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⑤④ **Automation plant for the doffing of cops and the insertion of empty pirns and for the replacement of bobbins, in self-acting mules.**

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⑦③ Proprietor : **S. BIGAGLI & C. SpA
Via delle Fonti 274
I-50047 Prato (Fi) (IT)**

⑦② Inventor : **Bigagli, Piero
Via Ferrucci 186
I-50047 Prato Firenze (IT)**

⑦④ Representative : **Mannucci, Gianfranco,
Dott.-Ing. et al
Ufficio Tecnico Ing. A. Mannucci Via della
Scala 4
I-50123 Firenze (IT)**

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Description

The invention refers to a plant for automatic replacement of bobbins of rove and for the junction of the roves in a spinning machine provided with supporting means on which the bobbins rest during feeding of the rove, said plant comprising an assembly for the transfer and the positioning of bobbins along the spinning machine, a unit supporting said transfer assembly above said supporting means, means for placing the bobbins on said supporting means, and means for removing the reeled off beams or bobbins and for the transfer thereof on one side of the machine.

According to a known technique, the rove bobbins are fed to the spinning machine manually or by carriages through transfer devices ; said bobbins are successively disposed by hand on suitable supports located on the machine. The bobbin replacement is carried out manually and so is the rove re-attachment; the machine operators cut the roves during the work and remove the reeled off bobbins, look for the ends of the bobbin roves, place the bobbin onto the supports of the feeding bench and carry out the junction of the ends of the new rove and of the one in the process of formation by rubbing and twisting these ends one to the other.

From EP-A-0196127 a rove bobbin replacement plant is known, which is suitable for automatic replacement of bobbins in a ring spinning machine. The structure of this plant is designed for an integration and cooperation with the members and structure of the ring spinner, and would not be suitable for an intermittent spinning machine, i.e. a self-acting mule.

A first object of the invention is, therefore, to provide a plant for automatic replacement of bobbins in an intermittent spinning machine.

According to the invention, a plant of the above mentioned type has been further developed in order to cooperate with an intermittent spinning machine having feeding drums on which the bobbins are supported during feeding of the rove. The plant according to the invention is characterized in that said unit is able to be lowered along guiding means from an upper position toward a lower position to place the bobbins on the corresponding feeding drums of the spinning machine, that sliding guides are combined to said feeding drums, for guiding the terminal pins of the beams on which the rove bobbins are wound up, and that means are provided for tilting said guides to discharge the beams or bobbins to be removed onto said removing means.

The present invention allows the automatic execution of the bobbin replacement operations. The machine operator has only the task of controlling the machine, predisposing the roves within suitable clamp means, giving the enable for starting the bobbin change ; such enable can be effected automatically by providing sensors for the detection of the bobbin

reeling-off degree, and actuation means.

Further advantageous features of the bobbin replacement plant according to the invention are set out in the appended claims.

The plant is advantageously designed for its application to spinning machines having a mobile feeding bench and fixed spindle bench, but it proves to be usable also to self-acting mules of other type like those with mobile spindle bench.

The actuation arrangement described later on is suitably controlled by a microprocessor or programmable logic operated electronic control unit (Central Processor Unit) or by a static logic or relay operated control system.

Operations are known for manually taking out the cops and replacing—also manually—said cops with empty pirns. Automatic systems are also known for the doffing of cops and the replacement thereof with empty pirns having the characteristic of carrying out the operations on single groups of spindles. These devices exhibit some drawbacks, as they normally carry out only the doffing of cops and, moreover, imply long periods during which the machine is stopped, with relative loss of production. In general, they are made up of racks capable of engaging the cops and taking them out from the spindles.

It is a further object of the invention to provide a plant which is suitable, not only to perform automatic bobbin replacement, but also to carry out the doffing of cops and their replacement with empty pirns ; thus a significant efficiency for the self-acting mules and an increased output can be achieved.

To this end, there may be provided a structure combined to the advantageously fixed spindle bench of the spinner, which bears the transfer assembly for the bobbins as well as the means for the doffing and replacement of cops with empty pirns. Said means may comprise : a pirn transfer assembly which transfer empty pirns along the spinning machine ; a pirn insertion unit which can be moved from an upper position, where it receives said empty pirns from said pirn transfer assembly to a lower position where it receives the formed cops removed from the spindles and inserts the empty pirns onto the spindles ; means carried by said pirn insertion unit, for the insertion of the pirns onto the spindles ; and a group combined with the spindles for removing the formed cops from the spindles and discharging them onto a cop conveyor carried by said pirn insertion unit.

Further advantageous features of the cop doffing system are described hereinafter and set out in the dependent claims.

The plant according to the invention is able to perform the operations simultaneously on all the spindles, or may carry out the doffing of the cops and the replacement of pirns on each half portion of the machine. The plant can possibly comprise means for orienting the pirns and transferring them to a tempor-

ary storing container, means forming such container, means for extracting the cops from the spindles with the breaking off of the yarns and the laying down of cops onto means for the transfer thereof beside the machine.

The present invention allows the automatic execution of the above mentioned operations. The machine operator has only the task of controlling said machine and enabling the start of the cop doffing ; such enabling may take place automatically by providing sensors for the detection of the cop packing degree, and actuation devices. The present invention achieves a significant rapidity and an optimal efficiency in carrying out the above mentioned operations.

An advantage offered by the plant according to the invention is that it extends mostly vertically so as to engage a minimum surface and to normally stand above the spindle zone.

It is another object of the invention to provide the cop doffing device and the bobbin replacement devices forming an integrated assembly and making up a single, compact, slightly cumbersome structure suitable for carrying out the operations in much reduced time. Considering also the high number of spinning units (spindles), clamp or similar devices of mechanical or pneumatic type usually employed in other cop doffing systems, have not been used, in order to simplify the devices and reducing the maintenance. The invention achieves a significant rapidity and optimal efficiency in carrying out the above mentioned operations.

An advantage offered by the plant according to the invention is that it has mostly a vertical extension so as to engage a minimal surface thereby being able to normally dwell above the spindle zone and the access zone for the control and reattachment of broken yarns, even in a plant which carries out both functions (bobbin replacement and cop doffing).

It is a further advantage of the invention that the devices for the replacement of the bobbins and the doffing of cops, are developed in an integral assembly with a single, compact, slightly cumbersome structure, operatively suitable to carry out the operations in much reduced time.

The invention will be better understood by following the description and the attached drawing, which shows a practical, non limitative exemplification of the same invention, in which the cop doffing apparatus is completed with the bobbin replacement apparatus. In the drawing :

- Fig. 1 shows a schematic and rough plan view ;
- Fig. 2 shows a side schematic ensemble view ;
- Fig. 3 shows the feeding bench ready for the bobbin replacement, after the lowering of the bobbin supporting group ;
- Fig. 4 shows the cop doffing devices at standstill ;
- Fig. 5 shows a cop doffing phase ;

Fig. 6 shows a phase of pirn insertion onto the spindles ;

Fig. 7 shows an enlarged detail of the pirn rack-support and of the pirn feeding chain ;

Fig. 8 is an enlarged partial view on line VIII-VIII of Fig. 7 ;

Fig. 9 shows schematically a chain conveyor for the bobbins ;

Fig. 10 shows a local section of the chain conveyor for the bobbins ;

Fig. 11 shows a detail of the bench for the feeding of the roves with the bobbins in work position and in discharge phase (with some components indicated by dashed lines), and the rove-cutting and junction devices ;

Fig. 12 is a detail of the blades of the cutting device, viewed according to line XII-XII of Fig. 11 ;

Fig. 13 shows an enlarged detail illustrating the extractor at rest ;

Figs. 14, 15 and 16 show an example of a pirn feeding group, in a front view and in the local sections on lines XV-XV and XVI-XVI of Fig. 14 ;

Fig. 17 shows a further example of feeding group ;

Fig. 18 is a time diagram of the phases for the pre-disposition and execution of bobbin replacement and cop doffing, in various sections ;

Figs. 19 to 21 show, in three views, an antirotation device for the bobbins predisposed on their conveyor ;

Figs. 22, 23 and 24 show a modified embodiment of the pirn feeding group in local sections on lines XXIII-XXIII and XXIV-XXIV respectively of Fig. 22.

