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W. CARTER & E. HODGSON.

DRIVING MECHANISM FOR DRAWING THROUGH DRUMS OF WIRE DRAWING MACHINES.

APPLICATION FILED AUG. 24, 1906.

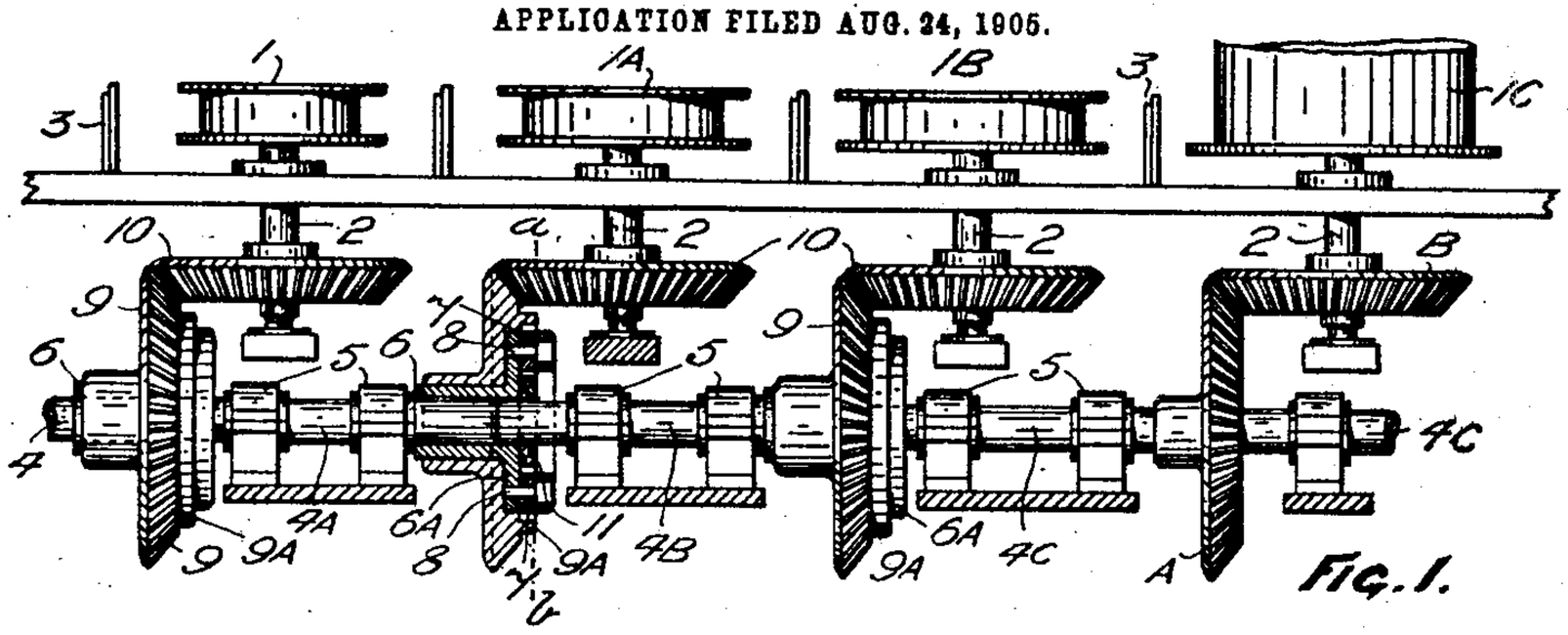

FIG. 1.

