H. SAVILLE.

CONTINUOUS WIRE DRAWING MACHINERY.

APPLICATION FILED AUG. 14, 1909.

954,888.

Patented Apr. 12, 1910.

Fig. 5.

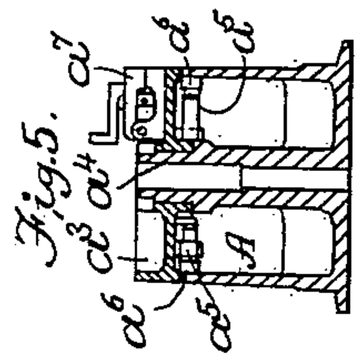


Fig. 6.

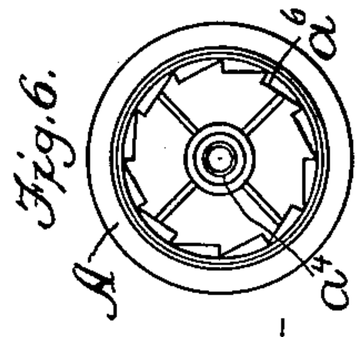


Fig. 7.

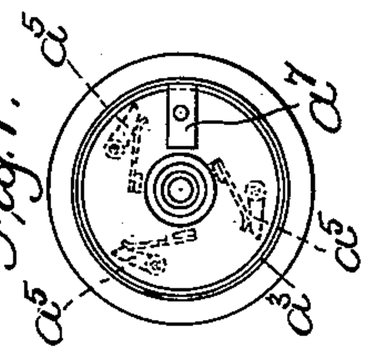


Fig. 3.

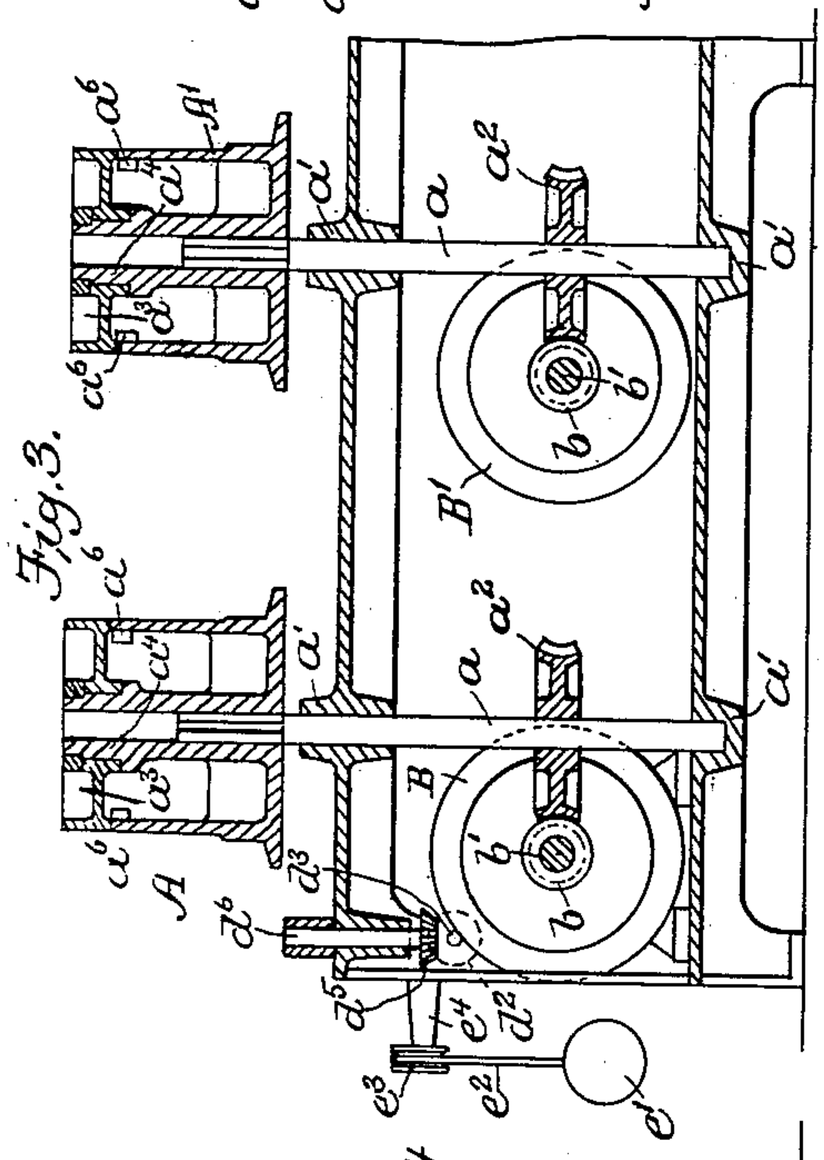


Fig. 4.

