(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 673 689 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **95103630.0**

(51) Int. Cl.[6]: **B21C 1/10**

(22) Date of filing: **14.03.95**

(30) Priority: **25.03.94 IT BO940131**

(43) Date of publication of application:
27.09.95 Bulletin 95/39

(84) Designated Contracting States:
DE FR GB

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(54) Drawing machine.

(57) The wire drawing drums (1) are disposed at a short distance from each other and the wire passing from one drawing drum to the next is run around a skew pulley (8) of suitable diameter, disposed above each drawing drum and designed to act also as an idler or tensioning device for the longitudinal tensioning of the wire. A drawplate (107) is provided between each skew pulley (8) and the underlying drawing drum.

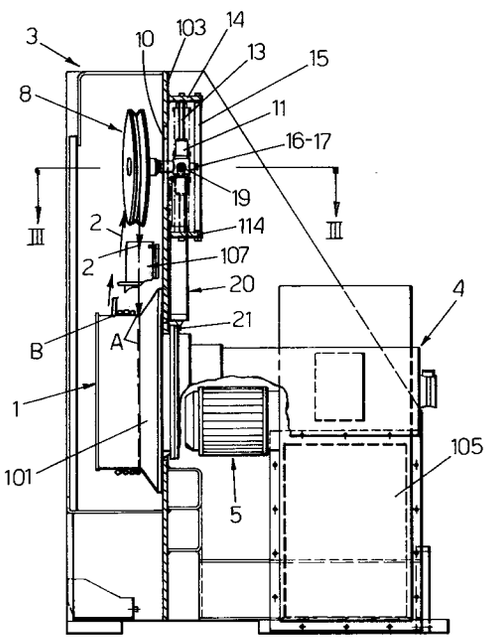


Fig. 2

EP 0 673 689 A1

The invention relates to a drawing machine or draw-bench, particularly for metal wire, characterized by a considerably shorter length than that of known drawing machines, with all the advantages derived from this condition.

In the drawing machine according to the invention, the wire drawing drums, called capstans, are mounted on the supporting frame with a small distance between them, at least sufficient to permit the free passage of the operator's arm for running the wire around them, the wire being run between each pair of adjacent drawing drums over a skew pulley of suitable diameter, designed to act also as an idler for the longitudinal tensioning of the said wire. The skew pulley is disposed above the drawing drum to be fed, and between these two components is the drawplate which reduces the section of the wire.

Further characteristics of the invention, and the advantages derived therefrom, will be made clearer by the following description of a preferred embodiment of the invention, illustrated solely by way of example and without restriction, in the figures on the two attached sheets of drawings, in which

Fig. 1 is a front elevation of a drawing machine according to the invention;

Fig. 2 shows further details of one of the drawing units of the machine shown in Figure 1 in transverse section along the line II-II;

Fig. 3 shows further details of the drawing unit in Figure 2, in section along the line III-III;

Fig. 4 shows details in a section along the line IV-IV in Figure 3.

In Figures 1 and 2 it will be seen that in the drawing machine according to the invention the rollers 1 for drawing the wire 2 fed from the left-hand side of Figure 1 are mounted in succession, parallel to each other, and projecting from the vertical wall 103 of the bench 3, with a distance between them at least sufficient for the operator's arm to pass freely between each pair of drums, in the initial phase of preparation of the drawing machine for operation, to wind the specified turns of the wire 2 to be drawn with sufficient convenience on the said drums. The wire meets each drum 1 at its conical flange 101, as indicated by A, and, after the winding of the correct number of turns adjacent to each other, leaves the drum at an exact distance from the said flange, as indicated by B.

In the example shown in Fig. 2, the drums 1 are driven by a corresponding gearmotor unit with a motor 4 with electronic speed control, so that the said drums 1 rotate at a progressively increasing speed. The motors 4 are conveniently cooled by a ventilation duct 105 to which is joined an electric fan 5. It should be understood, however, that these details are extraneous to the innovation concerned here, and therefore may be modified considerably.

The wire 2 which is to be wound on the first drawing drum 1 is first run around a pulley 6 supported so that it is free-running by the bench 3 (see below), parallel to the axis of the said drum, and the portion of wire leaving the said pulley passes through a drawplate 7 before reaching the drum.

Above each successive drum 1 there is provided a free-running pulley 8, with a skew disposition, whose diameter is sufficiently large for the entry part of the wire to be aligned with the exit point of the wire from the preceding drum 1 and for the exit part of the wire to be aligned with the entry point of the said wire to the underlying drum 1.