Roughly described, with initial reference to Figs. 1 and 2, the spinning plant comprises a spindle bench 1 which, in the illustrated embodiment, is fixed and combined to tracks 3 for the sliding of the bobbin feeding bench 5. This bench comprises a row of feeding drums 7 on which the bobbins, generally indicated by C, are made to rest, the sticks or beams of said bobbins being made to rest on inclined guiding and lowering surfaces 9. Numeral 11 indicates a thread-guiding and rove-cutting assembly, numerals 13 and 82 indicate the components of a junction chamber of a type known per se, numeral 15 indicates the drafting assembly and numeral 17 indicates the rove pressing cylinders for the feeding of same rove to the spinning bay F. This bay extends up to the end of the respective spindle 19 mounted on a spindle board 20, the whole being placed on the spindle bench 1. On the side 1A of said bench there are pivotally mounted the winding faller with relevant faller sickles 22 and the counter-faller with relevant counter-faller sickles 24, for the control of yarn F during the winding, backing off and underwinding phases. Also drums 26 are mounted on bench 1, which drive spindles 19 through conventional belts 28 or other equivalent means, the spindle-acutating drums 26 being

driven by a motor group 30. Numeral 32 indicates a second motor group which drives the movements of the feeding bench 5 on the track guides 3, all this in a per se known manner. Numeral 34 indicates the assembly for the control of the drafting assembly 15 and the feeding drums 7.

Adjacent and above the spindles bench 1 a structure 40 is provided with posts 42 and brackets 43 to support the assembly for the change of the bobbins and the replacement of the pirns together with the doffing of the formed cops or spools. In case of two adjacent and opposite machines (a disposition which can be usually found in the spinning plants), the brackets 43 of each machine are connected one to the other, or they may consist of a single piece, thereby allowing the set of posts 42 to be reduced and thus forming a multiport passageway. A system 44 is provided on the rear of the machine for the collection and removal of the reeled-off bobbins.

On structure 40 and, in particular, from brackets 43, inclined guides 50 extend downwards in a direction away from posts 42, which guides are intended to provide an independent movement of group 52 for the replacement of the bobbins, and of group 54 for the doffing of the cops and the replacement of the pirns.

The guides 50 may have an inclination between 0° and 30°.

Again with reference to Fig. 2 and, in particular, to Figs. 11 and 12, a more detailed description is given of the assembly of the members that are associated to the feeding bench 5 for carrying out the cutting of the rove and the disposal of the reeled-off bobbins. This phase is accomplished when the bench is in its outward position before new bobbins are placed on the feeding drum 7 by means of the device 52. The assembly of members 11 includes a rove guiding rack 11A and a pair of blades 11B and 11C which are transversally moved to operate the cutting of the rove, the cut end thereof lying on drum 7 as shown at ST1 in Fig. 11. According to a modified embodiment, it may be sufficient to provide only one blade; alternatively shear means with one or two blades may be used. The other end of the rove is retained within the lower junction half-chamber 13 and is ready to be joined with the initial rove end ST2 of the new bobbin which will be laid down on drum 7. During operation, bobbins C are made to unwind and adhere to drums 7 while pins 58A projecting from the ends of beam 58 slide along the inclined guides 9 so as to maintain the bobbins C in a stable balance condition. Guides 9 are rigidly connected at the lower end to shaft 60; this allows them to rotate from the position illustrated with solid line in Fig. 11 up to the position indicated by 9X. The actuation of shaft 60 is carried out by means of one or more actuators, or pneumatic pistons or an electrical motor. In the arrangement indicated by 9X, the partially (C1) or totally reeled-off bobbins are discharged according to arrow FC onto the removal group 44, as during the

rotation of guides 9 pins 58A encounter the interruptions 9Y provided along said guides. Suitably, the actuation of guides 9 takes place when the feeding bench has completed its outward run (during the yarn twisting phase).

Group 44 comprises two inclined hopper-like walls 64 and 66, between which a conveyer 68, preferably of belt type, is provided for moving away the partially or totally reeled-off bobbins up to a withdrawal or piling or selection means 70 (Fig. 1); the conveyor 68 is put into operation during the spinning phase.

In case the work run of the feeding bench is less than that allowed by the tracks (for the purposes and with the procedures set forth in the Italian Patent Application No. 9430 A/86), means are provided for the transfer of bobbins C or C1 from guides 9 to conveyor 44 (through belt conveyers or other).

In case the count of the yarn being produced requires the so-called "partial inward run" of the feeding bench (towards the spindles), the dwell time of this bench at the end of the outward run may not be sufficient to perform the cutting and the unloading prior to the successive inward run. In these cases, the control logic of the machine provides for the suitable slowing down of the spindles in order to prolong the dwell time.

When the feeding bench 5 moves near the spindle bench 1 (Fig. 3), it reaches a position in which a feeding of new bobbins C which are in overhanging and stand-by condition over group 52 (Fig. 2) may be performed. The bobbins CN to be laid down on the feeding bench 5 are supported by arms 72 at positions corresponding to the guide arms 9. Said arms 72 engage pins 58A of beams 58. These arms are carried by a supporting and guiding structure 74 which is borne (Fig. 10) through brackets 76 by a slide 78 able to be slidably moved along guides 50 from the lifted position of Fig. 2 to the lowered position of Fig. 3. The handling of members 78, 76, 74 is carried out by an actuation system with cables 80 driven by winch devices, or bidirectional actuation means such as hydraulic, pneumatic or mechanical jacks. By lowering the members 78, 76, 74, bobbins CN are brought close to the feeding drums 7 up to make said bobbins rest thereon in off-center position towards the guides 9 with respect to the higher position of said drums. By further lowering of arms 72, bobbins CN are free to roll as far as to rest with pins 58A onto guides 9 in their operating position shown in Fig. 3. The roves initial ends of bobbins CN, indicated by ST2, have been previously engaged to clamp means disposed on a support bar borne by arms 84 connected to members 78, 76, 74. In the terminal lowering stroke of members 78, 76, 74, while bobbins CN roll as far as to rest on guides 9, arms 84 bring the clamp means 82 in correspondence of devices 13 so as to make up the junction chambers. The devices formed by clamps 82 and half-chambers 13 carry out the junction between the

residual rove of bay F, cut out from the disposed bobbins, and the initial rove ST2 of the new bobbins CN. Such devices are of a type known per se and are not described in details ; reference may be made for them to the Italian Patent applications No. 83351 A/85, 83358 A/86 and 83302 A/87 respectively of 27 March 1985, 16 May 1986 and 15 January 1987. In this way, both the supply of new bobbins CN to the spinning machine and the junction of the final ends of the previously formed roves with the initial ends of the roves of the new bobbins are carried out. After having carried out these operations, the members 78, 76, 74 are lifted and, following the completion of the feeding bench run in the direction of the spindles bench (inward run), a new phase of yarn feeding and twisting is performed, which allows the final consolidation of the junction between the roves.