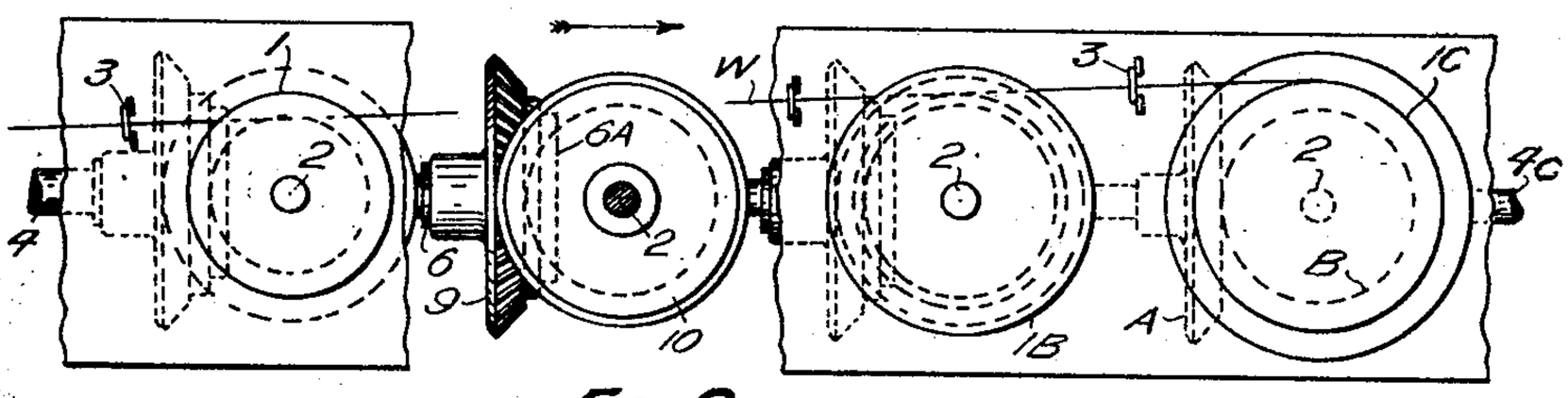

FIG. 2.

