Oct. 9, 1934. W. ROHN 1,976,247

WIRE DRAWING MACHINE

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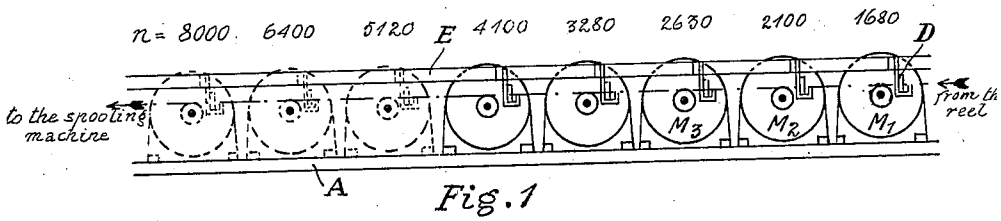

Fig. 1

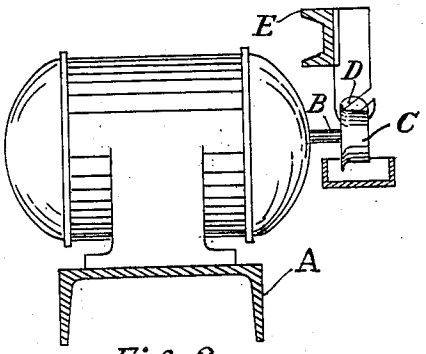

Fig. 2

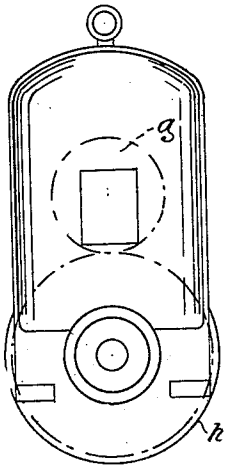

Fig. 3

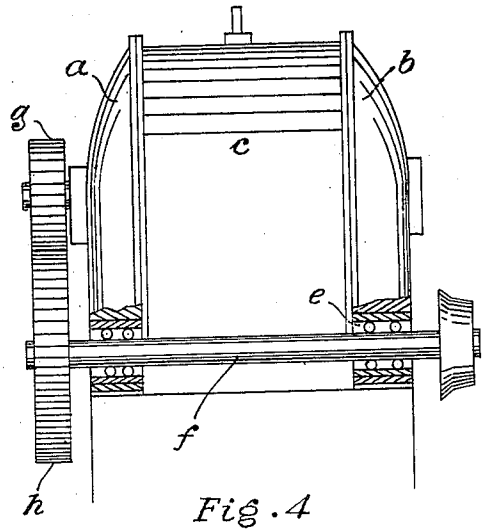

Fig. 4

Inventor:
Wilhelm Rohn
by
Paul Fuchs
Attorney

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WIRE DRAWING MACHINE

Wilhelm Rohn, Hanau-on-the-Main, Germany

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3 Claims. (Cl. 205—14)

This invention relates to improvements in wire drawing machines.

The invention is illustrated in the annexed drawing of which Fig. 1 is a diagrammatic longitudinal section showing the general arrangement of the elements of the machine. Fig. 2 is a cross-sectional view on an enlarged scale. Figs. 3 and 4 show a front view and a side view respectively of one of the motors combined with an intermediate gear train.

In the case of machines of older construction for drawing wire in a number of operations all the drawing discs are driven from a common shaft, that is to say with rigid ratios as regards the relative speeds of rotation. It is well known that in connection with such machines an undesirable wear of the drawing discs takes place as it is necessary to permit of a continuous backward slipping of the wire relatively to the drawing discs as it is practically impossible to impart exactly the theoretical correct ratio to the reductions in cross sections of the wire in the separate drawing dies and to the peripheral speeds of the separate drawing discs, and to the actual surface of the winding reel at the succeeding times. In order to overcome this objection it has been proposed to drive each separate drawing disc by means of a separate motor and to provide the motors with such regulating devices that slipping of the wire relatively to the drawing discs is obviated.