The change of bobbins on either side of the machine can be obtained by using half the number of arms 72 of conveyor 74. Consequently, the actuations for the cut of the roves 11 for the discharge of bobbins 60 and for the joining of the roves through device 13-82, must be differentiated on the two sides of the machine. It is thus possible to program the replacement on the two sides separately, in order to obtain a distributed consumption of material and control the work with greater flexibility.

To feed the bobbins to the transfer and support structure 74, said bobbins are connected on arms 72 mounted on a chain 88 which is suitably driven onto the ends 90 (see Fig. 9) of structure 74. The bobbins move along a trajectory which corresponds to the spindle front and which projects from the latter on one side in correspondence of the zone 92 for the loading of bobbins CN, into which the bobbins may be fed for example according to arrow FCN. In this zone, which is outside of the spinning machine, the loading of the bobbins takes place during the spinning cycle between two successive replacements on the bobbins. Every time a bobbin is placed on arms 72, the chain 88 is moved by a step corresponding to the spacing between two bobbins, so as to perform the successive loading. Within the station 92, it is also possible to carry out an automated loading. During a bobbin reeling-off period, the operator has the time to perform the loading and displacement of bobbins along the work front of the machine, and also the time to search for the ends of roves ST2 of said bobbins CN loaded on arms 72, in order to engage them to the clamps 82 which are carried by the arms 84 of the members 78, 76, 74. According to the illustrated preferential solution, the insertion of the roves into the clamps is performed when all the bobbins are predisposed on the chain 88 of conveyor 74. According to a modified embodiment, the clamps may be connected to the chain by means of arms, thus allowing the predisposition of the roves inside the clamps soon after the loading of a bobbin in the loading station. No matter how

the ends of roves ST2 are engaged to clamps 82, the system is ready to carry out the replacement of the bobbins by laying down the bobbins CN against guides 9 through the above described operation and performed through the lowering of the members 78, 76, 74 with which also the initial end ST2 of the roves is engaged by means of clamps 82 to the final end of the rove previously cut and retained by devices 13.

The invention provides also a bobbin blocking device 75 for preventing roves ST2, predisposed within clamps 82, from being broken off by accidental rotations of bobbins CN which are overhanged on arms 72. The device (Fig. 19) is made up of a jaw 75A articulated on a pin 75B. A spring 75C keeps the jaw alternatively in the work position depicted in Fig. 19, or in a disengagement position 75X. During the loading of bobbins on conveyer 52, the operator provides for blocking the beam 58 through the device 75 ; during the laying onto drums 7 (Fig. 3), the action of pins 58A on the jaw 75A, due to the contact of bobbin CN with the feeding drum 7, causes the rotation of the jaw up to the position 75X thus allowing the bobbin to be positioned on the guides as above described. The predisposition of the bobbins on conveyor 74 may be limited to half the available places when changing the bobbins on one side of the spinning machine only.

A further modified embodiment provides a rove cutting device mounted on a bar connected with arms 84. The device is put into operation when the feeding bench is at the end of the outward run thus allowing the feeding bench weight not to be increased by blades 11 and relevant actuation means.

Cops S formed on pirns T fitted over the spindles 19 must be taken out from the spindles on which the pirns have been inserted with some force (Fig. 4), to be discharged and moved away for the replacement of pirns T. During an initial phase of said cop doffing operation, there is formed the underwinding yarn 10 which is engaged to the spindle 19 beneath the pirn of the completed cop. This underwinding yarn may be made up of the initial length containing the rove fastening obtained by devices 13-82 in a possible bobbin replacement cycle which could be provided prior to the cop doffing cycle (two cop forming cycles generally being provided for each bobbin reeling-off cycle). Once the fastening of the underwinding yarn 10 has been performed in the arrangement shown in Fig. 13 through the faller sickles 22 of the winding faller and counter-faller sickles 24 of the counter-faller, the cop removal must then be provided. This is carried out by a so-called "undermining" or extractor device. This includes a comb-like extractor bar 102 with an edge provided with recesses wherein the spindles 19 are placed ; during the spinning cycle, said bar 102 dwells in the zone of underwinding yarn 10. The extractor bar 102 is slidably guided according to arrow F102 parallel to the axis of the spindles by the rod drive 104, the rods being driven by a shaft 106 disposed along

the spindle front and which operates the lifting and the lowering of said extractor by means of rack and pinion systems. The extractor rods 104 can be driven also through electrical actuator systems or pneumatic or oleodynamic pistons.

The extraction takes place in two times. In a first lifting phase of the extractor, the faller sickle is kept in the position represented in Fig. 13, with the purpose of maintaining the yarn 10 in the underwinding position. Subsequently, after having brought the extractor 102 back to the rest position, the faller sickle is moved to a position that will not hinder the trajectory of the extracted cops or of the cop doffing group 54. Finally, the last lifting of the extractor is carried out, thus the pirns T with cops S are made to slide upwards along the inclined spindles up to the cop falling position, as shown in Fig. 5, in which the falling cops SC are indicated with broken lines. The cops are collected by a belt conveyor 110 which moves them along the front as far as to discharge them onto a further conveyor or carrier 112 or otherwise move them away or accumulate them (Fig. 1). Downstream of conveyor 112, or as an alternative to it, a gauge separating device may be provided for the separation of completed cops from empty pirns which could be present on the spindles or removed through extractor 102 and belt 110. The conveyor 110 is placed on group 54 carried by a slide 114 and capable of sliding along the inclined guides of the structure 40. Said slide 114 may be actuated by winch or jack systems, through drawrods, as well as by electrical, pneumatic or oleodynamic actuators. Conveyor 110 reaches the cop collection at the end of the first portion of the lowering stroke of slide 114 as shown in Fig. 5, the conveyor 110 being above the trajectory of the yarns F being formed. Afterwards, for the insertion of the new pirns on spindles 19, slide 114 is further lowered until it grazes the trajectories of yarns F with the lower portion of the frame of conveyor 110.

The device for the insertion of the pirns on the spindles is illustrated in detail in Figs. 7 and 8 as well as in Figs. 5 and 6, in order to show the positioning phases, while the pirn feeding is shown in Figs. 14 and 16.