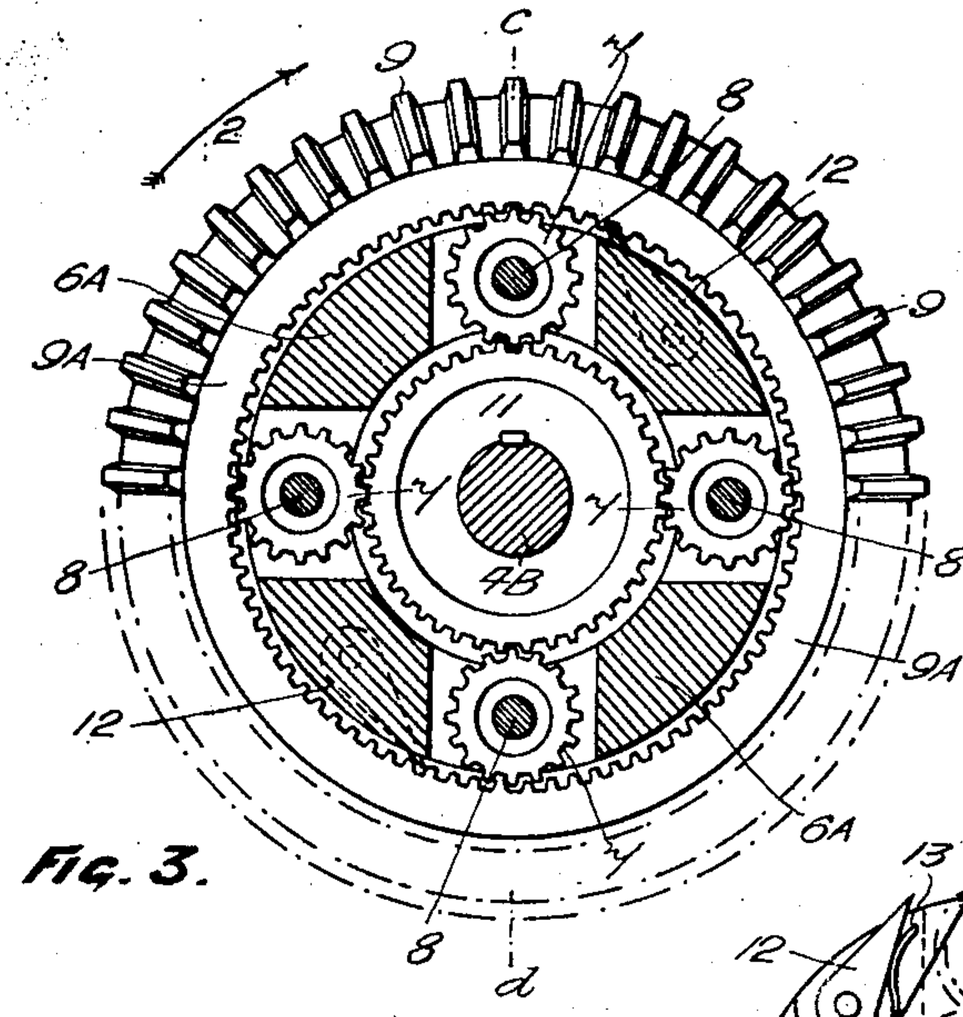

FIG. 3.

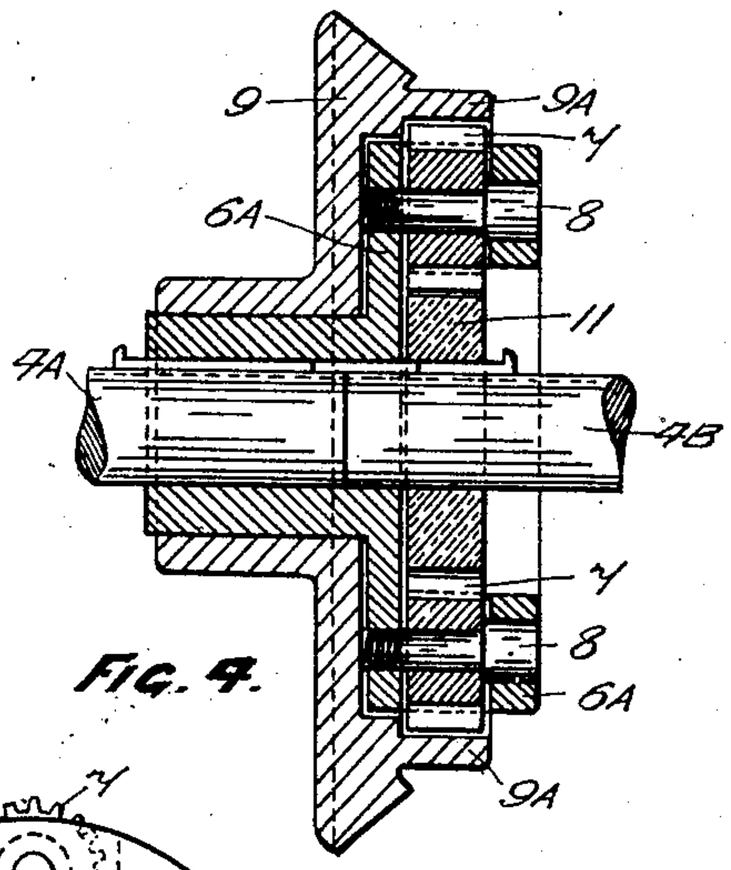

FIG. 4.