Such devices have proved entirely satisfactory in practice, but their economical result was, however, very unsatisfactory as in these constructions it was necessary to provide a separate gear train between each separate motor and the drawing disc driven thereby. It is, however, clear that it is considerably more inconvenient and expensive for example in a drawing machine in which a ten fold reduction is to be produced to have ten separate gear trains between the ten motors and the ten drawing discs, than to have a single motor and a combined gear train by which all the drawing discs are driven.

The difficulty above referred to can be overcome and a particularly simple and inexpensive construction of multi-wire drawing machines is obtained if the use of gear trains between the driving element and the drawing discs are omitted and the drawing discs are connected directly to the free shafts of the driving elements. This construction disregarding the regulation of the separate driving elements, has considerable advantages as will be described hereinafter. In order not to arrive at uneconomical slowly rotating types of motors it is preferable to make the drawing discs only about twenty to forty times the diameter of the wire when mounting the drawing discs on the shafts of the usual electric motors. Thorough researches have shown that the quality of the drawn wire is in no way influenced deleteriously in this manner. If, for example, it is desired to draw 1 mm. wire at a speed of 120 m. per minute, 2 m. per second, there may be used for this purpose a drawing disc having a diameter of 40 mm. which is mounted directly on the shaft of a motor making 1,000 revolutions per minute.

According to the present invention it is also possible to use drawing discs of substantially larger diameter and in spite of this to retain the simple construction of the drawing machine from units which are each separately removable from a base plate if the driving discs are mounted on the shafts of the driving elements which in the known manner consist of a motor built together with a simple gear.

For the construction by way of example of a ten fold wire drawing machine wherein the wire to be drawn is to be reduced in cross section by 20% on each separate drawing disc there are the following possibilities of construction.

The complete reduction in cross section of the wire which is supplied to the first drawing disc to the wire passing from the last drawing disc amounts to about 1:6 so that the delivery speed amounts to about six times the feeding speed. It is then possible to make all the drawing discs of the same diameter and, for example, drive the first drawing disc by a motor with 500 revolutions per minute and the last drawing disc by a motor making 3,000 revolutions per minute. Or all the motors may have the same speed and the last drawing discs are made six times the diameter of the first drawing discs. Finally a portion of the increase in speed of the wire may be obtained by increasing the speed and a portion by increasing the diameter of the drawing discs. The first method of operation is used with particular advantage when the same operation is always to be carried out in the drawing machine. It becomes still more favourable when in the drawing machine, for example, as a rule wire is to be drawn from 5 mm. to 1 mm. and when in a particular case for example it is desired to obtain wire having a diameter of 2 mm. In this case the motors with the drawing discs which are required for drawing from 2 to 1 mm. are removed and put on another base-plate and are used for the separate drawing of another quantity of material, from 2 to 1 mm.

The second method of construction is of particular advantage when it is desired to effect considerably different operations. If all the motors have the same speed and there are used, for example, ten motors assembled in the form of a bench for drawing a wire from 2 mm. to 0.6 mm. then if it is necessary in the meantime to produce a larger quantity of wire, for example, of only 1 mm. to separate the last five motors and assemble them so as to form a separate drawing machine. If then the drawing discs originally fitted to these motors are replaced by suitably smaller drawing discs then it is possible by means of these five separated elements also to draw wire from 2 to 1 mm. The two groups of operating elements are then to a certain extent arranged in parallel. For other purposes of use it will be understood that a suitable sub-division of the original machine can be effected and the separate elements suitably assembled.

The third method of operation is used when it is desired to effect a very considerable reduction in diameter in the machine. It is then in practice extremely difficult in many cases to reduce the speeds of rotation of the driving motors in a suitable manner when the drawing discs are all of the same diameter as it would be necessary for the first motor to have an abnormally low speed or an abnormally high speed of rotation for the last motor. In such cases it is advisable besides effecting a gradation by means of the speed of rotation of the motors also to effect an additional gradation by making the drawing discs of different diameters.

By means of the multi-wire drawing machines above described the following advantages are also obtained.