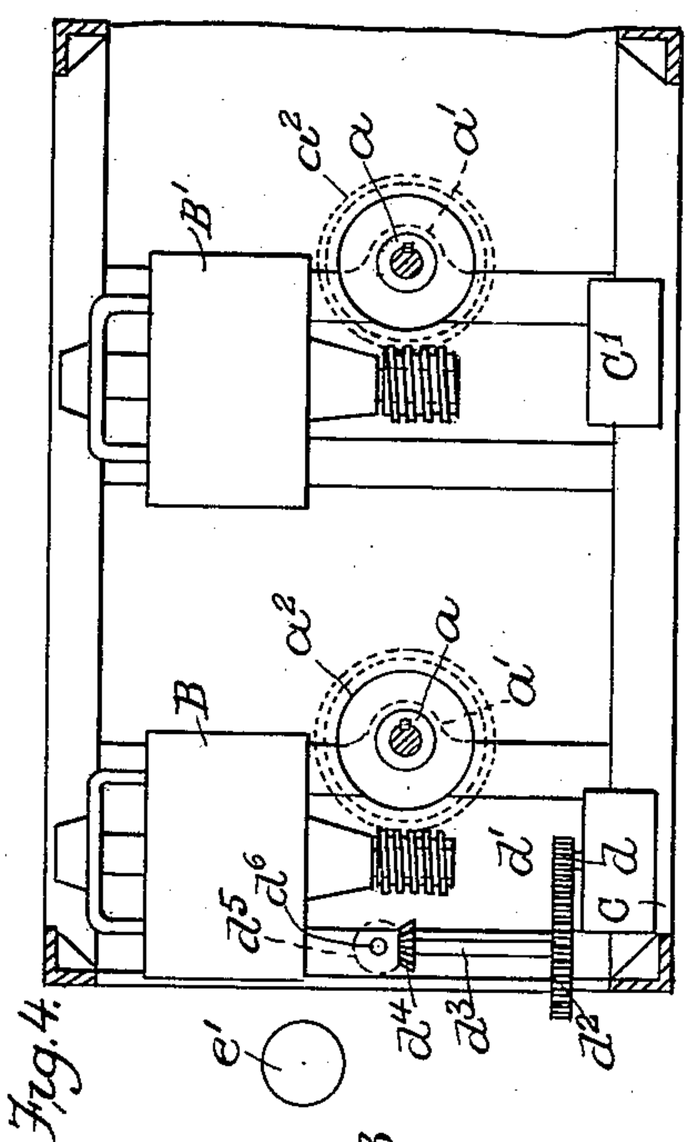


Fig. 1.