The pulley 8 is required to act both as a means of directing the wire from one drawing unit to the next, and as an idler or tensioning device to provide the wire with the necessary longitudinal tension. For this double purpose (Figs. 2-3-4) the pulley 8 is supported rotatably about its own axis by a pivot 9 which passes through an aperture 10 in the vertical wall 103 of the bench 3 and whose end behind the said wall is integral with a vertical collar 11 which, with the interposition of recirculating ball bearings 12-112, slides on a vertical guide bar 13, fixed by its ends to supports 14-114 fixed to project from the said wall 103 of the bench. The ends of a guide 15, parallel to the guide 13, are fixed to the said supports, and on its opposite sides there run a pair of rollers 16 supported by the carriage 17 integral with the said collar 11. The pulley 8 may therefore undergo raising and lowering movements, while remaining in the predetermined skew orientation, with the orientation specified in respect of the preceding roller and of the underlying drawing roller.

A perpendicular pivot 18 is integral with the said collar 11 and is connected at 19 to the rod of a single-acting cylinder and piston unit 20, whose casing is hinged at 21 to the said wall 103. The unit 20 may, for example, be of the plunger type, connected to a source of pressurized fluid, so that the pulley 8 is pushed upwards with a sufficient force which is inversely proportional to the portion of wire to be tensioned. To achieve this object without excessive structural complications, it is preferable for the units 20 mounted on the drawing machine to have rods of progressively decreasing diameters so that they can be supplied with fluid at the same pressure.

Figure 4 shows how the exposed portions of the guide 13 and of the rod of the unit 20 are protected by bellows 22-122-23.

The drawplate 107 which acts on the portion of wire between each pulley 8 and the underlying drawing drum 1 is vertical and at a tangent to the drawing surface of the said drum, and the point at which the wire leaves the said pulley 8 must be

axially aligned as closely as possible with the said drawplate. To allow for the tolerances permitted in the machining of the various components, and for the progressive wear of the drawing surface of the drum 1 and the progressive decrease in diameter of the drawn wire 2, the following provisions are made for the correct operation of the equipment concerned:

a) Figure 3 shows how the pulley 8 has its edge 108 facing the wall 103 of the bench 3 suitably raised, to act more effectively as a guide for the portion of wire reaching it from the preceding drawing drum;

b) Figure 1 also shows how the pulleys 8 of the various drawing units of the drawing machine may have diameters progressively decreasing with the decrease in the section of the drawn wire. This enables the pulleys to be aligned more effectively with respect to the exit point of the wire from the preceding drawing drum;

c) Finally, Figure 3 shows how the pulley 8 is mounted rotatably on the bearings 24 on a hub 25 which in turn is mounted on the supporting pivot 9 with a socket 26 parallel to and suitably distant from the axis of rotation of the pulley, the said socket 26 being partly open laterally with a slit 27 where a transverse securing bolt 28 is provided. By temporarily slackening the bolt 28 and rotating the hub 25 on the pivot 9, the pulley 8 can be moved in the direction indicated by the double arrow 29 and the necessary adjustment made. On completion of the adjustment, the bolt 28 is tightened to fix the hub 25 securely to the pivot 9.

All the drawing units, of which there may be any number, of the drawing machine are made according to the principles disclosed above.

It is to be understood that the description refers to a preferred embodiment of the invention, to which numerous variations and modifications, especially in respect of construction, may be made without departure from the guiding concept of the invention, as disclosed above, as illustrated and as claimed below. In the following claims, the references given in brackets are solely for guidance and do not limit the scope of protection of the claims.

Claims

1. Drawing machine with small overall dimensions, characterized in that the wire drawing drums (1), driven at progressively increasing speeds and disposed one after the other and with a parallel disposition, are spaced apart from each other at least sufficiently to allow the free passage around them of the arm of the operator who has to wind the specified turns of wire on these drums in the initial phase of preparation of the machine for operation, the portion of wire between each drawing drum and that immediately following it being run around a skew pulley (8) of suitable diameter, disposed above each drawing drum and such that the entry point of the wire is aligned with the exit point of the wire from the preceding drawing drum, and that the exit point of the wire is aligned with the underlying drawplate (107) through which the wire passes before it is wound on the underlying drawing drum, the pulley also being mounted, while remaining in these conditions of alignment, on guide means parallel to the drawplate and being connected to means which tend to push it away from the underlying drawing drum, so that it also acts as an idler or tensioning device to keep under longitudinal tension the portion of wire between every two successive drawing drums.

