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(54) Machine for cleaning cops or supports for spools of thread for the textile industry.

(57) A machine for cleaning cops or supports (4) of spools of thread for the textile industry comprising means (3) for axially locking the cop or support of a spool to be cleaned and means (5) for scraping the residual thread (6) wound on the cop or support (4). The scraping means (5) are movable along the lateral surface of the cop or support (4) along a direction which has a component that is axial with respect to the cop or support (4) for the gradual axial removal of the residual thread (6) from the cop or support (4).

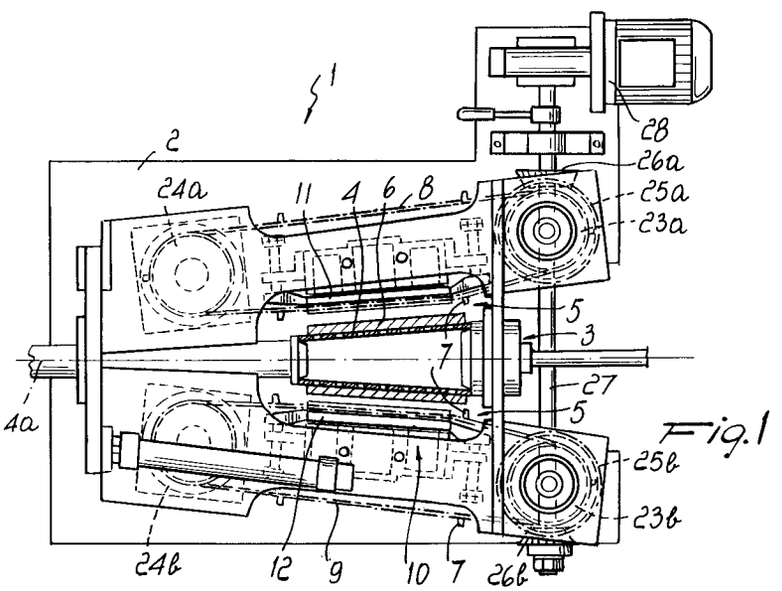

Fig.1

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The present invention relates to a machine for cleaning cops or supports of spools of thread for the textile industry, particularly for cleaning frustum-shaped cops, cops or supports for "Soleil" spools, and "Ring" cops.

It is known that textile machines are supplied with spools of thread constituted by a preset amount of thread wound around a cop or central support. During weaving, accidental breakage of the thread while the machine is being supplied may interrupt the supply of thread before the spool is depleted. If the thread breaks when the spool is almost fully used up, there is no economical advantage in using the remaining part of thread, and usually the spool is removed and replaced with a new spool of thread.

Due to this fact, in the textile industry there is the problem of cleaning cops or supports of thread spools before the spooling by means of which the support or cop of the spool is loaded with fresh thread.

One of the various technologies currently in use to perform this cleaning operation consists in cutting the residual threads by means of a blade which is made to slide axially along the lateral surface of the cop. The threads thus cut can be easily removed from the cop or support, which is thus ready for reuse.

However, this technique is complicated, since the cut should preferably not affect the cop so as to avoid producing alterations or damage that might compromise its life and at the same time might also damage the thread subsequently wound on the cop. This technique is furthermore difficult to apply to the cleaning of perforated cops, since the thread can penetrate the holes of the cop as a consequence of the pressure applied by the blade and therefore escape the action of said blade, making it extremely difficult to remove the thread from the cop or support.

Another technique for cleaning cops or spool supports consists in cutting the threads by means of a jet of air, heated to a high temperature, which is capable of melting the residual threads struck by such a jet. Of course this technique can be used only to clean cops or supports that hold synthetic threads.

Another technique currently in use adopts particular cops having, along their lateral surface, a slot that runs parallel to one of the directrices of said lateral surface, and consists in cutting the residual threads by means of a blade that enters said slot. Although this technique preserves the integrity of the cops or supports without using sophisticated devices, it has the drawback that it requires particular cops provided with a longitudinal slot that must replace the cops currently used by the textile industry, entailing relatively large investments for their purchase.

A principal aim of the present invention is to solve the problems described above by providing a machine that can clean cops or supports for spools of thread very effectively without altering the integrity of said cops or supports.

Within the scope of this aim, an object of the invention is to provide a machine that can equally clean cops or supports of spools from residues of natural or synthetic threads.

Another object of the invention is to provide a machine that is structurally simple and entails lower production costs than those required by currently commercially available machines for cleaning cops or supports of spools of thread.