For the feeding of pirns T, a support system 120 is provided on structure 40 so as to guide, along the front of the spinning machine in elevated position, a conveyor including a continuous belt or chain 122 — possibly a double one — suitably driven and carrying a set of mobile seats 124; said seats 124 are intended to receive the pirns T which are fitted therein in the inclined arrangement shown in the drawing, said pirns being received in the mobile seats 124, moved by chain 122 and kept at the bottom by a shaped support 126 and further retained by a wall 130, which is opposite to the mobile seats 124 and makes part of group 54 borne by slide 114 sliding on the inclined guides 50 of the structure 40. The conveyor 122, which receives pirns T outwardly of the machine front in the manners

to be described later on, slides along the machine front in the direction of arrow F122 in front of a rack structure formed by the fixed wall 130, so as to lay down pirns T into seats provided for them in the wall 130 in correspondence of the spindles; these fixed seats, indicated by 132, are shaped as shown in Fig. 8 with the wall which is previously encountered during the movement of conveyor 122 being inclined, while the inclined wall of seats 124 is the one ahead with respect of the direction of motion of conveyor 122. In addition, each seat 124 may have a spring 134 which cooperates with the gravity action to urge the pirns T to move into seats 132 of the opposite wall 130. Consequently, the pirns moving forwards with conveyor 122 slide along wall 130 and over the pirns which are already received into seats 132, and each pirn is urged by its weight and possibly by spring 134 to fit the first empty seat 132 met by the pirn moving forwards along the front; the pirn which encounters a free seat slides on the section 126 and enters the seat 132 by following down the profile 126A as far as to rest on a retaining section 138 which is provided close to the lower end of the fixed seats 132. In this way, each pirn moves from position T1 shown in Fig. 7, into which it is carried by conveyor 122 within seat 132, up to a position T2 in which it is received inside seat 132 by making it to rest on the retaining section 138. However, section 138 which may be a continuous bar or a set of small walls corresponding to seats 132, is mounted so as to move in the direction F138 and, in this particular case, it rotates about a horizontal axis defined by pins 140 (see Fig. 7) making part of a unit which comprises, in addition to said retaining section 138, also arms 142, urged by tensile springs 144 having the function of engaging the retaining section 138 so as to keep it in the position of Fig. 7. By means of a rope 146, the arms 142 may be recalled in the direction of arrow F142 towards a shaft 148 making part of group 54 which is borne by slide 144, in similar way as the unit 142, 138, 140. The shaft 148 is driven by an actuator or motor and has, in correspondence of each seat 132 and thus in correspondence of each spindle 19, a helical spring 150 anchored at 152 to the shaft 148 and having at its free end a projecting extension with a block 154 corresponding to the upper end of the fixed seat 132, which block 154 can act on the pirn located at T2 within seat 132 to launch said pirn onto the spindle. Shaft 148 may be rotated, from a position in which the blocks 154 are lifted from the seat, in such a direction as to press said blocks 154 against the upper end of the pirns at position T2, in order to elastically load these pirns by axially urging them downwards and pressing them against the retaining member 138. Rope 146, which drives the unit 142-138, is driven in turn by shaft 148; the rotation of the latter in the direction F148 causes the elastic loading of springs 150 and the elastic action of blocks 154 on pirns T2; the rope 146 overtakes the

position 146A and this causes also the return of arms 142 according to arrow F142 and thus the removal of the retaining means 138 from the base of the pirns located at T2. This operation is suitably carried out in two steps, the first of which after the pirns have been all positioned in the support or container made up of the wall 130 and of fixed seats 132, and shortly before the lowering of slide 114 ; the second after slide 114 has been lowered first to receive the cops SC taken out from the spindles and then to bring pirns T2 into alignment with the spindles ; consequently, as soon as the retaining means 138 move away from seats 132, owing to the effect of the elastic action of springs 150 transmitted by blocks 154, the pirns T2 are projected onto the spindles and forced by inertia thereon through a single operation. The replacement of yarn cops with empty pirns is thereby obtained. The operation for the loading of pirns T2 on spindles 19 is instantaneous, while the feeding of the pirns to the seats 132 may take place during the cycle of yarn formation on the cops. After the placement of pirns on the spindles, the assembly 54 moves again upwards along guides 50 to allow the free operation of the faller sickles and of faller and counter-faller to perform the typical operations of the intermittent spinning machine (self-acting mule) in question.

In case it is desired to carry out the doffing of the cops and the replacement of the pirns on one side only of the spinning machine, the following actuators shall be suitably duplicated and made independent on two sides : extractor 102 and shaft 148 for the loading and the ejection of the pirns. During the execution of the cops doffing, the shaft 148 of the not involved side is made to intervene merely to give a preload to the pirns located in the fixed seats 132 and prevent same pirns from accidentally falling down during the manoeuvre of group 54 during the doffing execution on the concerned side. To avoid accidental falls of cops from belt 110 during the motion of the latter, a band 116 is provided (Fig. 4) articulated on hinges, which closes the free zone between belt 110 and rack 130.

The placement of the pirns within the seats 124 of the chain conveyor 122 may be obtained manually or even and advantageously by an automatic system like that roughly illustrated in Figs. 14 to 16. From a storing container 170, a conveyor-elevator 172 takes out the randomly disposed pirns T by means of fin or hook members 174 of said conveyor, lifts them up and then drop them into a hopper 176 shaped to receive the frusto-conical pirns left in horizontal arrangement by the elevator 172. At the bottom of hopper 176 and at the two sides thereof, neck shaped elements 178 are provided (Fig. 16), able to allow the passage of only the narrow part of the pirn. Consequently, whatever the orientation of the pirn after its falling down inside the hopper may be, said pirn is kept by its larger part and made to drop with its thinner part downwards, as shown at T3 in Fig. 14 ; thus all pirns fall with their

thinner part downwards and fit individually and successively into one of the radial slots 180 provided in a wheel conveyor 182, located beneath the hopper. This conveyor 182, through its rotation, changes the arrangement of pirns T3 from the position with the tips directed downwardly which they assume when they fall into the slot located in the vertical upper position, to an overturned arrangement with the major base downwards as indicated by T4 in Figs. 14 and 15 ; when a pirn is at position T4, it shows up in front to one of seats 124 of the chain conveyor 122 and is subject to the action of a pusher 186 which pushes the pirn T4 into the mobile seat 124 and on the section 126, wherein the pirn is retained and guided during its transfer from the pirn loading unit, outside of the machine front, along the whole front and up to a fixed seat 132 which is found free. Pusher 186 may be suitably operated through at least an air jet activated in synchronism with the passage of the mobile seat 124 in front of pirn T4 located in the wheel 182.

A modified embodiment of the apparatus described in Figs. 14 to 16 is illustrated in Fig. 17. The functions of pirns overturning and insertion within the mobile seats 124 are carried out by a static conveyor made up of an inclined and shaped plane 190 ; owing to their conical shape, the pirns released by elevator 172 roll onto plane 190 in a known manner, placing themselves with their major base downwards and are guided in correspondence of the location where the pusher 186 is placed and is able to intervene by inserting them into the mobile seats 124.

Upstream of container 170, known means are provided for the accumulation, transfer and ejection of pirns disposed in random condition and non conforming to the arrangement which they have to take up inside said container 170, in order to prevent the pirns from being inserted one inside the other.

A further modified embodiment of the described devices is shown in Figs. 22 to 24. According to known procedures, the pirns are stacked in a container 170 so as to have them parallel to one another but not necessarily oriented in the same direction. The lower zone of the container is made to converge into a feeding hopper 176 through a gauge 178 of the type already described. The supply of pirns to the gauge is controlled by an element 198 having a concave shape and provided with a rotary motion. Upon every revolution of element 198 according to f198, one pirn is passed to the gauge 178. On their exit from the gauge, the pirns are guided by a conveyor 200 until they are inserted into relevant mobile seats 204 similar to those indicated by 124 previously described. Such seats are dragged along by the conveyor 202, guided by the three pinions 206, 208 and 210. The embracing zone of pinion 206 facilitates the transit of pirns from conveyor 200 to seat 204 ; the length between pinions 208 and 210 allows the transit of pirns from seats 204 to seats 124 through the fixed profiles 230 as shown

in Fig. 24.

Actuations of conveyors of mobile seats 124 and 204, pusher 186, wheel 182, elevator 172, element 198 and of motions upstream of container 170 in the various solutions presented, are provided with systems for controlling the number of pirns being fed and their accumulation inside the container 170, which may be of optical or other type, as well as with systems for the synchronization and phasing of the individual actuations. The actuations themselves may be of mechanical, electrical, pneumatic or oleodynamic type.