2. Drawing machine according to Claim 1, in which the skew pulley (8) is supported rotatably by a pivot (9) which passes through a vertical aperture (10) in the adjacent wall (103), which is also vertical, of the drawbench, and, behind this wall, the said pivot is integral with a collar or slide (11) which slides on means with a low coefficient of friction (12-112) on a vertical guide (13) held at its ends by supports (14-114) fixed to the said wall and supporting another guide (15) parallel to the preceding one, on which there slides, means with a low coefficient of friction (16), a slide or carriage (17) integral with the said collar, which is provided laterally with an appendage (18) connected to the rod of a pressurized-fluid type single-acting cylinder and piston unit (20), preferably of the plunger type, having its casing linked to a fixed part of the bench (3), and being connected to a source of pressurized fluid, so that the skew pulley (8) tends to be pushed away from the underlying drawing drum (1) with a force sufficient to keep the portion of wire that runs around the skew pulley under suitable tension.

3. Drawing machine according to Claim 1, in which the skew pulley (8) has its edge (108) facing the adjacent vertical wall (103) of the draw-bench suitably raised or extended towards this wall, to form a more effective guide for the portion of wire reaching this skew pulley from the preceding drawing drum.

4. Drawing machine according to Claim 1, in which the skew pulley (8) is mounted rotatably on a hub (25) provided with a socket (26) with an axis parallel to the axis of rotation of the

pulley, but suitably spaced from it, this socket being made in the form of an elastic clamp and provided with a securing bolt (28) or being otherwise designed for fixing to the pivot (9) which links the skew pulley to the corresponding movement slide, the whole being designed to permit precise adjustment of the pulley with respect to the preceding drawing drum and also with respect to the following drawing drum.

5. Drawing machine according to the preceding claims, characterized in that the skew pulleys (8) of the successive drawing units of the said drawing machine may have diameters which decrease progressively as the diameter of the wire to be drawn decreases, to enable the pulleys to be better aligned with respect to the exit point of the wire from the preceding drawing drums.