Another object of the invention is to provide a machine that ensures high cleaning efficiency even in the case of perforated cops or supports.

This aim, these objects, and others which will become apparent hereinafter are achieved by a machine for cleaning cops or supports of spools of thread for the textile industry, characterized in that it comprises means for axially locking the cop or support of a spool to be cleaned and means for scraping the residual thread wound on said cop or support, said scraping means being movable along the lateral surface of said cop or support along a direction having a component that is axial with respect to said cop or support for the gradual axial removal of the residual thread from said cop or support.

Further characteristics and advantages of the invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of the machine according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a top plan view of the machine according to the invention;

Figure 2 is a front elevation view of the machine according to the invention;

Figures 3 and 4 are enlarged-scale sectional views of a detail of Figure 1, in two different operating conditions; and

Figures 5 to 7 are plan views of a detail of the machine according to the invention, illustrating its operation.

With reference to the above figures, the machine according to the invention, generally designated by the reference numeral 1, comprises a main structure 2 which supports means 3 for axially locking a cop or support 4 of a spool to be cleaned and means 5 for scraping the residual thread 6 wound on the cop 4. Said scraping means 5 are movable along the lateral surface of the cop 4 in a direction which has an axial component with respect to the cop 4, so as to obtain the gradual axial removal of the residual thread 6 from the cop 4.

More particularly, the scraping means 5 comprise teeth 7 which are fixed to two chains 8 and 9 in which one portion, respectively designated by the reference numerals 8a and 9a, faces the lateral surface of the cop 4 to be cleaned.

The teeth 7 are spaced along the extension of the corresponding chain, and there are pressure means 10 which act on the chains 8 and 9, more specifically on their portions 8a and 9a, towards the axis 4a of the cop 4, so as to produce an effective action of the teeth 7 during the translatory motion of said teeth along the lateral surface of the cop 4.

The arrangement of the chains 8 and 9 is such that the portions 8a and 9a face two diametrically mutually opposite regions of the cop 4.

The pressure means comprise shoes 11 and 12 which laterally face, on opposite sides, the lateral surface of the cop 4; each shoe forms a lateral support for the portion 8a or 9a of the chains 8 and 9 which is arranged opposite the cop 4.

Advantageously, said shoes are movable by control towards or away from the cop 4 so as to facilitate the operations for loading and unloading the cop 4 in and from the machine.

More particularly, each one of the shoes 11 and 12 is mounted so that it can slide, along a direction that lies substantially at right angles to the axis 4a, on a support 13 which is fixed to the main structure 2. An intermediate portion of the shoe 11 or 12, located in the region that lies opposite to the side directed towards the cop 4, is fixed to the end of the stem 14a of a piston 14 which can slide within a cylindrical chamber 15 formed by the support 13. The chamber 15 and the piston 14 constitute, as a whole, a double-action pneumatic piston by means of which the shoe 11 or 12 is moved towards or away from the axis 4a of the cop 4.

Laterally, in opposite regions with respect to the piston 14 of the double-action cylinder, there are two small pistons 16a and 16b which are also connected to the corresponding shoe 11 or 12 and are arranged so that their axis lies parallel to the axis of the piston 14. Said secondary pistons 16a and 16b can slide inside cylindrical chambers 17a and 17b which can be supplied with compressed air so as to assist the thrust applied to the shoe by the piston 14 towards the axis 4a. The connection of the shoe to the stem 14a of the piston 14 and the connection of said shoe to the pistons 16a and 16b have a certain clearance so as to allow the shoe 11 or 12 to oscillate in the plane of arrangement of the chains 8 and 9, as will become apparent hereinafter.

The secondary pistons 16a and 16b and the corresponding chamber 17a and 17b, which can be supplied with compressed air, constitute as a whole two pneumatic springs which oppose the distancing of the shoe 11 or 12 from the cop 4.

The movement of the shoe 11 or 12 towards the cop 4 is limited by two mechanical stroke limiters which are connected to the longitudinal ends of the corresponding shoe 11 or 12 and are constituted, in the illustrated embodiment, by nuts 18a and 18b which couple to two threaded shafts 19a and 19b which are connected to the ends of the shoe 11 and 12 and are arranged parallel to the axis of the piston 14. The nuts 18a and 18b, which can be screwed along the corresponding threaded shaft 19a and 19b so as to vary the extent of the translatory motion of the shoe 11 or 12, abut against or check the shoulders 20a and 20b formed by the support 13.