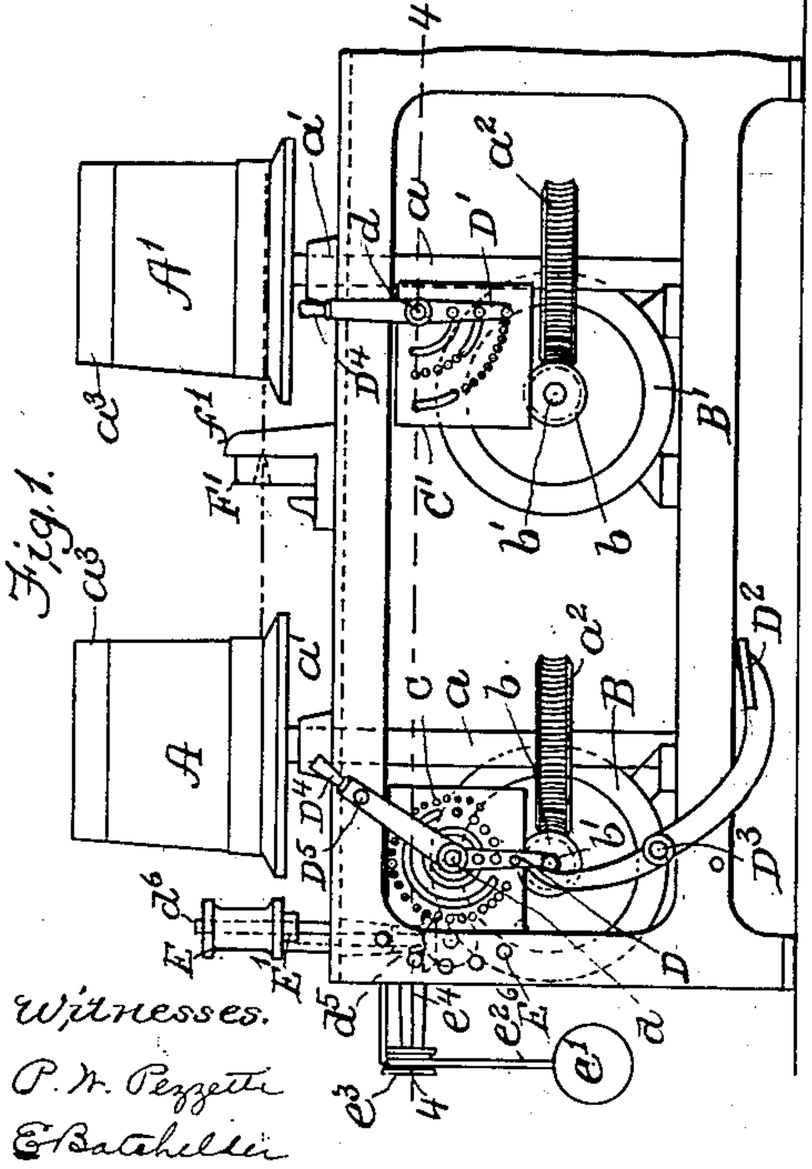
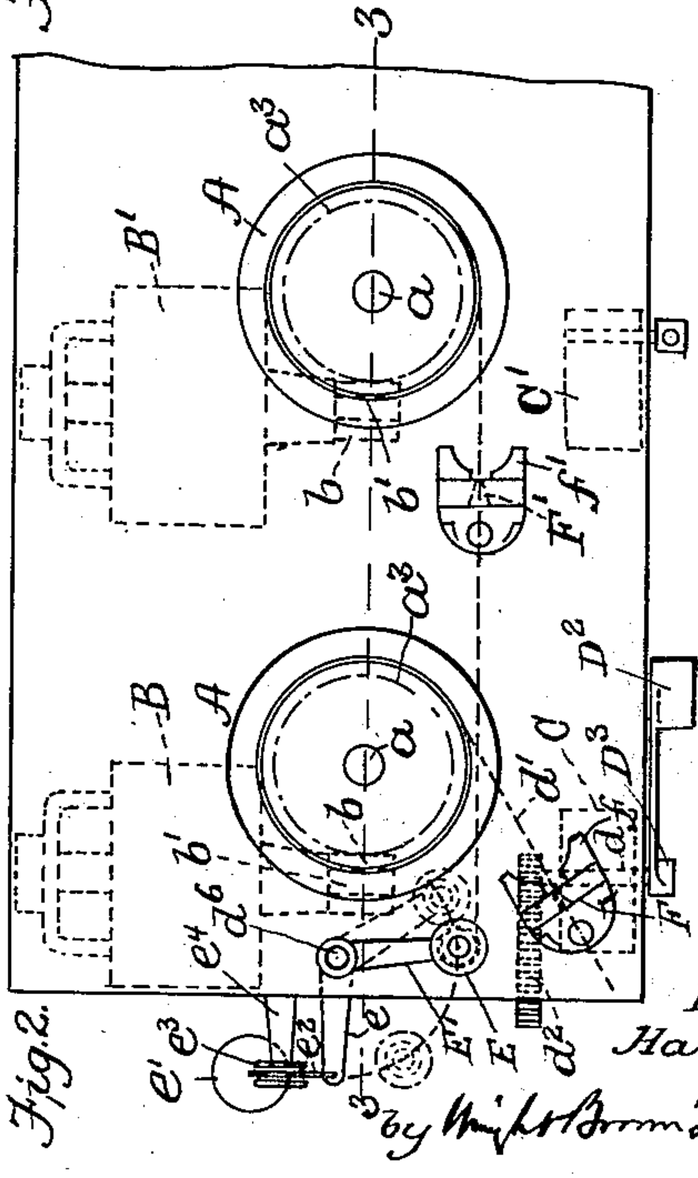


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

HARRY SAVILLE, OF CLECKHEATON, ENGLAND, ASSIGNOR TO THE BRITISH STEEL AND WIRE COMPANY, LIMITED, OF MANCHESTER, ENGLAND.