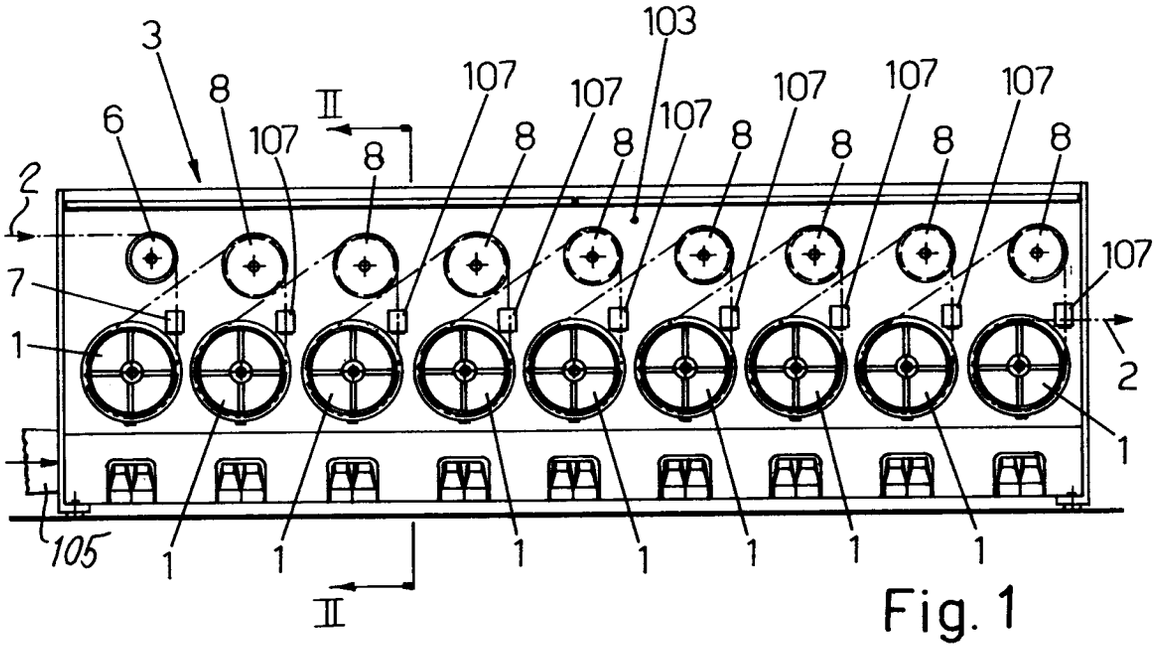

3
6
8
107
II
103
2
7
1
105
II

Fig. 1

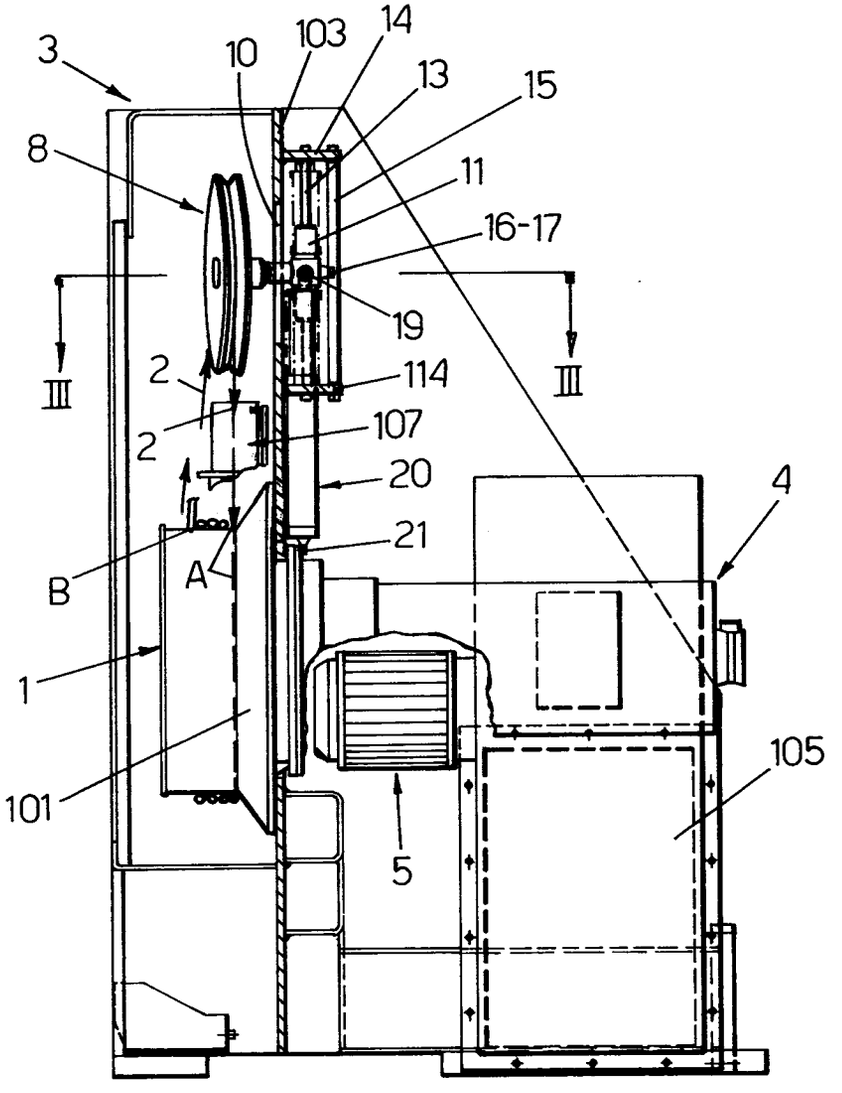
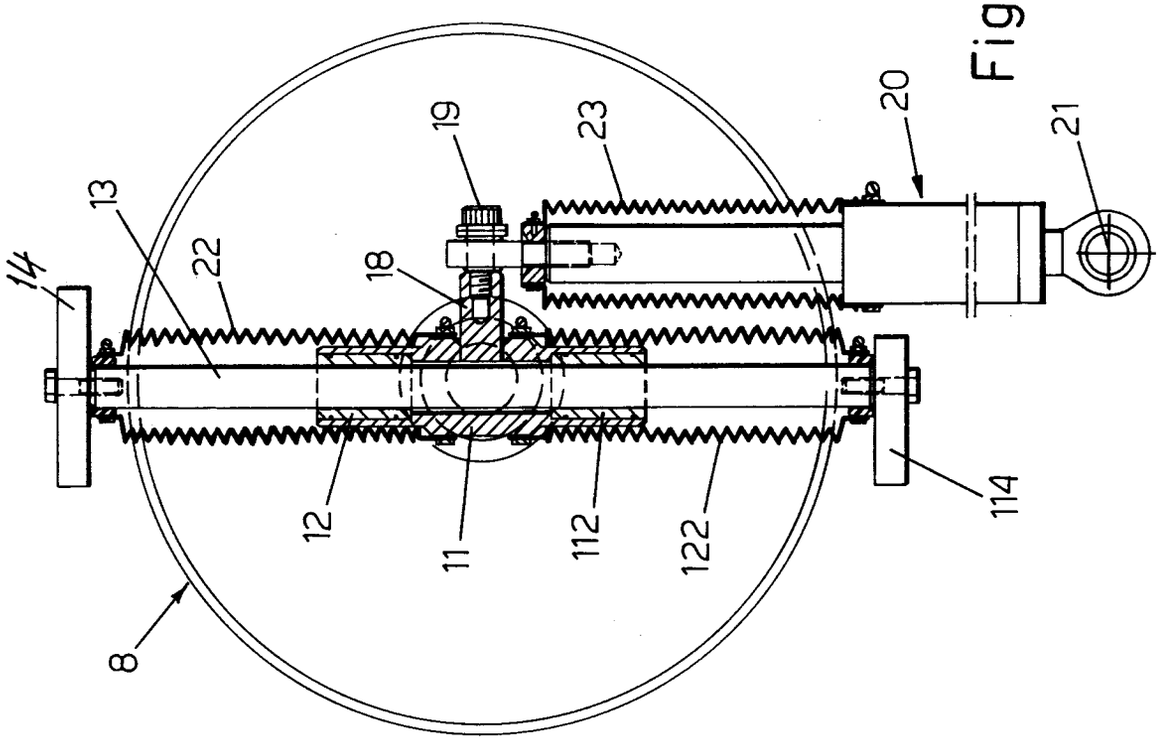

