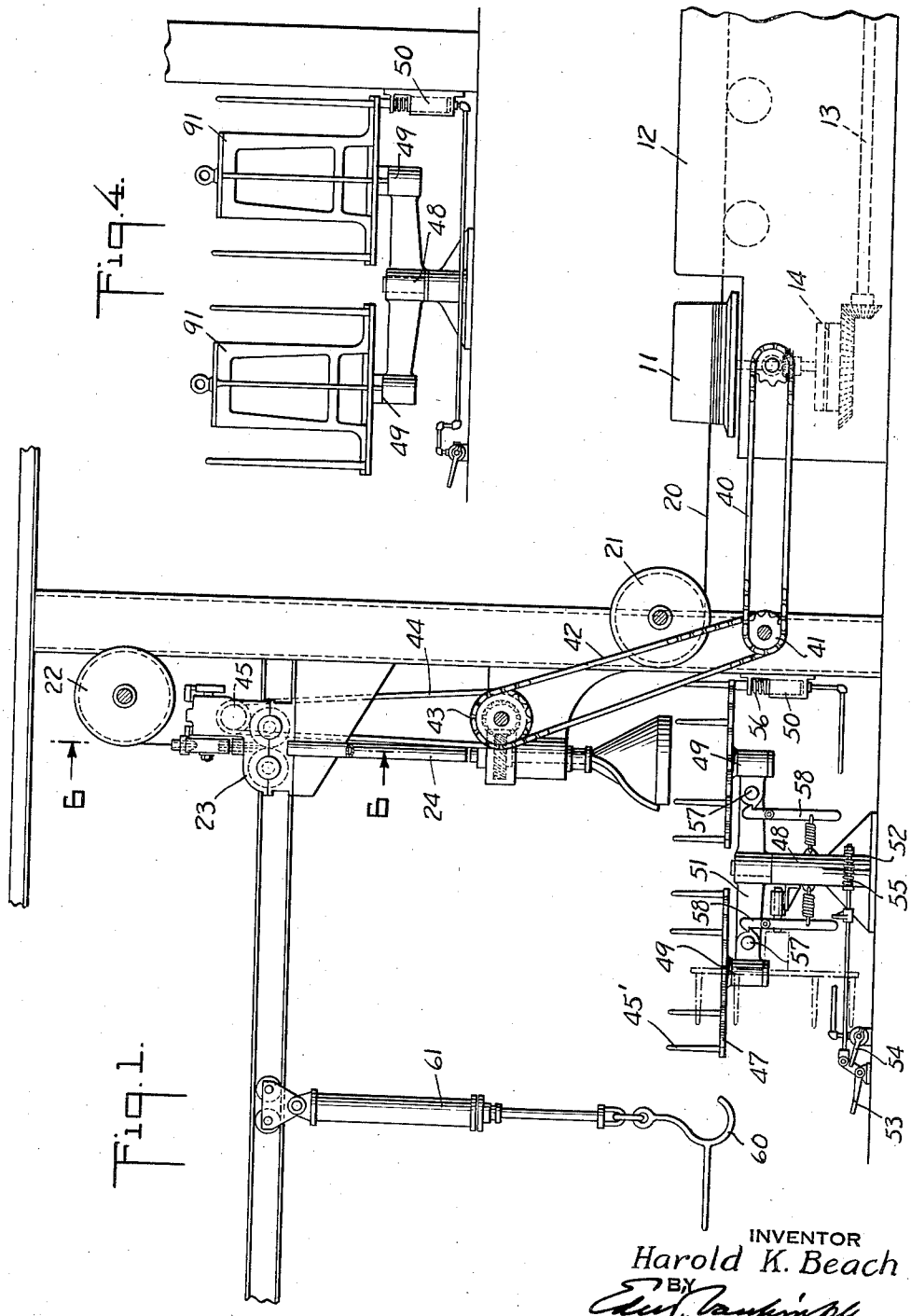
Aug. 9, 1938. H. K. BEACH 2,126,528

APPARATUS FOR CONTINUOUS WIRE DRAWING

Filed March 9, 1937 4 Sheets-Sheet 1



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APPARATUS FOR CONTINUOUS WIRE DRAWING