CONTINUOUS-WIRE-DRAWING MACHINERY.

954,888. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed August 14, 1909. Serial No. 512,913.

To all whom it may concern:

Be it known that I, HARRY SAVILLE, a subject of the King of Great Britain, residing at Laurel Bank, Booth Street, Cleckheaton, in the county of York, England, have invented certain new and useful Improvements in Continuous-Wire-Drawing Machinery, of which the following is a specification.

This invention relates to continuous wire drawing machinery wherein the wire to be drawn is reduced in diameter a number of times by being passed through a series of dies in one continuous drawing process.

In drawing wire by the continuous process it is necessary in practice to revolve each forwarding drum faster than the preceding one in order to allow for the elongation of the wire due to its reduction in thickness. The required speed is only obtainable approximately by calculation, as the variation in the size of a die and the wear which takes place during each wire drawing operation make it necessary to revolve the forwarding drums at a speed greater than would deliver the theoretically ascertained amount for elongation. Also when different sizes of wire are to be drawn, and the reductions vary at each die from what was calculated for some other size of die, a certain amount of slip takes place between the wire and the forwarding drums owing to the latter revolving at a peripheral speed in excess of the speed at which the wire is traveling. This slipping of the wire around the forwarding drums, removes the coating, scratches the wire, and destroys the wire forwarding seats of the drums.

The chief object of this invention is to obviate the above mentioned slipping, and to provide means whereby each forwarding drum will deliver exactly the amount of wire needed to supply the next succeeding drum.

A further object of the invention is to provide means whereby the slack end of the wire which has been pulled through the die by hand for attachment to the drum, can be readily taken up, thereby avoiding breakage of the wire when the drum is started to revolve.

According to this invention in order to enable each forwarding drum to deliver exactly the amount of wire required to supply its succeeding drum, each drum is driven from an independent motor and the pull exerted upon the wire by each succeeding drum is utilized to control the speed at which the preceding drum is driven. An arrangement for effecting this purpose consists in driving each drum from a separate electric motor provided with a rheostat control, the wire as it leaves each drum passing over a pulley mounted upon a mechanically controlled movable arm or member, and from thence through a drawing die to the next succeeding drum and so on throughout the series, the arrangement being such that any variation in pull exerted upon the wire by any succeeding drum, imparts movement to the aforesaid arm of the preceding drum, which movement is utilized to actuate a controlling arm on the rheostat for regulating the speed of the motor of that drum in accordance with the aforesaid variation in pull.

Each drum is made with a movable portion capable of being rotated independently of the drum in one direction only, and provided with means for securing the end of the wire thereto.

In order that the said invention may be clearly understood and readily carried into effect the same will now be described with reference to the accompanying drawings, in which:—

Figure 1 is an elevation of part of a continuous wire drawing machine showing the mechanism whereby variation in the amount of wire delivered to a succeeding drum controls the speed of rotation of the preceding drum. Fig. 2 is a plan of Fig. 1. Fig. 3 is a section taken on line 3, 3 of Fig. 2. Fig. 4 is a section taken on line 4, 4 of Fig. 1. Fig. 5 is a vertical section of one of the drums drawn to a larger scale. Fig. 6 is a plan of the drum shown in Fig. 5 with the rotatable portion removed to show the ratchet teeth, and Fig. 7 is a plan of the rotatable portion showing the position of the pawls.

A, A′ represent the first and second drums, B, B′ the electric motors for driving the same, C, C′ the rheostats for controlling the speed of such motors, D, D′ the switch or controlling arms, E the pulley, and E′ the pulley arm for actuating the said arms, and F, F′ the first and second drawing dies.

With reference more particularly to Figs. 1 to 4, each of the drums A, A′ is mounted upon an upright shaft *a* journaled in bearings *a′* in the machine frame. Each such

shaft carries a worm wheel a^2 which gears with a worm b fixed or formed on the spindle b' of each of the motors B, B'. The controlling arm D of the rheostat C is mounted on a spindle d on which is fixed a pinion d' (Fig. 4) gearing with a spur wheel d^2 fixed on a shaft d^3 which also carries a bevel wheel d^4 gearing with a bevel wheel d^5 mounted on an upright shaft d^6. Fixed on this shaft is the arm E' carrying the pulley E. A second arm e is also fixed on the aforesaid shaft, and such arm is connected to a weight e' by a cord e^2 passing over a pulley e^3 supported from a bracket e^4 connected to the machine frame. The first and second drawing dies F, F' are mounted in holders f, f' fixed in suitable positions on the machine frame in relation to their respective drawing drums.

a^3 represents the movable portion rotatably mounted upon the axial sleeve a^4 of its respective drum and provided with a number of spring controlled pawls a^5 (Fig. 7) which engage with ratchet teeth a^6 formed on the inner periphery of the drum and permit of independent rotation of the said portion in one direction only. Each of the rotatably mounted portions is provided with a clamping device a^7 for holding the end of the wire.