3
10
103
14
13
15
8
11
16-17
19
III
III
2
114
107
20
4
21
B
A
1
101
5
105

Fig. 2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23
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12
11
112
122
114
8

Fig.4

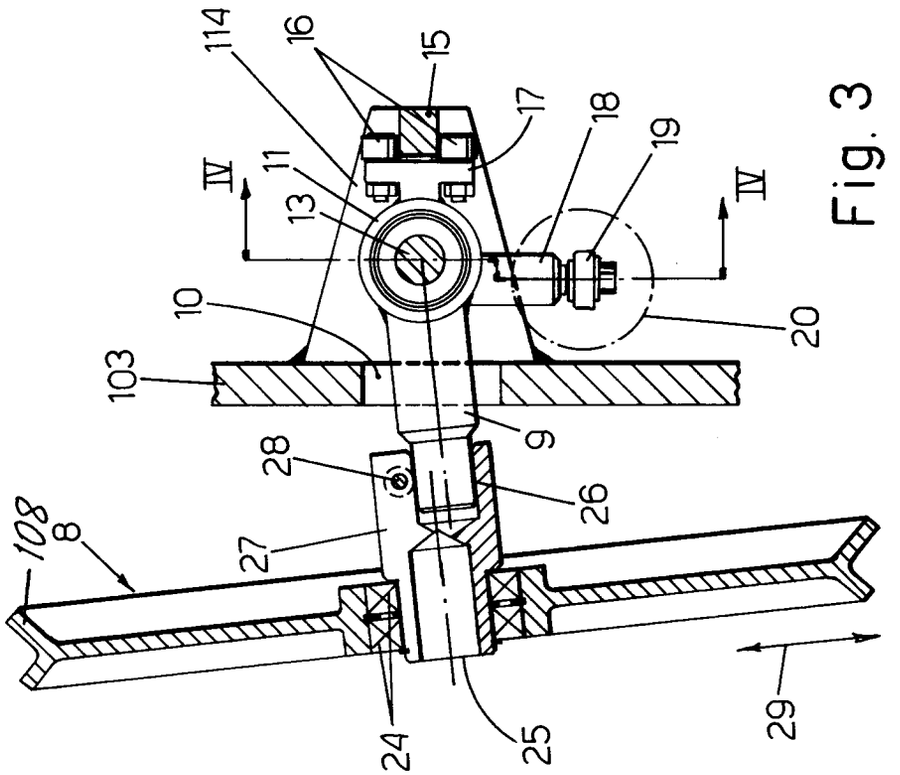
114
16
15
17
18
19
IV
11
13
IV
10
20
103
9
28
26
108
8
27
24
25
29

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 3630

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	GB-A-931 178 (MORGAN CONSTUCTION CO) * page 3, line 76 - line 115; claim 1; figures *	1,6 2,3,5	B21C1/10
A	US-A-4 045 992 (GRIFFITHS) * column 3, line 62 - column 4, line 20; claim 1; figures *	1-3,5,6	
A	GB-A-915 257 (SYNCRO MACHINE CO) * page 2, column 53 - column 85; figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 July 1995	Barrow, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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