawing operation must be carried out seven times, and each time the drawing operation is completed, the wire has to be transferred from the drawing section 11d to the delivery section 11e for the next drawing operation. This requires much time. In addition, with this conventional drawing method, it is necessary that the delivery section 11e should have a length generally equal to that of the drawing section 11d. Thus, the frame 11 has to be twice the length of the finished wire. As a result, the wire drawing apparatus 10 has an increased overall size and therefore is space-consuming.

#### SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a wire drawing apparatus which is substantially reduced in size and does not require a wire to be transferred from the discharge side to the delivery side for a subsequent drawing operation each time the drawing operation is completed.

Another object is to provide a method of drawing a wire in an efficient manner.

According to the present invention, there is provided an apparatus for drawing a wire which comprises an elongated frame; a carriage mounted on the frame for movement therealong;

a chuck mounted on the frame at one end thereof for holding one end of the wire; a drawing die mounted on the carriage for passing the wire therethrough; and drive means operatively connected to the carriage for moving it along the frame away  
5 from the chuck to move said die along the wire, thereby reducing the cross-section of the wire.

According to another aspect of the present invention, there is provided a method of drawing wire which comprises the steps of passing one end of the wire through a drawing die;  
10 holding the one end of the wire against movement; and moving the drawing die along the wire away from the chuck to reduce a cross-section of the wire.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a side-elevational view of a wire drawing  
15 apparatus provided in accordance with the prior art;

FIG.2 is a plan view of the portion of the wire drawing apparatus indicated by a circle A of FIG.1;

FIG.3 is a cross-sectional view of the portion of FIG.2;

FIG.4 is a side-elevational view of a wire drawing  
20 apparatus provided in accordance with the present invention;  
and

FIG.5 is a side-elevational view of a die of the wire drawing apparatus of FIG.4.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Like reference numerals denotes corresponding parts in the views of the drawings.

In the specification, the term "wire" means both a wire of  
5 the solid type and a hollow elongated element.

A wire drawing apparatus 30 shown in FIG.4 comprises a horizontal elongated frame 11 having front and rear ends 11a and 11b. A support member 31 is fixedly mounted on the top 11c of the frame 11 adjacent to the rear end 11b. A chuck 14 is  
10 fixedly mounted on one surface of the support member 31 facing away from the rear end 11b and spaced upwardly from the top 11c of the frame 11.

A carriage 13 is mounted on the top 11c of the frame 11 for reciprocable movement along the frame 11 between the chuck  
15 14 and the front end 11a of the frame 11, the carriage 13 having rolls 13a disposed in rolling engagement with rails (not shown) mounted on the frame 11. The carriage 13 has a vertically pivotable hook member 15 mounted on one surface thereof directed toward the front end 11a of the frame 11.

20 As described above for the wire drawing apparatus 10 shown in FIG.1, a drive pulley 16 and a driven pulley 17 are rotatably mounted on the frame 11, and an endless chain 20 extends around the drive and driven pulleys 16 and 17 and guided by guide rollers 18. The drive pulley 16 is operatively  
25 connected to an electric motor (not shown) for being driven for rotation.

A drawing die 12 is detachably mounted on the carriage 13 through a die holder 33, and has a hole 12a for passing the wire therethrough. The hole 12a of the die 12 has an axis disposed in alignment with the axis of the chuck 14 and  
5 disposed in parallel with the axis of the frame 11. The hole 12a of the die 12 tapers in a direction toward the chuck 14.

For drawing a wire 22, one end of the wire 22 is first processed into a tapered shape, and the wire 22 is placed on the top 11c of the frame 11 with the tapered end of the wire 22  
10 passed through the hole 12a of the die 12 and clamped by the chuck 14. At this time, the carriage 13 is located immediately adjacent to the chuck 14. Then, the hook member 15 is pivotally moved downwardly to engage with the pin 20b of the endless chain 20 disposed below the hook member 15. The  
15 endless chain 20 is driven by the motor for movement around the drive and driven pulleys 16 and 17 to move the carriage 13 along the frame 11 toward the front end 11a, so that the die 12 moves along the wire 22 to reduce the diameter thereof at a predetermined rate.

20 By virtue of the provision of the vertically pivotable hook member 15, the carriage 13 is caused to automatically stop when the hook member 15 reaches the drive pulley 16. After the die 12 moves past the free end of the wire 22 remote from the chuck 14, the drawing die 12 is detached from the die holder 33  
25 and replaced by another die having a die hole smaller in size than the hole 12a of the die 12. Then, the second drawing operation is carried out according to the procedure mentioned

above. The wire 22 is drawn several times in this manner, using a plurality of drawing dies having holes of different sizes until the wire 22 is reduced to a desired diameter.

With this construction, the wire drawing apparatus 30 does  
5 not require a delivery section as is the case with the prior art wire drawing apparatus 10 and therefore can be reduced to a length generally equal to the length of the finished wire. Thus, the wire drawing apparatus 30 is quite space-saving. In addition, the wire does not need to be transferred to the  
10 delivery section each time the drawing operation is completed. Therefore, the drawing operation can be carried out quite efficiently.