It is thus possible to automatically carry out the loading of the pirns in the conveyor 122 which transfers them to the seats 132 of group 54, which provides for their insertion onto the spindles 19 as already mentioned.

Fig. 18 illustrates the automation cycle of the self-acting mule. Diagram A relates to bobbin predisposition (during the spinning cycle) and to the cycle for the predisposition of pirns into the container (during the spinning cycle) and in particular: A1 indicates the actuation of the conveyor chain; A2 indicates the actuation of the pinn conveyor; A3 indicates the actuation of the pinn elevator. Diagram B relates to the bobbin change and the underwinding and, in particular: B1 indicates the actuation of the feeding bench; B2 indicates the cutting actuation; B3 indicates the actuation of beam discharge; B4 indicates the actuation of group 52 of the bobbin chain; B5 indicates the actuation of the rove junction; B6 indicates the actuation of the beam belt. Diagram C relates to the cop doffing and in particular: C3 is the actuation of cop-pirn group 54; C4 is the actuation of the extractor; C5 is the actuation of the spring shaft; C6 is the actuation of the safeguard band; C7 is the actuation of the removal belt. Other indications are marked along the diagram lines and in particular: D1-D2 indicate a stretch in which the machine comes to a stop for the replacement of bobbins; D2-D3 indicate a stretch in which the machine comes to a stop for the replacement of cops with empty pirns. Further, D4 is the instant in which the unloading of cops is ended.

Claims

1. A plant for automatic replacement of bobbins (CN) of rove and for the junction of the roves in an intermittent spinning machine (self-acting mule) which is provided with feeding drums (7) on which the bobbins rest during feeding of the rove, said plant comprising an assembly (74) for the transfer and the positioning of bobbins (CN) along the spinning machine above the feeding drums (7) thereof; a unit (52) supporting said transfer assembly (74) above said feeding drums (7), means (50, 72) for placing the bobbins on said feeding drums (7), and means (44) for

removing the reeled off beams (58) or bobbins (CN) and for the transfer thereof on one side of the machine,

characterized in that said unit (52) is able to be lowered along guiding means (50) from an upper position toward a lower position to place the bobbins (CN) on the corresponding feeding drums (7) of the spinning machine, that sliding guides (9) are combined to said feeding drums (7), for guiding the terminal pins (58A) of the beams (58) on which the rove bobbins (CN) are wound up, and that means (60) are provided for tilting said guides (9) to discharge the beams (58) or bobbins (CN) to be removed onto said removing means (44).

2. Plant according to claim 1, characterized in that the assembly (74) for the transfer of bobbins along the spinning machine comprises hooks (72) for hanging the end pins (58A) of the beams (58) able to release the bobbins upon the abutment thereof on the feeding drums (7) in off-centered position, the bobbin rolling along said drums (7) as far as they rest against the sliding guides (9).

3. Plant according to claim 1 or 2, characterized in that the guides (9) for the sliding of the beam pins (58A) are able to be inclined about an axis (60) parallel to that of the beams, in order to disengage the beams (58) or the reeled-off bobbins (C1) and cause them to drop onto the transfer means (44).

4. Plant according to one or more of claims 1 to 3, characterized in that the means (44) for the withdrawal of the beams (58) and the reeled-off bobbins (C1) are located on the rear of the machine on the side opposite to the spindle bench (1), that is on the side of maximum outward run of the bobbin holder bench (5), while the bobbin transfer assembly (74) is adjacent to the spindle bench (1).

5. Plant according to one or more of claims 1 to 4, characterized in that, on the bobbin holder bench (5), devices (13) are provided for the junction of roves and the cutting thereof, and that on the unit (52) able to be lowered for the laying down of bobbins, clamps (82) are provided for retaining the initial ends of the roves (ST1), said clamps being able to cooperate with said devices (13) for the junction.

6. Plant according to one or more of claims 2 to 5, characterized in that it comprises, on suspension hooks (72) of the bobbin transfer assembly (74), means (75, 75A) for braking the bobbin pins (58A), in order to prevent them from rotating prior to their release.

7. Plant according to one or more of claims 1 to 6, characterized in that it is combined to means (102, 120, 138) for the doffing of cops (S) and replacement thereof with empty pirns (T).

8. Plant according to claim 7, characterized in that a structure (44, 42), combined to the advantageously fixed spindle bench (1), bears the transfer assembly (74) for the bobbins as well as the means (102, 120,

138) for the replacement of cops (S) with empty pirns (T).

9. Plant according to claim 7 or 8, characterized in that said means for automatic doffing of cops (S) and replacement of cops (S) with empty pirns (T) comprises: a pirn transfer assembly (120, 122, 124) which transfer empty pirns (T1) along the spinning machine; a pirn insertion unit (54) which can be moved from an upper position, where it receives said empty pirns (T1) from said pirn transfer assembly (120, 122, 124), to a lower position where it receives the formed cops (S) removed from the spindles (19) and inserts the empty pirns (T1) onto the spindles (19); means (138, 148, 150) carried by said pirn insertion unit (54), for the insertion of the pirns (T1) onto the spindles (19); and a group (102, 104) combined with the spindles (19) for removing the formed cops (S) from the spindles (19) and discharging them onto a cop conveyor (110) carried by said pirn insertion unit (54).

10. Plant according to claim 9, characterized in that: on the pirn insertion unit (54) there is provided a rack support assembly (130, 132) with seats (132) for pirns in correspondence of spindles (19) with retaining means (138) and thrusting and launching means (150, 154) for the insertion of the pirns (T) onto the spindles (19), that said pirn transfer unit (54) comprises a transverse pirn conveyor (122, 124) able to slide in front of said rack assembly (130, 132) to pass the pirns to the empty seats (132) thereof; and a control means (148) for the loading of the springs (150), for the thrust and launching of the pirns, and for the disengagement of the retaining means (138).

11. Plant according to claims 9 and 10, characterized in that said cop conveyor (110) carried by said pirn insertion unit (54) is brought up to a level corresponding to the upper end of spindles (19) by said unit (54), in order to receive the extracted cops; said unit (54) being able to be further lowered for positioning the pirns located on rack (134, 132) into alignment and close to the spindles (19), and for allowing the insertion of the pirns and the fitting thereof on the spindle rods.

12. Plant according to claims 10 and 11, characterized in that the transverse pirn conveyor (120, 122, 124) slides in front of the rack support assembly (130, 132) in the lifted arrangement of the latter, for the loading of pirns thereon; said conveyor and said rack assembly being inclined to facilitate the pirn transfer.

13. Plant according to one or more of claims 9 to 12, characterized in that the group for removing the formed cops (S) from the spindles comprises a comb-like extractor bar (102) to extract the cops and lift them up in two times until they fall on the conveyor (110) carried by the pirn insertion unit (54).