Each shoe 11 or 12 has a profile with which the portion 8a or 9a of the corresponding chain makes contact; at least one central portion 21 of said profile has a profile that is substantially parallel to the directrices of the lateral surface of the cop 4 which face said shoe. Said central portion 21 is preceded, along the direction of the advancement of the chain along the corresponding shoe, by an initial segment 22 that moves gradually towards the cop 4. The transition from the initial segment 22 to the central portion 21 occurs in a region that is spaced from the axial end of the cop 4 which lies opposite to the end through which the residual thread 6 is removed. In this manner the teeth 7 engage the residual thread 6 to be removed starting from a region of said residual thread that is spaced from the axial end of the cop 4 which lies opposite to the axial end from which the residual thread is removed.

The two chains 8 and 9 wind around two pairs of sprockets designated respectively by the reference numerals 23a, 24a, 23b, and 24b. The sprockets 23a and 23b are connected, by means of two pairs of bevel gears 25a, 26a and 25b, 26b, to a same shaft 27 which is connected to the output shaft of a gearmotor 28 which thus drives the two chains 8 and 9.

The means 3 for axially locking the cop 4 are constituted by two oppositely arranged pins, respectively designated by the reference numerals 29 and 30, which are arranged coaxially to each other along an axis that constitutes the axis 4a of the cop fitted on the machine. At least one of the two pins 29 or 30 is axially movable, in a per se known manner, with respect to the other pin, so as to axially lock the cop 4 or render possible its removal at the end of the cleaning operation.

The operation of the machine according to the invention is as follows.

The cop or support 4 is placed between the pins 29 and 30 that lock it axially. After locking, the shoes 11 and 12 are pushed towards the cop by the piston 14 and by the secondary pistons 16a

and 16b, while the gearmotor 28 drives the chains 8 and 9. In this manner, the teeth 7 located along the chains 8 and 9 gradually make contact with the residual thread 6 present on the cop 4 and gradually remove it axially from the cop 4. It should be noted that owing to the particular shape of the shoes 11 and 12 the first tooth 7 that makes contact with the residual thread 6 located on the cop 4 engages the residual thread 6 in a region of said residual thread which is spaced from the axial end of the cop 4, i.e. with a portion of the residual thread 6 which is spaced from the corresponding axial end of said residual thread. In this manner, removal of the residual thread from the cop 4 starts, particularly in the case of frustum-shaped cops, without acting on the axial end of the residual thread; this accordingly prevents the mass of thread from turning inside out along the cop, thus hindering the free removal of the residual thread from the cop 4. Furthermore, when the tooth 7 engages the residual thread the shoe yields at the tooth since the shoes 11 and 12 can oscillate: this yielding action gradually affects the entire extension of the shoe during the translatory motion of the tooth 7 along the cop 4. This elastic yielding further increases the effectiveness of the removing action performed by the teeth 7 on the residual thread 6. Removal can of course be started by one pair of teeth 7 and completed by subsequent pairs of teeth 7.

Once the residual thread 6 has been removed from the cop 4, the cleaned cop 4 is disengaged by the pins 29 and 30 and replaced with another cop to be cleaned.

In practice it has been observed that the machine according to the invention fully achieves the intended aim, since it allows to effectively clean cops or supports of spools of thread, particularly frustum-shaped cops and even perforated cops, both for removing synthetic thread and for removing natural thread.

The machine thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept: all the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Machine for cleaning cops or supports of spools of thread for the textile industry, characterized in that it comprises means for axially locking the cop or support of a spool to be cleaned and means for scraping the residual thread wound on said cop or support, said scraping means being movable along the lateral surface of said cop or support along a direction which has a component that is axial with respect to said cop or support for the gradual axial removal of the residual thread from said cop or support.

2. Machine according to claim 1, characterized in that said scraping means comprise teeth that move by control means along directions which are substantially parallel to directrices of the lateral surface of said cop or support and means for pushing said teeth towards the axis of said cop or support.

3. Machine according to the preceding claims, characterized in that said scraping means comprise teeth which move by control means along the lateral surface of said cop or support and make contact with two diametrically mutually opposite regions of said cop or support.

4. Machine according to one or more of the preceding claims, characterized in that said scraping means comprise at least two chains a portion of which faces two diametrically opposite regions of the lateral surface of said cop or support, said teeth being applied on said chains and being mutually spaced along the extension of said chains.