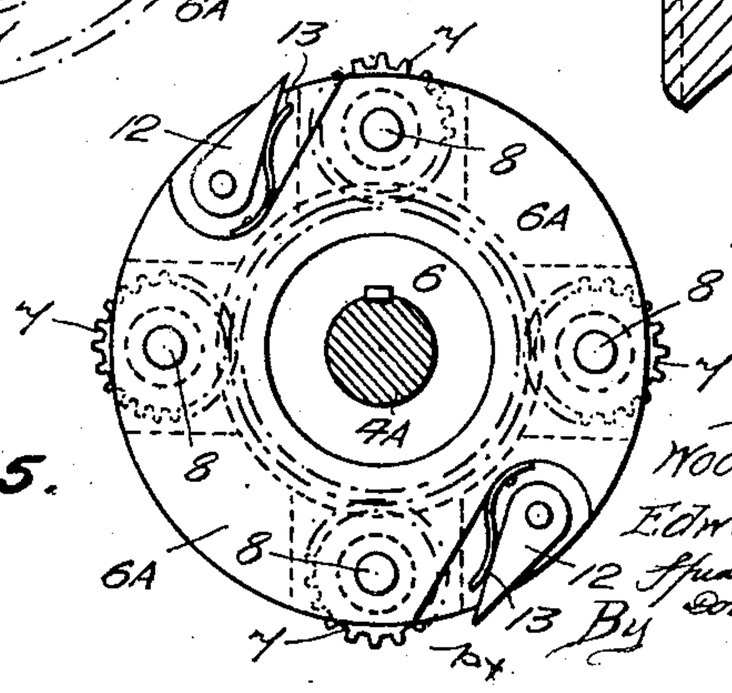

FIG. 5.

Attest:

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UNITED STATES PATENT OFFICE.

WOODHOUSE CARTER, OF VICTORIA MILLS, LOW MOOR, AND EDWIN HODGSON, OF CLECKHEATON, ENGLAND.

DRIVING MECHANISM FOR DRAWING-THROUGH DRUMS OF WIRE-DRAWING MACHINES.

No. 865,679. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed August 24, 1905. Serial No. 275,697.

To all whom it may concern:

Be it known that we, WOODHOUSE CARTER and EDWIN HODGSON, subjects of the King of Great Britain and Ireland, respectively, residing at Victoria Mills, Low Moor, and Snelsins Lane, Cleckheaton, both in the county of York, England, have invented certain Improvements in Driving Mechanism for Drawing-Through Drums of Wire-Drawing Machines, of which the following is a specification.

This invention has for its object, the rotation of the drawing-through drums in continuous wire drawing machines, in such a manner that each drawing-through drum is driven at a speed corresponding to the reduction and elongation of the wire as it is drawn through the holes of the respective reducing plates, by driving gear so arranged that should the circumferential speed of any of the drawing-through drums be retarded, the rotation of each of the successive drawing-through drums will be automatically and proportionately increased, and thereby assist the retarded drawing-through drum in drawing the wire through the reducing plate, and maintain an equalization of tension, and prevent undue tension being put upon the wire by any of the drawing-through drums, to such an extent as to endanger breakage of the wire, on the removal of lubricant from same by slipping around the drawing-through drum.

Providing the circumferential speed of all the gear driven drawing-through drums in continuous wire drawing machines could be definitely adjusted to take up the wire as reduced and elongated, and at the same time maintain an equal tension on the wire, a main driving shaft made in a continuous length and geared for positively operating the drawing-through drums could be utilized without detriment to the wire, and no special attention of the workman would be required for adjusting the tension, as is now the case with machines in which the drawing-through drums are definitely driven from a continuous shaft.

By our invention, the rotation of the drawing-through drums is automatically controlled, and the tension on the wire automatically adjusted, in accordance with the constantly varying speed at which the wire is drawn through the respective reducing plates, and thereby slipping around the said drums prevented.

In describing our invention in detail, reference is made to the accompanying drawings, in which

Figure 1 represents a side elevation of a continuous wire drawing machine, of a length for drawing the wire through four reducing plates, the compensating portion of the driving gear of one of the drawing-through drums is shown in section. Fig. 2 is a plan with one of the drawing-through drums removed, showing the driving gear below. Fig. 3 is a front sectional view through line *a. b.* of Fig. 1 of a driving wheel combined with compensating gear. Fig. 4 is a sectional view through line *c. d.* of Fig. 3, and Fig. 5 a back view of the cage, showing spring operated pawls mounted thereon.

The drawing-through drums 1. 1^A. 1^B and 1^C are of the usual construction, and of such diameters as to approximately take up the wire as it is elongated similar to ordinary definitely driven continuous wire drawing machines; each drawing-through drum being secured to a shaft 2, but the angular velocity of drum 1^A. exceeds that of drum 1. and so on to 1^C, so that when drawing wire, pawls 12 at short intervals, slip over one or more teeth of the internal racks 9^A. by which the speed of succeeding drum or drums is accelerated, and tension on the wire maintained throughout the machine. The angular velocity of drum 1^C. is greater than that of the preceding drum, and receives the reduced wire around its circumference.