Patentansprüche

1. Anlage zum automatischen Auswechseln von Vorgarnspulen (CN) und zum Verbinden des Vorgarns in einer intermittierend arbeitenden Spinnmaschine (Wagenspinner), die mit Zuführtrommeln (7) versehen ist, auf denen die Spulen während der Zuführung des Vorgarns aufliegen, und mit einer Einrichtung (74) zum Überführen und Positionieren von Spulen (CN) längs der Spinnmaschine oberhalb von deren Zuführtrommeln (7), einer die Überföhrungseinrichtung (74) unterstützenden Einheit (52) zum Auflegen der Spulen auf die Zuführtrommeln (7), und Mittel (44) zur Entnahme der leeren Spulenkerne (58) oder Spulen (CN) an deren Abgabe an eine Seite der Maschine, **dadurch gekennzeichnet**, daß die Einheit (52) längs Führungsmitteln (50) von einer oberen Stellung in eine untere Stellung absenkbar ist, um die Spulen (CN) auf die entsprechenden Zuführtrommeln (7) der Spinnmaschine abzulegen, daß mit den Zuführtrommeln (7) Gleitführungen (9) kombiniert sind zum Föhren der Endzapfen (58A) der Spulenkerne (58) auf denen die Spulen (CN) aufgewickelt sind, und daß Mittel (60) vorgesehen sind zum Verdrehen der Führungen (9), um die Spulenkerne (58) oder Spulen (CN), die auf die Entnahmemittel (44) abgeföhrt werden sollen, freizugeben.

2. Anlage nach Anspruch 1, **dadurch gekennzeichnet**, daß die Einrichtung (74) zur Überföhrung von Spulen längs der Spinnmaschine Haken (72) zum Aufhängen der Endzapfen (58A) der Spulenkerne (58) umfaßt, die zur Freigabe der Spulen bei ihrem Auftreffen auf den Zuführtrommeln (7) in exzentrischer Position ausgebildet sind, wobei die Spule entlang den Trommeln rollt, so weit sie an den Gleitführungen (9) aufliegt.

3. Anlage nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß die Führung (9) zum Verschieben der Endzapfen (58A) um eine Achse (60), die parallel zu der der Spulenkerne ist, gedreht werden kann, um die Spulenkerne (58) oder die leeren Spulen (CN) zu lösen und zu bewirken, daß sie auf die Übertragungsmittel (44) fallen.

4. Anlage nach einem oder mehreren der Ansprüche 1-3, **dadurch gekennzeichnet**, daß die Mittel (44) zum Abföhren der Spulenkerne (58) und der leeren Spulen (CN) an der Rückseite der Maschine an der gegenüberliegenden Seite zur Spindelbank (1) angeordnet sind, das heißt an der Seite der maximalen Ausladung der Spulenhalterbank (5), während die Überföhrungseinrichtung (74) von Spulen neben der Spindelbank (1) angeordnet ist.

5. Anlage nach einem oder mehreren der Ansprüche 1-4, **dadurch gekennzeichnet**, daß auf der Spulenhalterbank (5) Vorrichtungen (13) zum Verbinden und Schneiden von Vorgarn vorgesehen sind und daß auf der Einheit (52) die zum Ablegen von Spulen abgesenkt werden kann, Klammern (82) vorgesehen

sind zum Zurückhalten der Anfangsenden des Vorgarns (ST1), wobei die Klammern mit der Vorrichtung (13) zum Verbinden zusammenwirken können.

6. Anlage nach einem oder mehreren der Ansprüche 2-5, dadurch **gekennzeichnet**, daß sie an Aufhängungshaken (72) der Spulenüberführungseinrichtung (74) Mittel (75, 75A) zum Bremsen der Spulenzapfen (58A) umfaßt, um sie am Drehen vor ihrer Freigabe zu hindern.

7. Anlage nach einem oder mehreren der Ansprüche 1-6, dadurch **gekennzeichnet**, daß sie mit Mitteln (102, 120, 138) zum Entnehmen von Spulen (S) und zu deren Auswechseln gegen leere Spulenhülsen kombiniert ist.

8. Anlage nach Anspruch 7, dadurch **gekennzeichnet**, daß eine Anordnung (44, 42), die mit der vorteilhafterweise feststehenden Spindelbank (1) kombiniert ist, sowohl die Überführungseinrichtung (74) der Spulen, als auch die Mittel (102, 120, 138) zum Auswechseln der Spulen (S) gegen leere Spulenhülsen (T) trägt.

9. Anlage nach den Ansprüchen 7 oder 8, dadurch **gekennzeichnet**, daß die Mittel zum automatischen Entnehmen der Spulen (S) und Auswechseln der Spulen (S) gegen leere Spulenhülsen (T) folgende Einrichtungen umfassen: eine Spulenhülsenzuführeinrichtung (120, 122, 124) die leere Spulenhülsen (T1) entlang der Spinnmaschine überführt; eine Spulenhülseneinsetzeinheit (54), welche von einer oberen Stellung, wo sie die leere Spulenhülse (T1) von der Überführungseinheit (120, 122, 124) empfängt, in eine untere Stellung bewegt werden kann, wo sie die gebildeten Spulen (S), die von den Spindeln (19) entnommen wurden, empfängt und die leeren Spulenhülsen (T1) in die Spindeln (19) einsetzt; Mittel (138, 148, 150), die durch die Spulenhülseneinsetzeinheit (54) getragen werden, zum Einsetzen der Spulenhülsen (T1) auf die Spindeln (19); und eine Gruppe (102, 104), die mit den Spindeln (19) kombiniert ist, zum Entnehmen der gebildeten Spulen (S) von den Spindeln (19) und zum Entladen derselben auf einen Spulenförderer (110), der von der Spulenhülseneinsetzeinheit (54) getragen wird.

10. Anlage nach Anspruch 9, dadurch **gekennzeichnet**, daß auf der Spulenhülseneinsetzeinheit (54) eine Gestellstützeinrichtung (130, 132) mit Sitzen (132) für Spulenhülsen entsprechend den Spindeln (19) mit Zurückhaltungsmitteln (138) und Schub- und Startmitteln (150, 154) zum Einsetzen der Spulenhülsen (T) in die Spindeln (19) vorgesehen sind, daß die Spulenhülseneinsetzeinheit (54) einen diagonal verlaufenden Spulenhülsenförderer (122, 124), der vor der Gestelleinrichtung (130, 132) verschoben werden kann, um die Spulenhülsen an die leeren Sitze (132) zu übergeben, und Steuermittel (148) zum Spannen der Feder (150), zum Verschieben und Starten der Spulenhülsen und zum Auskuppeln der Rückhalte-

mittel (138), umfaßt.

11. Anlage nach den Ansprüchen 9 und 10, dadurch **gekennzeichnet**, daß der Spulenförderer (110), der von der Spulenhülseneinsetzeinheit (54) getragen wird, mittels der Einheit (54) auf ein Niveau angehoben wird, das mit dem oberen Ende der Spindel (19) korrespondiert, um die ausgeworfenen Spulen aufzunehmen, wobei die Einheit (54) weiter gesenkt werden kann zum Positionieren der Spulenhülsen, die auf dem Gestell (134, 132) angeordnet sind, fluchtend zu und nahe bei den Spindeln (19) und zum Ermöglichen des Einsetzens und des Anbringens der Spulenhülsen auf den Spindelstangen.

12. Anlage nach den Ansprüchen 10 und 11, dadurch **gekennzeichnet**, daß der quer verlaufende Spulenhülsenförderer (120, 122, 124) vor der Gestellstützeinrichtung (130, 132) in angehobener Anordnung verschoben werden kann, zum Beladen mit den Spulenhülsen; wobei der Förderer und die Gestelleinrichtung geneigt sind, um die Spulenhülsenüberführung zu ermöglichen.