5. Machine according to one or more of the preceding claims, characterized in that said pressure means comprise shoes that laterally face, on opposite sides, the lateral surface of said cop or support, said shoes being movable by control means towards or away from said cop or support, and individually form a lateral support, arranged opposite to said cop or support, for said chains that bear said teeth.

6. Machine according to one or more of the preceding claims, characterized in that the side of said shoes that is directed towards said cop or support and engages said chains has at least one central portion that is substantially parallel to the directrices of the lateral surface of said cop or support which face said shoes.

7. Machine according to one or more of the preceding claims, characterized in that each one of said shoes has, upstream of said central portion along the advancement direction of the portion of said chains that faces said cop or support, an initial segment that gradually moves closer to said cop or support, the initial part of said central portion being spaced from an axial end of said cop or support, so that said teeth engage the residual thread to be removed starting from a region which is spaced from the axial end of said cop or support that lies opposite to the axial end from which said residual thread is extracted.

8. Machine according to one or more of the preceding claims, characterized in that said shoes are oscillatable in the plane of arrangement of said chains.

9. Machine according to one or more of the preceding claims, characterized in that said shoes are oscillatable in the plane of arrangement of said chains against, or by virtue of the action of, elastic means.

10. Machine according to one or more of the preceding claims, characterized in that said locking means comprise two oppositely arranged and mutually coaxial pins, at least one of which is axially movable by control means with respect to the other pin to lock or release a cop or support interposed coaxially between said pins.