It is only necessary to provide solely separate motors each of which if desired is built together with a simple gearing so as to form a unit and bolted side by side for example, on a U-shaped iron. Such motors can be obtained at any time from stock or are obtainable very quickly. The requirement of special parts is solely in respect of simple and inexpensive drawing discs. It is clear that electric motors as standard articles can be obtained quicker and more cheaply than wire drawing machines with individually constructed gear trains. Wire drawing machines composed of separate motors have at the same time also the advantage of particular adaptability. If, for example, it is necessary on one occasion to produce a small quantity of thin wires then for example it is possible to construct from 120 separate motors with drawing discs applied thereto 10 twelve-fold drawing machines in that 12 separate motors are bolted side by side, for example, on a U-shaped iron plate forming a bed. If at another time it is necessary to produce a larger weight of thicker wires the same 120 separate electric motors are, for example, assembled so as to form 15 eight-fold drawing machines or 20 six-fold drawing machines.

Although the costs of installing a drawing machine according to the present invention are not higher than those for the usual drawing machines the driving members in the case of a machine which would have to be scrapped prematurely have a considerably higher value than those of the known drawing machines. In the known arrangements the gear trains which are mounted in the machines separately from the driving members can only be used usefully in the rarest of cases. As, however, separately constructed gear trains in the known arrangement constitute the main portion of the costs of installation of the machine then when the machine is no more in use a considerable portion of the costs expended become practically valueless.

It is known to arrange separate elements of a wire drawing machine within a common framework. In the known drawing machine it was, however, not possible to simply and easily exchange the separate elements mounted on the base plate as gear trains and drawing discs for each separate element were mounted separately on the bed.

Figure 1 of the accompanying drawing shows diagrammatically in longitudinal section the arrangement of the separate drawing machine elements in accordance with the application mounted on a base plate, whilst Figure 2 shows a cross section of a drawing machine. On a U-shaped iron A are fitted motors M_1, M_2 and so forth. On the shafts B of the motors are fitted the drawing discs C. The drawing dies D are supported on a separate U-iron E. From Figure 1 it will be clearly seen that a suitable group of motors (indicated in the drawing by dotted lines) can be separated and assembled to form a separate drawing machine. In Figure 1 there are indicated on the separate motors the number of revolutions which these motors may, for example, have.

Figures 3 and 4 of the accompanying drawing show a driving element consisting of a motor combined with an intermediate gear train. A driving ring is mounted upon the free shaft of the gearing.

The two bearing shields *a* and *b* of the electric motor *c* shown in Figure 4 are each provided with an extension, each of which has a bearing *d* and *e* for the shaft *f*. The end of the shaft of the electric motor opposite to the operative side carries a pinion *g* gearing with a toothed wheel *h* on the shaft *f* whilst at the opposite end of the shaft *f* there is fitted the drawing disc.

As for reasons of economy in space it is particularly important to arrange the drawing dies as closely behind one another as possible the gearings referred to are arranged above or underneath the electric motors so that the entire extent in width of the driving element to be fixed to the bed is not larger than that of the electric motor itself.

In order to compensate for slight differences which must occur in the speeds of rotation of the separate motors by reason of the fact that the diameter of the drawing dies can never be accurately met in practice to correspond to the theoretical stepping, there may be used various methods, which are partly known, for example the construction of the separate motors as soft compounded compound motors or the use of shunt wound motors or compound motors having resistances, in series to the armatures. ("Soft compounded motor" in this connection means a cumulatively wound motor, i. e. a motor of which the speed decreases substantially as the load increases.) It may also be mentioned that the waste of a portion of the electrical energy in these resistances does not represent any increased consumption of current relatively to the previously known constructions of multiple drawing machines as by the omission of the intermediate gearings trains and the slip between the wire and the drawing discs there are also eliminated the unavoidable losses of energy by friction and within these intermediate gearing trains.

I claim:—

1. A multiple wire drawing machine composed of a simple base plate, a number of separate units screwed on the said baseplate and being readily removable as units, each unit consisting of an electric motor as driving element and a drawing drum fitted to the shaft of said unit.

2. A multiple wire drawing machine composed of a simple base plate, a number of separate units screwed on the said baseplate and being readily removable as units, each unit consisting of an electric motor as driving element with a simple gearing built together with the motor and a drawing drum fitted to the last shaft of the gearing.

3. A multiple wire drawing machine composed of a simple base plate, a number of separate units screwed on the said baseplate and being readily removable as units, each unit consisting of an electric motor as driving element without a gearing, and a drawing drum fitted directly to the shaft of said motor.

WILHELM ROHN.