The main driving shaft is made in sections, four sections or lengths are enumerated by the drawings, 4. 4^A. 4^B and 4^C, these may be increased in number. Each section is in axial line and supported by pedestals 5, the last drum 1^C being driven by an ordinary bevel wheel A keyed on shaft 4^C, and gearing with wheel B as shown. The first length of sectional shaft rotates in the direction of the arrow 2 and may be rotated in any convenient manner, and on all the sections but the last there is keyed the boss 6 of a flanged cage 6^A, constructed for the reception of planet gears 7 freely mounted on studs 8 secured to said cage. Upon each boss 6 mounted free to rotate, is a bevel wheel 9 gearing with a bevel wheel 10, secured on the respective drawing-through shafts 2. The bevel wheel 9 is connected to or integral with an internal rack 9^A. with which planet gears 7 mesh.

One end of section 4^A of main driving shaft, and each succeeding section as shown by 4^B in Fig. 4, is by preference extended into the shaft hole of adjoining boss 6 for support, and upon 4^A and each succeeding section, is keyed a sun gear wheel 11, of such diameter as to mesh with planet gears 7, such as shown, or two planet gears may be cast side by side, concentric with each other, one to mesh with rotary internal rack 9^A as described, and the other say of smaller diameter, to mesh with a sun gear wheel similar to 11, but larger in diameter.

At the back of flanged cage 6^A, one or more recesses are sunk for the reception of pawls 12 and springs 13, applied so as to force the ends of said pawls into contact with the teeth of internal rack 9^A, for the purpose as hereinafter described.

On beginning to draw a length of wire, a portion is reduced in the same manner as when preparing wire for the feeding up of a continuous wire drawing machine of the ordinary description, any known method for such purpose is suitable. A sufficient length of wire is drawn

as will pass through plates 3, and wrap two or more times around drawing-through drums 1 to 1^C, to the latter the wire is secured in any convenient manner.

On putting the machine in motion, the necessary tension on the wire between the respective drums throughout, may be obtained by the retardation of drum 1^C, in which case, the teeth of the preceding internal racks 9^A, engage with the respective pawls 12, and during such retardation, positively drive the drawing-through drums, until drum 1^C is liberated, and when the machine runs at its normal condition the pawls 12 slip over the teeth of internal racks 9^A, during the wire drawing.

The action of the machine is as follows:—Motion from the first length 4 of sectional shaft is transmitted to drawing-through drum 1, by bevel gears 9 and 10, the former being freely mounted upon boss 6 keyed to section 4 of main shaft, from which rotary motion is conveyed to bevel gear-wheel 9 and other parts of the machine in the following manner.

On reference to Figs. 3 and 4, the flanged cage 6^A is shown partly within the internal rack 9^A integral with bevel gear wheel 9, and is presumed to be rotating in the direction of curved arrow 2. When the machine is in motion, should a drum, say 1^A be abnormally retarded by the pull of wire, pawls 12 will slip over more teeth of internal rack 9^A, than when the pull is under normal conditions, and by this abnormal retardation the planet gears 7 which revolve about the stud 8 when the machine is running at normal speed will rotate faster and in the same direction upon the stud 8 and thereby increase the angular velocity of sun gear 11 in the direction of arrow 2, by which the speed of the succeeding drums is accelerated, and assistance given to drum 1^A.