13. Anlage nach einem oder mehreren der Ansprüche 9-12, dadurch **gekennzeichnet**, daß die Gruppe zum Entnehmen der gebildeten Spulen (S) von den Spindeln einen kammartigen Abziehstab (102) umfaßt zum Abziehen der Spulen und zum Anheben derselben in zwei Zeiten, bis sie auf den Förderer (110) fallen, der durch die Spulenhülseneinsetzeinheit (54) getragen wird.

Revendications

1. Dispositif de remplacement automatique de bobines (CN) de mèche et de jonction des mèches dans une machine de filature intermittente (renvideur) qui est munie de tambours d'alimentation (7) sur lesquels reposent les bobines pendant l'alimentation de la mèche, ledit dispositif comprenant un ensemble (74) de transfert et de positionnement des bobines (CN) le long de la machine de filature au-dessus de ses tambours d'alimentation (7); une unité (52) supportant ledit ensemble de transfert (74) au-dessus desdits tambours d'alimentation (7), des moyens (50, 72) pour placer les bobines sur lesdits tambours d'alimentation (7), et des moyens (44) pour retirer les tubes de bobines dévidés (58) ou les bobines (CN) et les transférer sur un côté de la machine, caractérisé en ce que ladite unité (52) est capable d'être abaissée le long de moyens de guidage (50) depuis une position haute en direction d'une position basse pour placer les bobines (CN) sur les tambours d'alimentation correspondants (7) de la machine de filature, des guides de glissement (9) sont combinés auxdits tambours d'alimentation (7) pour guider les axes d'extrémité (58A) des tubes de bobines (58) sur lesquelles les bobines de mèche (CN) sont enroulées, et des moyens (60) sont prévus pour faire bas-

culer lesdits guides (9) et décharger les tubes (58) des bobines (CN) et les déposer sur lesdits moyens d'évacuation (54).

2. Dispositif selon la revendication 1, caractérisé en ce que l'ensemble (74) de transfert des bobines le long de la machine de filature comprend des crochets (72) pour suspendre les axes d'extrémité (58A) des tubes de bobines (58) capables de lâcher les bobines lors de leur venue en butée sur les tambours d'alimentation (7) dans une position hors centre, la bobine roulant le long desdits tambours (7) jusqu'à ce qu'elle repose contre les guides de glissement (9).

3. Dispositif selon la revendication 1 ou 2, caractérisé en ce que les guides (9) destinés au glissement des axes d'extrémité des tubes de bobines (58A) sont susceptibles d'être inclinés autour d'un axe (60) parallèle à celui des tubes de bobines, de manière à dégager les axes de bobines (58) ou les bobines dévidées (C1) et les amener à tomber sur les moyens de transfert (44).

4. Dispositif selon une ou plusieurs des revendications 1 à 3, caractérisé en ce que les moyens (44) de retrait des tubes de bobines (58) et des bobines dévidées (C1) sont disposés à l'arrière de la machine sur le côté qui est à l'opposé du banc à broches (1), c'est-à-dire sur le côté de la course maximale vers l'extérieur du banc de support de bobines (5), alors que l'ensemble de transfert de bobines (74) est adjacent au banc à broches (1).

5. Dispositif selon une ou plusieurs des revendications 1 à 4, caractérisé en ce que des dispositifs (13) sont prévus sur le banc de support de bobines (5) en vue de la jonction des mèches et de leur coupe, et en ce que des pinces (82) sont prévues sur l'unité (52) apte à être abaissée pour le dépôt des bobines afin de retenir les extrémités initiales des mèches (ST1), lesdites pinces étant aptes à coopérer avec lesdits dispositifs (13) destinés à la jonction.

6. Dispositif selon une ou plusieurs des revendications 2 à 5, caractérisé en ce qu'il comprend, sur les crochets de suspension (72) de l'ensemble de transfert de bobines (74) des moyens (75, 75A) pour freiner les tiges de bobines (58A) et leur éviter de tourner avant leur dégagement.

7. Dispositif selon une ou plusieurs des revendications 1 à 6, caractérisé en ce qu'il est combiné à des moyens (102, 120, 138) pour la levée des canettes (S) et leur remplacement par des tubes vides (T).

8. Dispositif selon la revendication 7, caractérisé en ce qu'une structure (44, 42), combinée au banc à broches (1) qui avantageusement fixe, supporte l'ensemble de transfert (74) destiné aux bobines de même que les moyens (102, 120, 138) destinés au remplacement des canettes (S) par des tubes vides (T).

9. Dispositif selon la revendication 7 ou 8, caractérisé en ce que lesdits moyens de levée automatique des canettes (S) et de remplacement de canettes (S)

par des tubes vides (T) comprennent : un ensemble de transfert de tubes (120, 122, 120) qui transfère les tubes vides (T1) le long de la machine de filature ; une unité d'insertion de tubes (54) qui peut être déplacée d'une position haute où elle reçoit lesdits tubes vides (T1) dudit ensemble de transfert de tubes (120, 122, 124) vers une position basse où il reçoit les canettes formées (S) retirées des broches (19) et insert les tubes vides (T1) sur les broches (19) ; des moyens (138, 148, 150) supportés par ladite unité d'insertion de tubes (54) en vue de l'insertion des tubes (T1) sur les broches (19) ; et un groupe (102, 104) combiné aux broches (19) pour retirer les canettes formées (S) des broches (19) et les décharger sur un convoyeur de canettes (110) supporté par ladite unité d'insertion de tubes (54).

10. Dispositif selon la revendication 9, caractérisé en ce qu'il est prévu sur l'unité d'insertion de tubes (54) un ensemble de support à râtelier (130, 132) avec des sièges (132) pour les tubes en correspondance des broches (19), des moyens de retenue (138) et des moyens de poussée et de lancement (150, 154) destinés à l'insertion des tubes (T) sur les broches (19), en ce que l'unité de transfert de tubes (54) comprend un convoyeur de tubes transversal (122, 124) apte à coulisser à l'avant dudit ensemble à râtelier (130, 132) pour transférer les tubes dans les sièges vides (132) de cet ensemble, et des moyens de commande (148) pour le chargement des ressorts (150), pour la poussée et le lancement des tubes, et pour le dégagement des moyens de retenue (138).

11. Dispositif selon les revendications 9 et 10, caractérisé en ce que ledit convoyeur de canettes (110) supporté par ladite unité d'insertion de tubes (54) est soulevé à un niveau correspondant à l'extrémité supérieure des broches (19) par ladite unité (54) pour recevoir les canettes extraites, ladite unité (54) étant apte à être abaissée encore plus pour positionner les tubes situés sur le râtelier (134, 132) en alignement et à proximité des broches (19), et pour autoriser l'insertion des tubes et leur fixation sur les tiges des broches.

12. Dispositif selon les revendications 10 et 11, caractérisé en ce que le convoyeur de tubes transversal (120, 122, 124) coulisse à l'avant de l'ensemble de support à râtelier (130, 132) dans la position soulevée de ce dernier pour le chargement des tubes ; ledit convoyeur et ledit ensemble à râtelier étant inclinés pour faciliter le transfert des tubes.

13. Dispositif selon une ou plusieurs des revendications 9 à 12, caractérisé en ce que le groupe prévu pour retirer les canettes formées (S) des broches comprend une barre d'extraction en forme de peigne (102) pour extraire les canettes et les soulever en deux fois jusqu'à ce qu'elles tombent sur le convoyeur (110) supporté par l'unité d'insertion de tubes (54).