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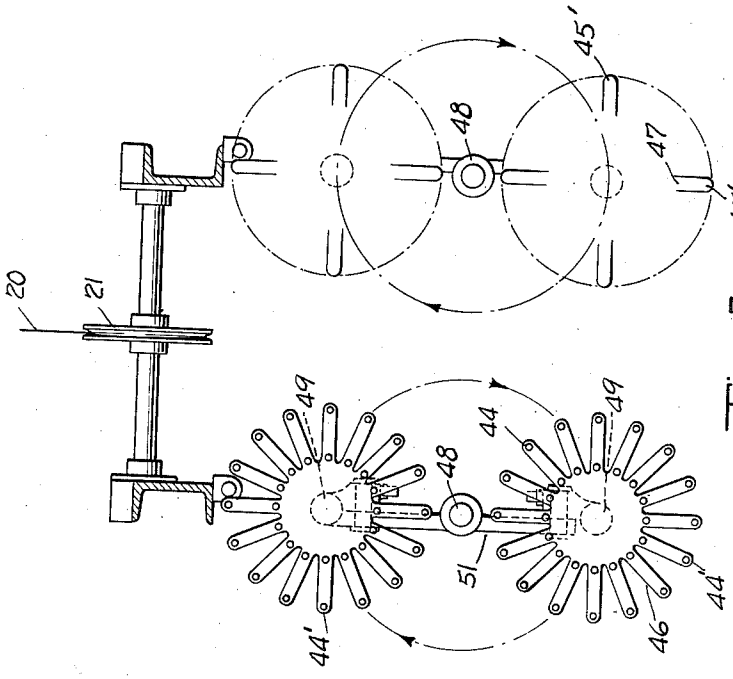


Fig. 3.

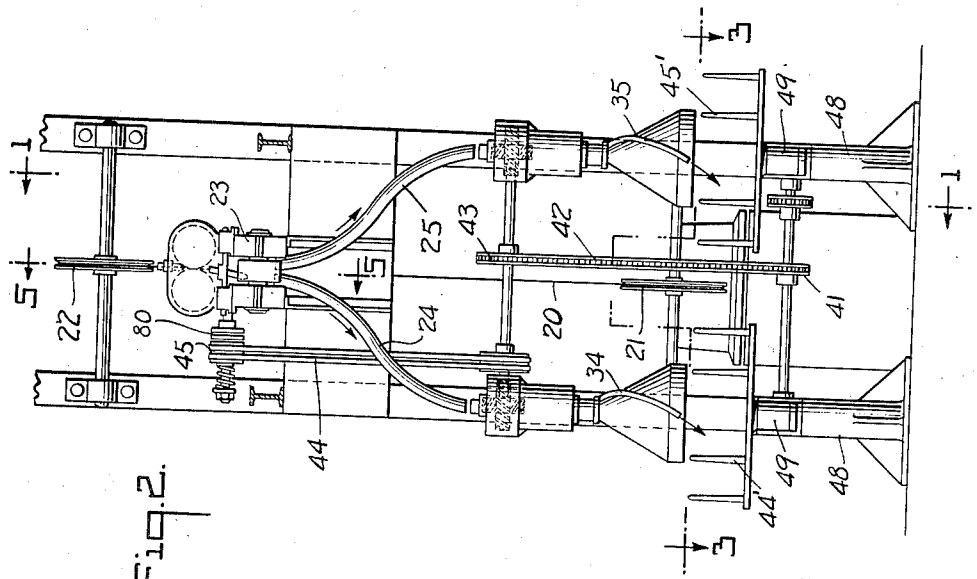


Fig. 2.

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APPARATUS FOR CONTINUOUS WIRE DRAWING

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Fig. 7.

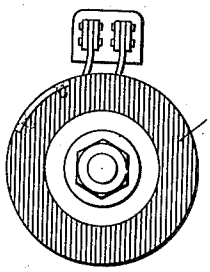


Fig. 5.