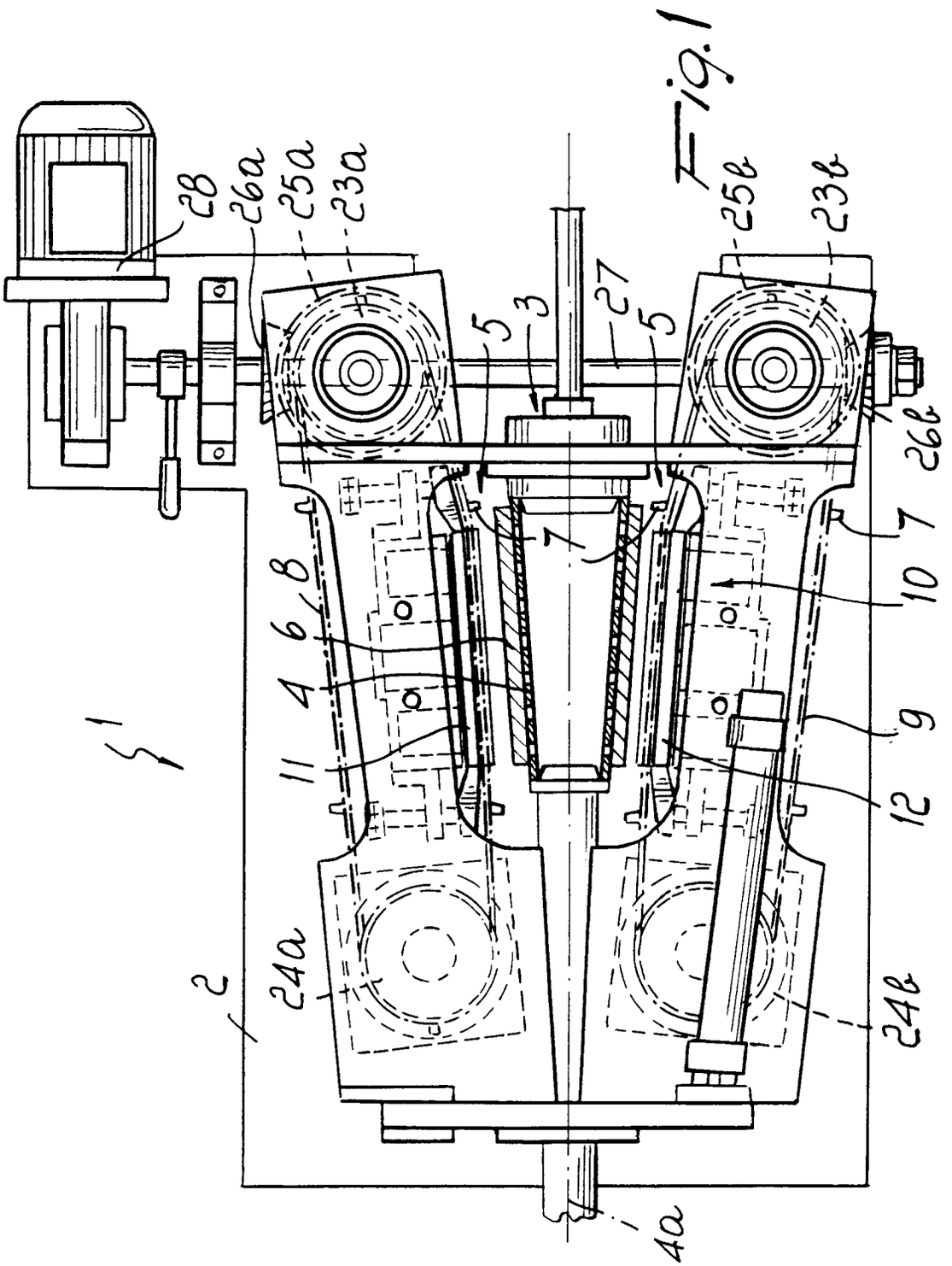