Pawls 12 shown by dotted lines in Fig. 3, are engaged with the teeth of internal rack 9^A in a manner for admitting the drawing-through drums to revolve in the direction for drawing and elongating the wire W, and for preventing internal rack 9^A and bevel wheel 9 revolving at a greater angular speed in the direction of the arrow 2 than the flanged cage upon whose boss the bevel wheel 9 is revolubly mounted and for preventing the corresponding sun gear 11 becoming stationary and thereby preventing the subsequent sections of the machine stopping whenever there is no tension or pull on a particular drawing-through drum, such as when said drum is running empty when the wire is broken or becoming exhausted. Should the wire to be drawn be broken, or the supply exhausted, say at drum 1, the remainder of the drums will continue to rotate and draw the wire to a finish. This is accomplished by the teeth of internal rack 9^A engaging with pawls 12, and thereby preventing bevel wheel 9 overrunning in the direction of arrow 2.

Flanged cage 6^A through planet gears 7, is the driving medium of each drawing-through drum, and providing there were no pawls 12 in connection with the compensating gear, and the pull on say drum 1 liberated, sun gear 11 within the first internal rack 9^A would stop, but flanged cage 6^A would continue revolving, carrying planet gears 7 with it, so that in the absence of pawls 12, and by planet gears meshing with sun gear 11 and bevel wheel 9, the latter would revolve at a rapid rate in the direction indicated by arrow 2. By the introduction of pawls 12 and ends of same engaging with the teeth of internal rack 9^A, overrunning is prevented as before mentioned.

From the description given, it will be seen, if the rotation of drum 1 and thereby bevel wheel 9 be retarded, the speed of the subsequent drums will be increased, and by the accelerated speed of drum 1^A, the tension or pull on wire W between drums 1^A and 1 will be increased, and the rotation of last named drum correspondingly assisted, by which slipping of the wire around drum 1 will be prevented, and a more equalization of tension maintained. As drum 1 regains its normal speed, the rotation of sun gears 11 and planet gears 7 are correspondingly reduced, also the speed of drum 1^A and those beyond. The above operation is repeated by each succeeding section of main shaft whenever any drawing-through drum is retarded, the rotation of the succeeding section or sections and drum or drums being increased in proportion to the slowing down of any drum, thus retaining a more equal tension on the wire to an extent that, slipping around the drums is prevented.

What we claim is

1. In a continuous wire drawing machine, the combination of a plurality of reducing plates and drawing-through drums, a series of sectional shafts in alinement, a gear supporting cage secured to each sectional shaft except the last planet gears revolubly supported thereon, an internal rack revolubly mounted around each sectional shaft upon which a gear cage is secured, said rack meshing with planet gears and supporting a bevel wheel arranged to mesh with a like wheel secured on respective drawing-through drum shaft, a sun gear secured to succeeding sectional shaft upon which the aforesaid gear cage is secured, said sun gear meshing with planet gears, and a driving connection between the first and last length of sectional shafts.

2. In a continuous wire drawing machine, the combination with a plurality of reducing plates and drawing-through drums, a series of sectional shafts in alinement, a gear cage secured to each sectional shaft except the last length, planet gears carried by each cage revolubly supported thereon, an internal rack revolubly mounted upon each cage, pawls carried thereby engaging with respective internal racks, said racks meshing with planet gears, means for transferring rotary movement to the drawing-through drums, a sun gear secured to adjacent sectional shaft meshing with preceding planet gears, and a driving connection between the first and subsequent sections of driving shafts and drawing-through drums.

3. In a continuous wire drawing machine, the combination of a plurality of reducing plates and drawing-through drums, a series of sectional driving shafts in alinement, a gear cage secured to one of the sectional shafts, a planet gear revolubly supported thereon, an internal rack revolubly mounted around the sectional shaft upon which the gear cage is secured, said internal rack arranged to mesh with the planet gear, a bevel gear supported by said internal rack member and arranged so as to mesh with the bevel gear which is on one of the shafts for driving a drawing through drum, a sun gear secured to the sectional shaft which is adjacent said sectional shaft upon which the aforesaid gear cage is mounted, said sun gear arranged to mesh with said planet gear, and a driving connection between the last mentioned sectional shaft and a second drawing-through drum.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

WOODHOUSE CARTER.
EDWIN HODGSON.

Witnesses:
WM. ILLINGWORTH,
ALFRED DEAN.