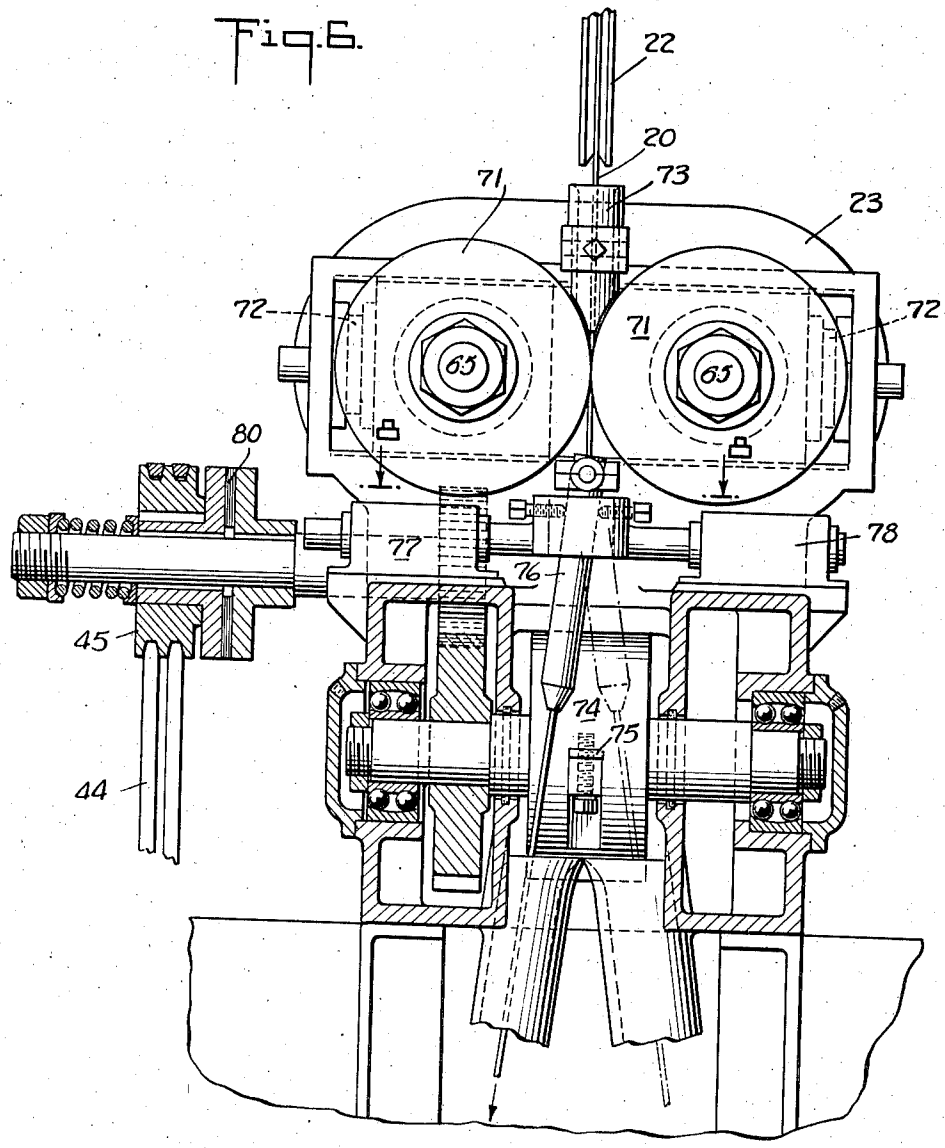
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APPARATUS FOR CONTINUOUS WIRE DRAWING

Filed March 9, 1937 4 Sheets-Sheet 4

Fig. 6.



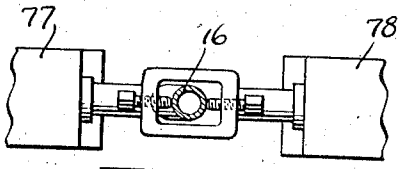


Fig. 8.

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UNITED STATES PATENT OFFICE

2,126,528

APPARATUS FOR CONTINUOUS WIRE DRAWING

Harold K. Beach, Cranford, N. J., assignor to Phelps Dodge Copper Products Corporation, New York, N. Y., a corporation of Delaware

Application March 9, 1937, Serial No. 129,799

2 Claims. (Cl. 242—80)

My invention relates to the drawing and the coiling of wire, more particularly to a device which provides a means for the easy removal of a finished coil of wire without the necessity of interrupting the progress of the wire or the stopping of the wire drawing machine, thereby saving the time so lost to production.

In the usual method of drawing wire, it is necessary to stop the wire drawing block to permit the removal of the finished coil of wire, causing an interruption in the production, for the time required for this removal. At the modern speeds of wire drawing, this loss of time will amount to fifty per cent or more of the total operating time for medium and coarse gages of wire drawing.