If desired the controlling arm may be actuated by hand or by foot in addition to being actuated by variation in the amount of wire delivered from one drum to another, and in Fig. 1 a treadle D^2 is shown pivoted on a stud D^3 carried by the machine frame in such a position that its upper end can bear against the controlling arm D. A hand lever D^4 is also fixed upon each shaft d and may be provided with a locking pin D^5 as shown in connection with the first drum A to engage with any of a number of holes D^6 formed in the machine frame for enabling such lever to be secured in different positions for causing the motor to revolve at any predetermined speed when the drum is used singly, or as a finishing, or storing drum.

The operation is as follows:—After the wire has been pointed, a sufficient length is drawn through the first die F to enable its end to be secured to the clamping device a^7 on the rotatably mounted portion a^3 of the first drum A. The portion a^3 is then revolved by the operator independently of its drum until any slack wire has been taken up and wound onto the latter. Several wraps of wire are then wound onto the drum by setting its motor into operation, after which the motor is stopped and the end of the wire is taken out of the clamping device and is passed over the pulley E. A length of wire is then drawn through the second die F' and its end is secured in the clamping device on the rotatably mounted portion of the second drum any slack wire being taken up by rotating such portion in the manner above described. When the wire is in this position, the motor of the second drum is set in motion and the drawing operation commences. Owing to the pull of the wire upon the pulley E, the arm E' is moved in opposition to the pull exerted by the weight e' and causes the controlling arm D to be moved in a direction to start the motor of the first drum and to accelerate its speed until it will deliver just the amount of wire required by the succeeding drum. Should the die "stop up," the wire will be drawn finer than it was when originally started, with the result that less wire will be fed to the second drum, in which case the loop passing over the pulley will lengthen and will permit the weight to move the controlling handle in a direction to reduce the speed of the motor appertaining to the first drum. In the event of the die "cutting out," the wire delivered to the second drum will be larger than it was when originally started, consequently more wire will be required from the preceding drum with the result that the loop passing over the pulley will shorten and so move the arm to actuate the controlling handle in a direction to increase the speed of the preceding motor.

By the arrangement above described any number of drums can be employed in a machine and any one of them can be used as a finishing drum and can operate to control all the preceding drums.

In the drawings, the first drum only is shown as provided with the automatic regulating device, but it is to be understood that in the event of more than two drums being employed, all of the drums except the last one of the series would be fitted with the automatic regulating device.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a continuous wire drawing machine, the combination with the dies and drums, of electric motors for rotating such drums, switches for controlling said motors, and means whereby the pull exerted upon the wire by one drum controls the speed of the electric motor by which the preceding drum is driven.

2. In a continuous wire drawing machine, the combination with the dies and drums, of electric motors for rotating such drums, a rheostat electrically connected with each electric motor, a controlling arm forming part of said rheostat, means whereby said controlling arm is actuated in one direction by the pull exerted upon the wire by a succeeding drum, and means for exerting a pull upon the controlling arm in opposition to the pull exerted by the wire.

3. In a continuous wire drawing machine, the combination with the dies and drums, of electric motors for rotating such drums, a rheostat electrically connected with each

electric motor, a movably mounted arm operatively connected with the controlling arm of the rheostat, the first mentioned arm being actuated in one direction by the pull exerted upon the wire from a succeeding drum, and means for exerting a pull upon such arm in opposition to the pull exerted by the wire.

4. In a continuous wire drawing machine, the combination with the dies and drums, of a pivotally mounted arm carrying a pulley over which a loop of wire passes from one drum to the next succeeding drum, means for exerting a pull upon such arm in opposition to the pull exerted thereon by the wire, a separate electric motor operatively connected with each drum, a rheostat electrically connected with its respective motor, and a controlling arm for said rheostat operatively connected with the pivotally mounted arm.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY SAVILLE.

Witnesses:
P. MACLELLAN THOMSON,
W. ROBINSON.