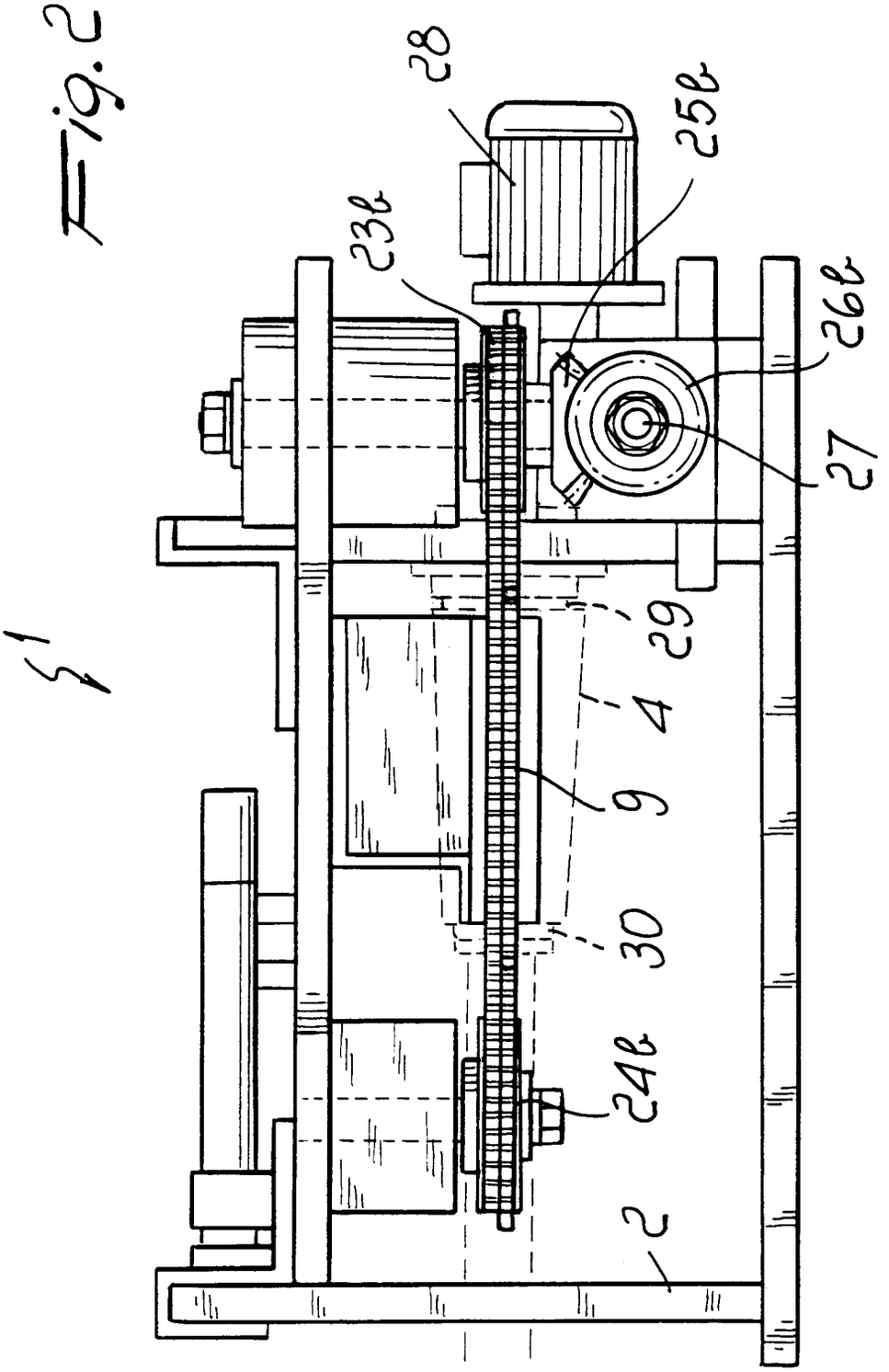