There is also a definite limit to the weight of the finished coil that may be drawn and the speed of drawing, the weight being limited by the capacity of the block, the speed being limited by the tangling of the wire due to centrifugal force at the upper part of the coil.

One of the objects of this invention is to produce a device that will eliminate these delays so that the wire drawing may be uninterrupted.

A further object of my invention is to produce a device that will be able to coil wire in any commercial sizes at a speed limited only by the characteristics of the metal being drawn and by the durability of the drawing dies and also to provide means to procure coils of any desired weight.

My invention comprises a plurality of coilers of the laying type, a shear, and means for directing the strand of wire into the shear and simultaneously transferring this wire from one coiler to another without interrupting the progress of the drawn wire. I may use in combination with the above, a set of pinch rolls for maintaining tension on the wire coming off the drawing block and to feed the end of the wire, after the wire has been severed by the shear, into the coilers.

I am aware that wire machines have been operated with a continuous wire drawing head in which the wire was laid on a stationary auxiliary block by means of a rotating arm. The principle of continuous heads of this type is such that they require mechanical construction that is inherently not suitable for drawing at modern speeds of wire drawing, and in addition, if the machine is made of practical dimensions at the speed required, the wire is subjected to bends around small pulleys, injuring the physical characteristics of the wire.

With that device there is constant liability of the tangling of the coil unless an operator is constantly arranging the strands of wire as they are laid on the block, due to the wire being pushed along a stationary horizontal block by the pressure of the strand of wire against the fillet of the block.

My device is mechanically suitable for operation at the highest practical speed of drawing, permits the use of guide pulleys large enough to avoid injury to the physical characteristics of the wire, and is not subject to tangling.

The foregoing and other features of my invention will now be described in connection with the accompanying four sheets of drawings forming part of this specification in which I have represented my device in its preferred form, after which I shall point out in the claims those features which I believe to be new and of my own invention.

In the drawings:—

Figure 1 is a side elevation of my device, with the drive and drawing head of a wire drawing machine shown in dotted lines on the right side of the figure.

Figure 2 is a side elevation at right angles to that shown in Figure 1.

Figure 3 is a plan view showing the arrangement of my coil carriers and their relative movement.

Figure 4 is an elevation of a coil carrier in modified form.

Figure 5 is an enlarged detailed section along the line 5—5, Figure 2.

Figure 6 is an enlarged detailed section along the line 6—6, Figure 1.

Figure 7 is a detail of a revolution counter which I may employ.

Figure 8 is a part section of my transfer device along the line 8—8, Figure 6.

In the carrying out of my invention I utilize a capstan 11 of any commercial wire drawing machine 12 having a power shaft 13 and clutch 14 by means of which the capstan 11 may be stopped or revolved at will.

The finished drawn wire 20 is led around guide pulleys 21—22 of large diameters into a combined feed, shear and transfer device contained in the housing 23 and thence through the guide pipes 24 or 25 into their corresponding laying coiler 34 or 35.

The mechanism in the housing 23 and the coilers 34—35 are all driven synchronously with the wire drawing block 11 by means of the belts and pulleys 40, 41, 42, 43, 44, 45, as shown, or I may use an alternating current generator (not

shown) which may be connected to the drive shaft 13 and having individual synchronous motors driving each of the separate shafts, the motors being operated from the generated source of power.

The coilers 34—35 are of the laying type and although the application to the art of drawing wire is new, they are well known to the art of rolling rods, so they require no further description here. Sufficient to say that these coilers with their flying arms lay the wire into suitable receptacles for the coil of finished wire, the form of these receptacles being adapted to the requirements for the subsequent handling of the wire.

If the wire is not subjected to further processing and is to be shipped in coils, I provide receptacles comprising an assembly of pins 44'—45' arranged in two circles as shown in Figures 2 and 3 upon a spider 46—47. I shall preferably set under each coiler two of these spiders mounted on a rotating member 48 so that the finished coil of wire may be tied up and removed from the full spider while the empty spider is receiving the wire from the continuously rotating coiler. These spiders rotate on centers 49 and are held from rotating while receiving the wire from the coiler by a suitable lock 50. The rotating member 51 is held in place by lock 52. These locks may be released by foot treadles 53—54 and are held in engagements by the springs 55 and 56 respectively.