WHAT IS CLAIMED IS:

1. Apparatus for drawing a wire which comprises:
  - (a) an elongated frame;
  - (b) a carriage mounted on said frame for movement  
5 therealong;
  - (c) a chuck mounted on said frame at one end thereof for holding one end of the wire;
  - (d) a drawing die mounted on said carriage for passing the wire therethrough; and  
10 (e) drive means operatively connected to said carriage for moving it along said frame away from said chuck to move said die along the wire, thereby reducing the cross-section of the wire.
2. Apparatus according to claim 1, in which said carriage has  
15 a vertically-pivotable hook member mounted on one end thereof facing away from the one end of said frame, said drive means including an endless chain extending generally along said frame and having a plurality of transverse pins, and said hook member being engageable with one of said transverse pins so that the  
20 carriage is driven for movement along said frame.
3. Apparatus according to claim 1 or 2, in which said drawing die has a hole for passing the wire therethrough, said hole having an axis disposed in alignment with an axis of said chuck and disposed in parallel to the axis of said frame.
- 25 4. A method of drawing a wire which comprises the steps:
  - (a) passing one end of the wire through a drawing die;

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(b) holding said one end of the wire against movement; and

(c) moving said drawing die along the wire toward the other end thereof to reduce a cross-section of the wire.

5. A method according to claim 4, further comprising the step  
5 of processing said one end of the wire into a tapered shape before the step of passing.

FIG. 1

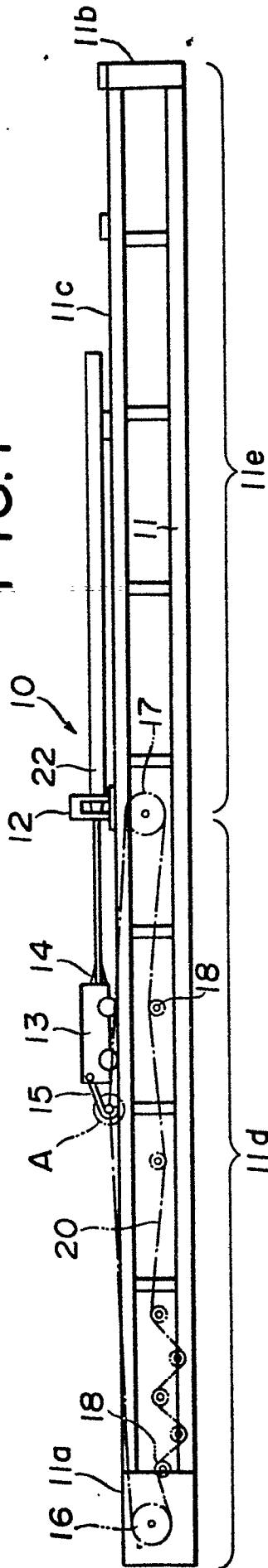


FIG. 2

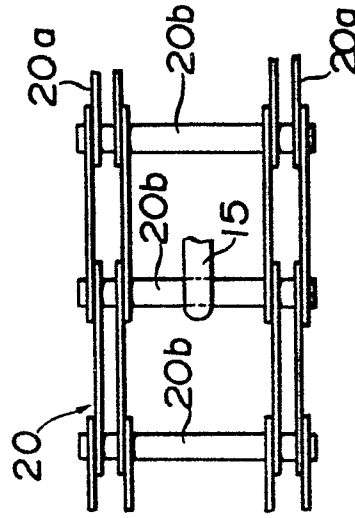


FIG. 3

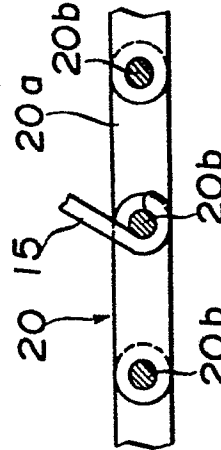


FIG. 4

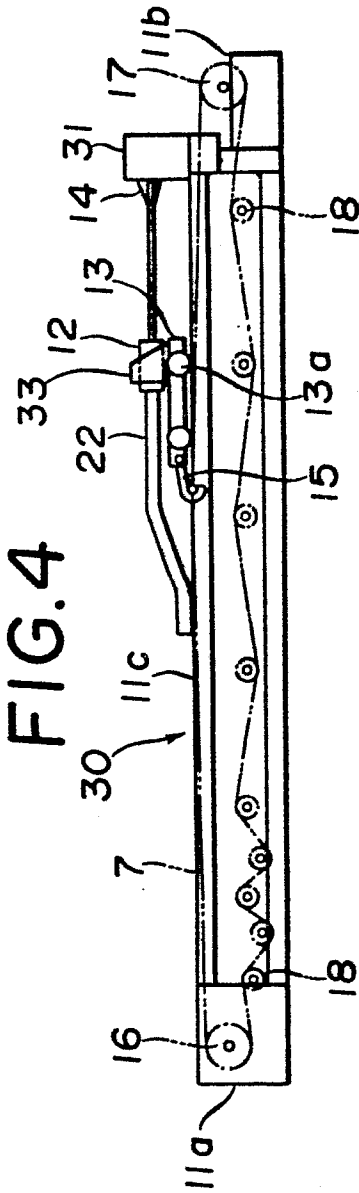


FIG. 5