Fig. 1

Fig. 2



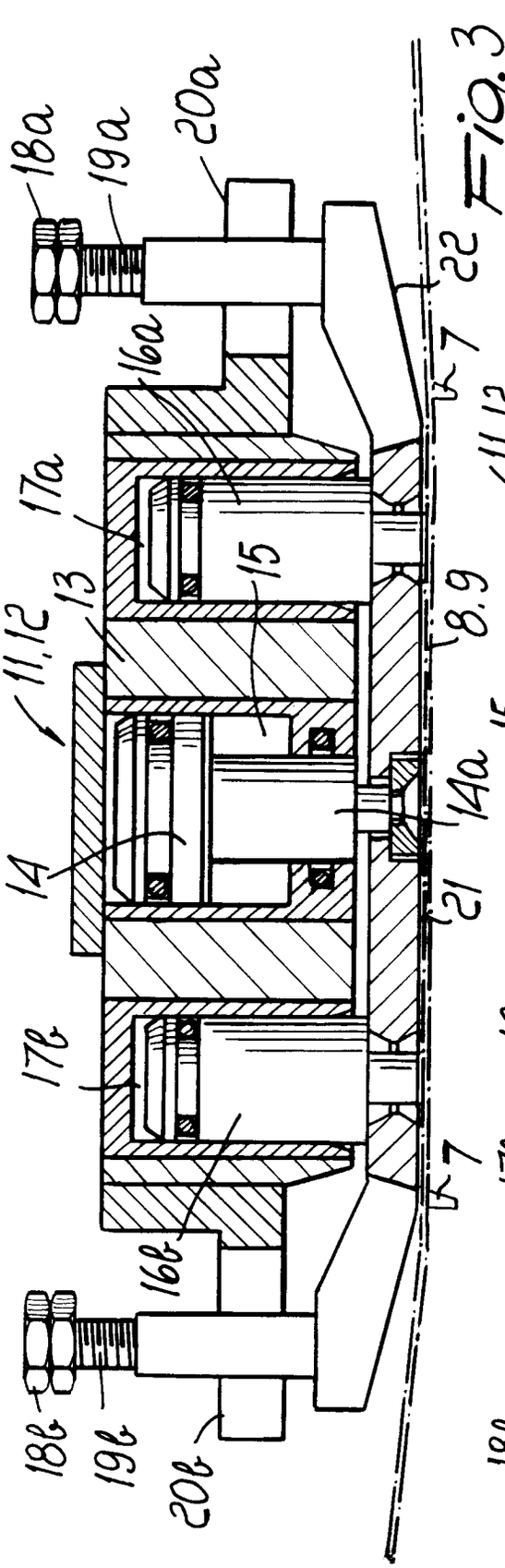

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Fig. 3

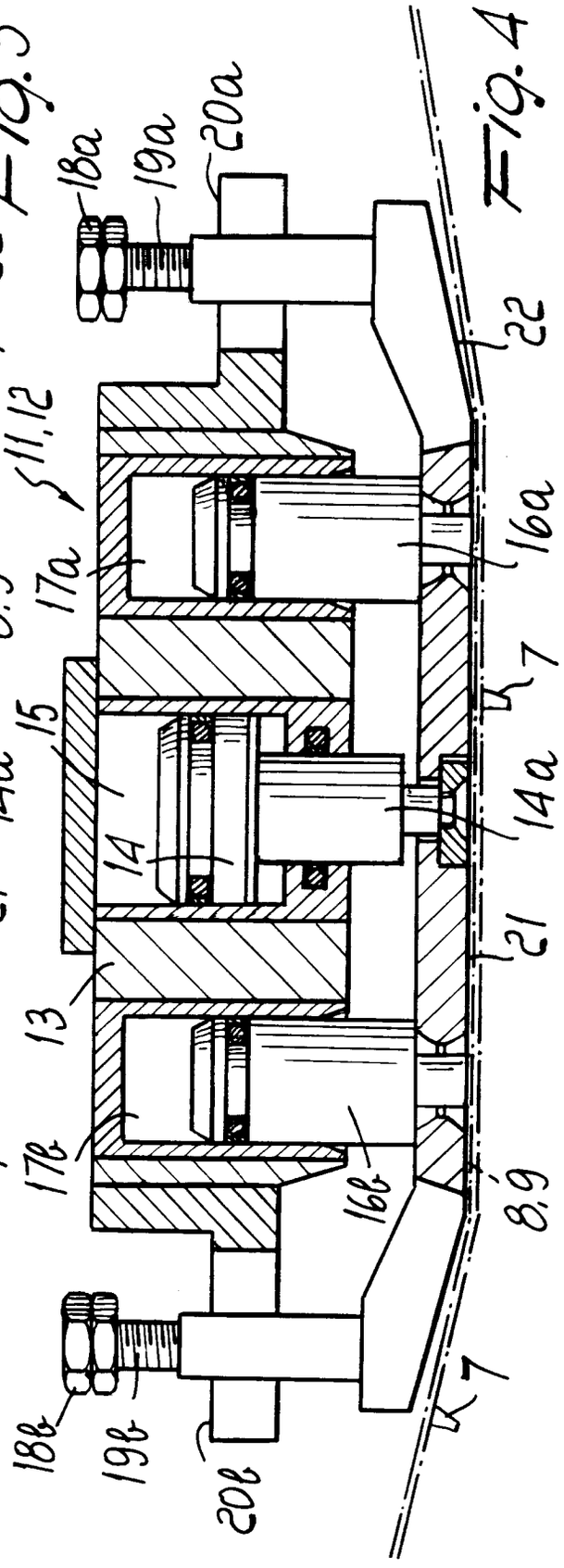
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Fig. 4