It may be convenient or desirable in some instances to tip the spiders 47 so I provide a pivot 57 and locking means 58. Upon release of the latch 58 the spider will swing to a plane at right angles to its original position and from there the coil of wire may be removed by the hook 60 provided for the purpose, operated by the crane 61.

If the wire is subject to further processing, I may use removable spiders 91 set on a rotating spider 48 provided with suitable means of locking into position 50, all as detailed in Figure 4. The wire may be taken through any subsequent steps of manufacture, such as annealing, on these removable spiders, and they will then act as take-off spiders for the drawing operation which may follow.

The housing 23 contains pinch rolls 71 suitably grooved for the gage of wire being drawn which are held together by compression springs 72. While I have indicated rubber blocks, these springs may be made of coil wire. I provide a guide 73 to aid the wire 20 to enter the wire groove in the pinch rolls 71. Below these rolls 71, I provide rolls 74 mounted to revolve at a distance apart to accommodate free movement of the wire so that the wire may pass freely between the rolls. These rollers have a smooth periphery and carry in the middle of their faces shear knives 75. I may employ an anvil shear or its equivalent in the same location and do not wish to be limited to the shearing means.

Between the pinch rolls 71 and the rotating shear 74 I provide a movable guide 76 which is mounted to swing across the face of the rotating shear by means of the solenoids 77—78 or the equivalent mechanism. These solenoids may be operated manually by closing an electric switch or I may automatically actuate them by an electric switch 79 operated by a counter mechanism 99 driven by the revolving pinch rolls 71, so that the solenoids operate to move the transfer device so as to transfer the wire automatically upon a pre-delivered length of wire being drawn. The counter mechanism 99 is geared so that with one revolution of the wheel 79 the length of wire passed into the laying coiler is the equivalent of a full coil of wire. Upon the completion of the revolution the solenoid circuit is energized and the transfer device is set in operation. The wheel 79 is preferably made of mica with a metallic inset as shown.

When the guide 76 is in the position shown in full lines, it directs the wire into guide pipe 24 leading to its coiler 34; when in the position shown in dotted lines it directs the wire into guide pipe 25 leading to its coiler 35. In its movement from one coiler to the other the wire is passed between the shear knives 75. The width of the knives and the speed of travel of the guide are so adjusted to the speed of the wire that contact of the wire with the knives will occur only once in one revolution of the rolls of the rotating shear.

The pinch rolls are driven through the revolving pulley 45 which is mounted on shaft 62 on which is mounted the gear 63 meshing with gear 64 mounted on shaft 65 with the pinch roll 71. The gear 63 also drives gear 66 on the shaft 67 carrying the cutting mechanism 74.

The pinch rolls and rotating shear are driven at synchronous speeds through suitable gear, the entire mechanism being driven from a shaft either mechanically as shown from the wire drawing power line 13 or by a synchronous motor. I prefer to drive through slip friction 80 with the driving pulley at a speed slightly above the synchronous speed as an insurance against slackness in the wire.

I wish it distinctly understood that my apparatus for continuously drawing wire herein described and illustrated is in the form in which I desire to construct it and that changes or variations may be made as may be convenient or desirable without departing from the salient features of my invention and I therefore intend the following claims to cover such modifications as naturally fall within the lines of invention.

I claim:—

1. An apparatus for continuously forming wire into coils, comprising in combination, means for supplying wire, a plurality of laying coilers, means interposed between the wire supply means and the coilers for transferring the wire from one coiler to the other without interruption of the progress of the wire, comprising shear knives continuously rotating at the peripheral speed substantially equal to the speed of the wire, means for transferring the wire from one coiler to the other and across the path of the shear.

2. An apparatus for continuously forming wire into coils, comprising in combination, means for supplying wire, a plurality of laying coilers, means interposed between the wire supply means and the coilers for transferring the wire from one coiler to the other without interruption of the progress of the wire, comprising shear knives continuously rotating with a peripheral speed substantially the same as the speed of the wire, a guide normally inoperative but capable of moving in a path parallel to the shear knives so that the wire is severed in its passage between the shear and while passing from one coiler to the other.

HAROLD K. BEACH.