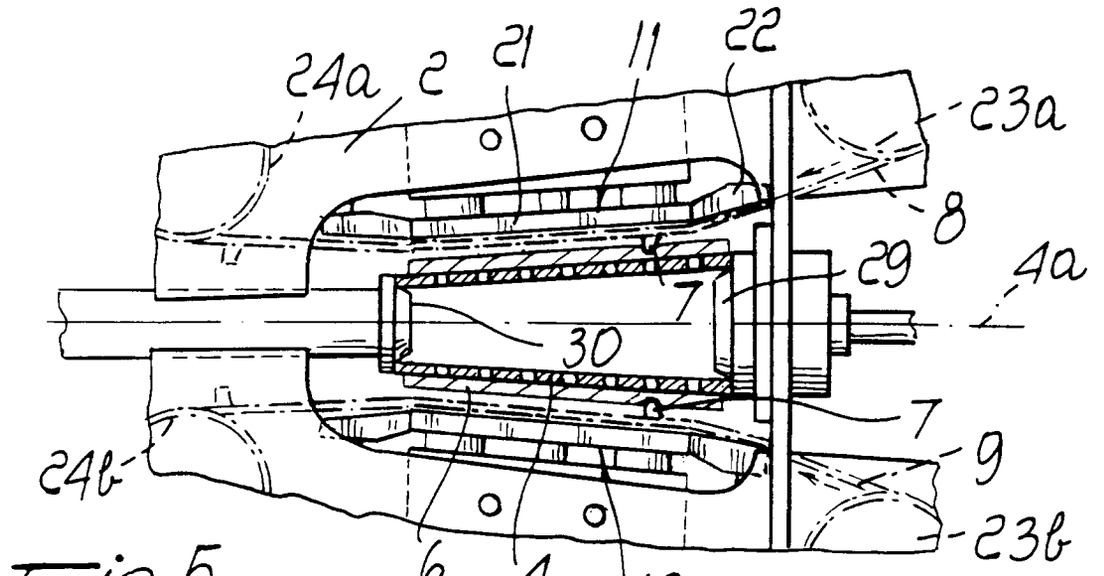

Fig. 5

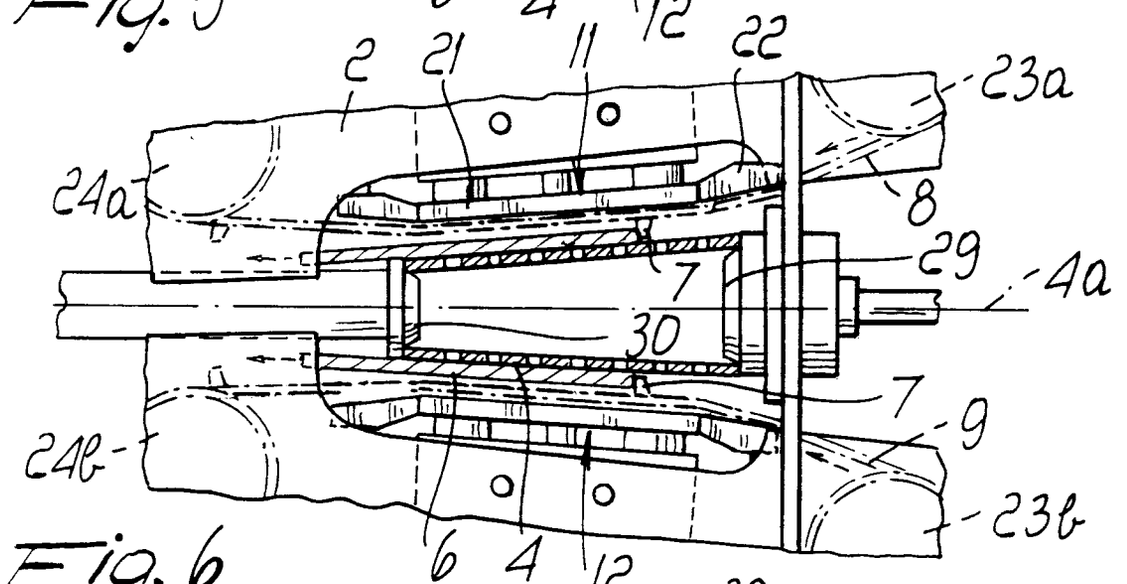

Fig. 6

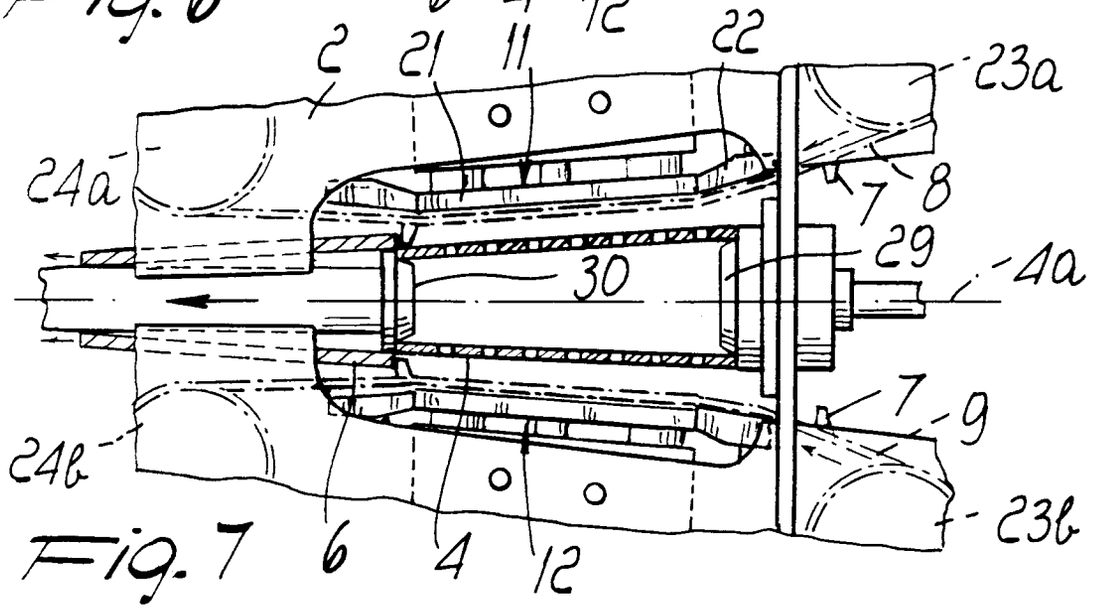

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 8296

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	CH-A-372 991 (GEORG RÖHL) * page 1, line 70 - page 2, line 3 * * page 1, line 53 - line 55 * * page 2, line 14 - line 17 *	1-6	B65H73/00
X	DE-B-10 78 510 (GEORG RÖHL) * the whole document *	1	
A	EP-A-0 053 090 (FELIX MANNHART AG) * abstract *	1-10	
A	DE-A-42 21 348 (MURATA KIKAI K.K.) * figure 3 *	1-10	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65H
D01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 March 1995	Tamme, H-M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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