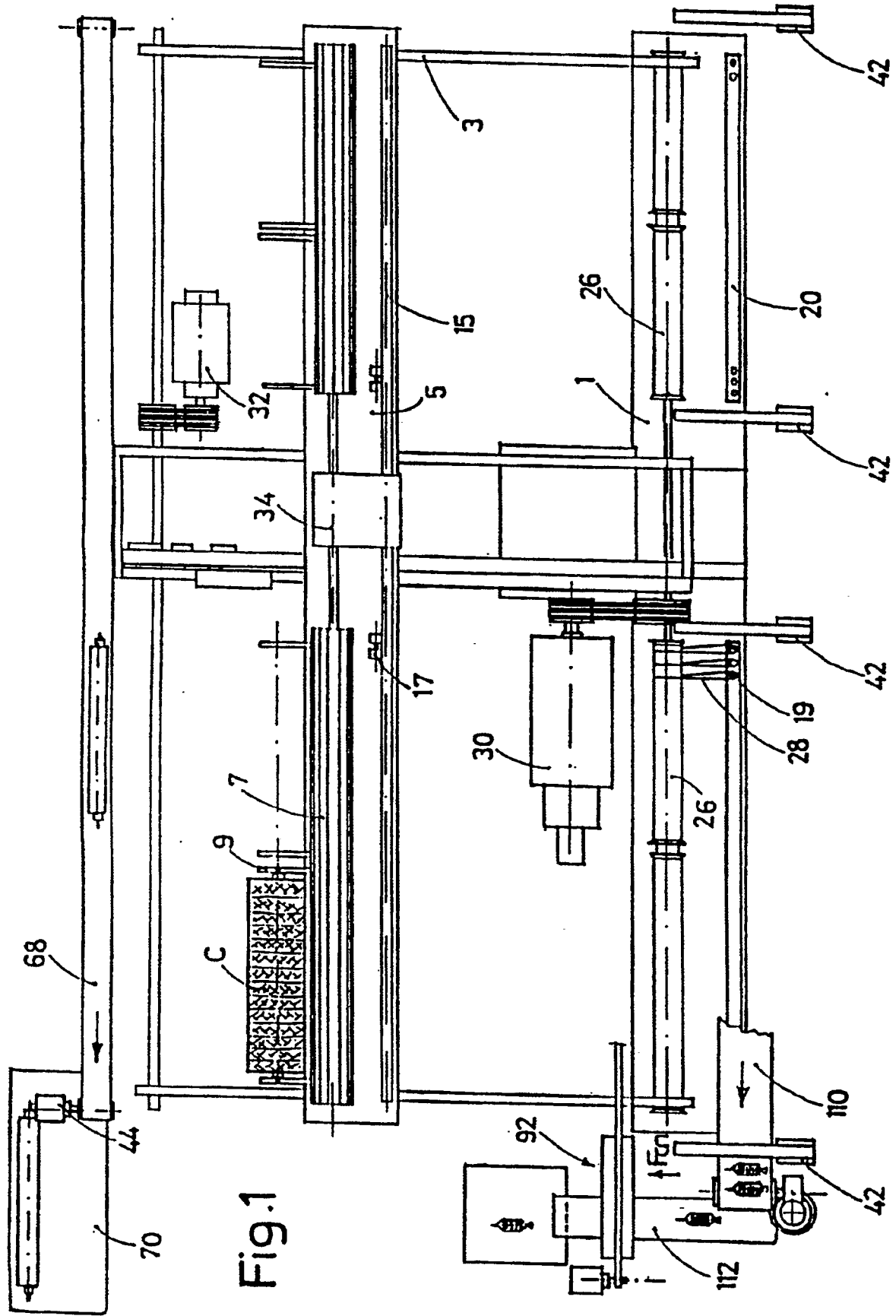


Fig. 1

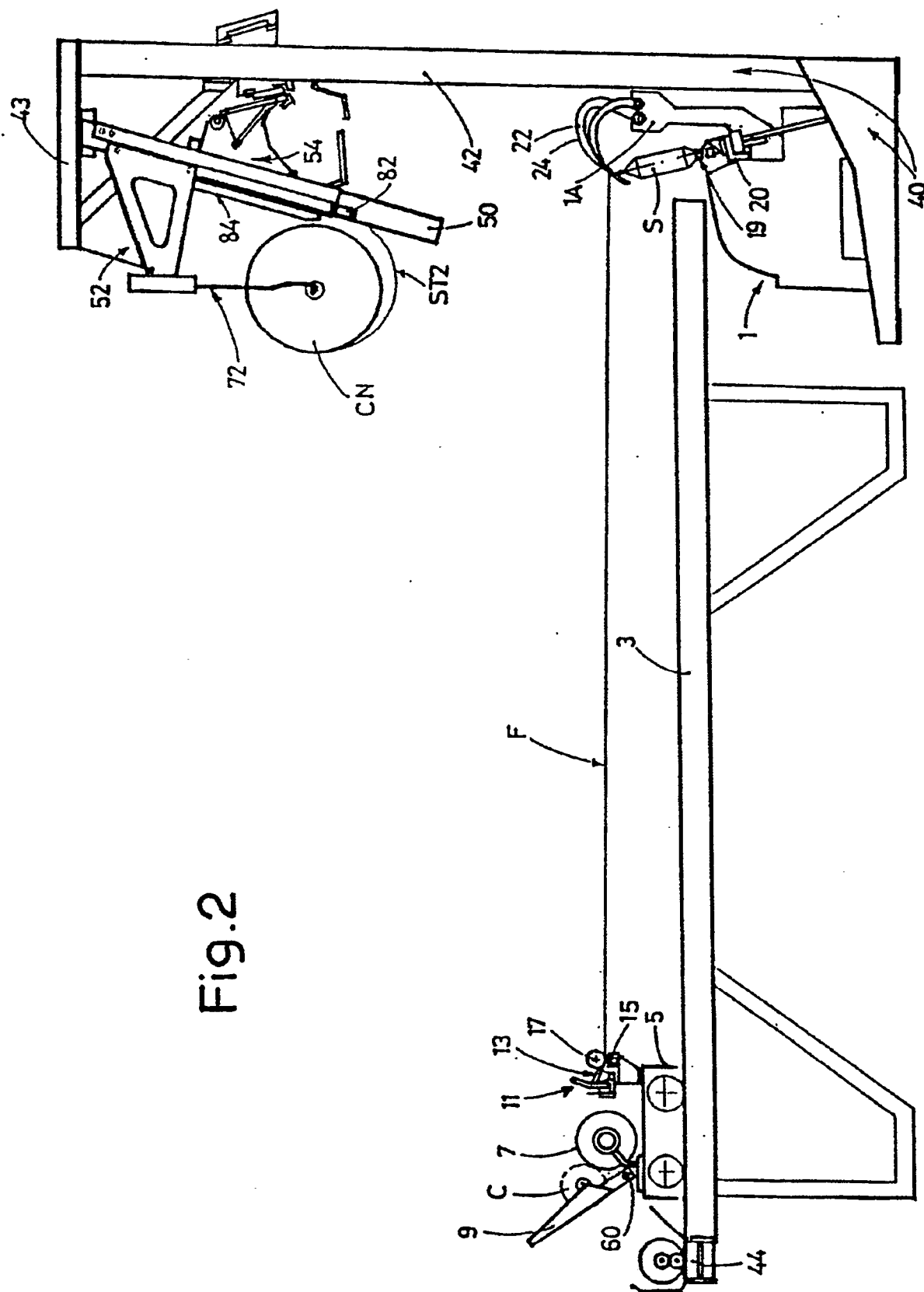


Fig. 2

Fig.3

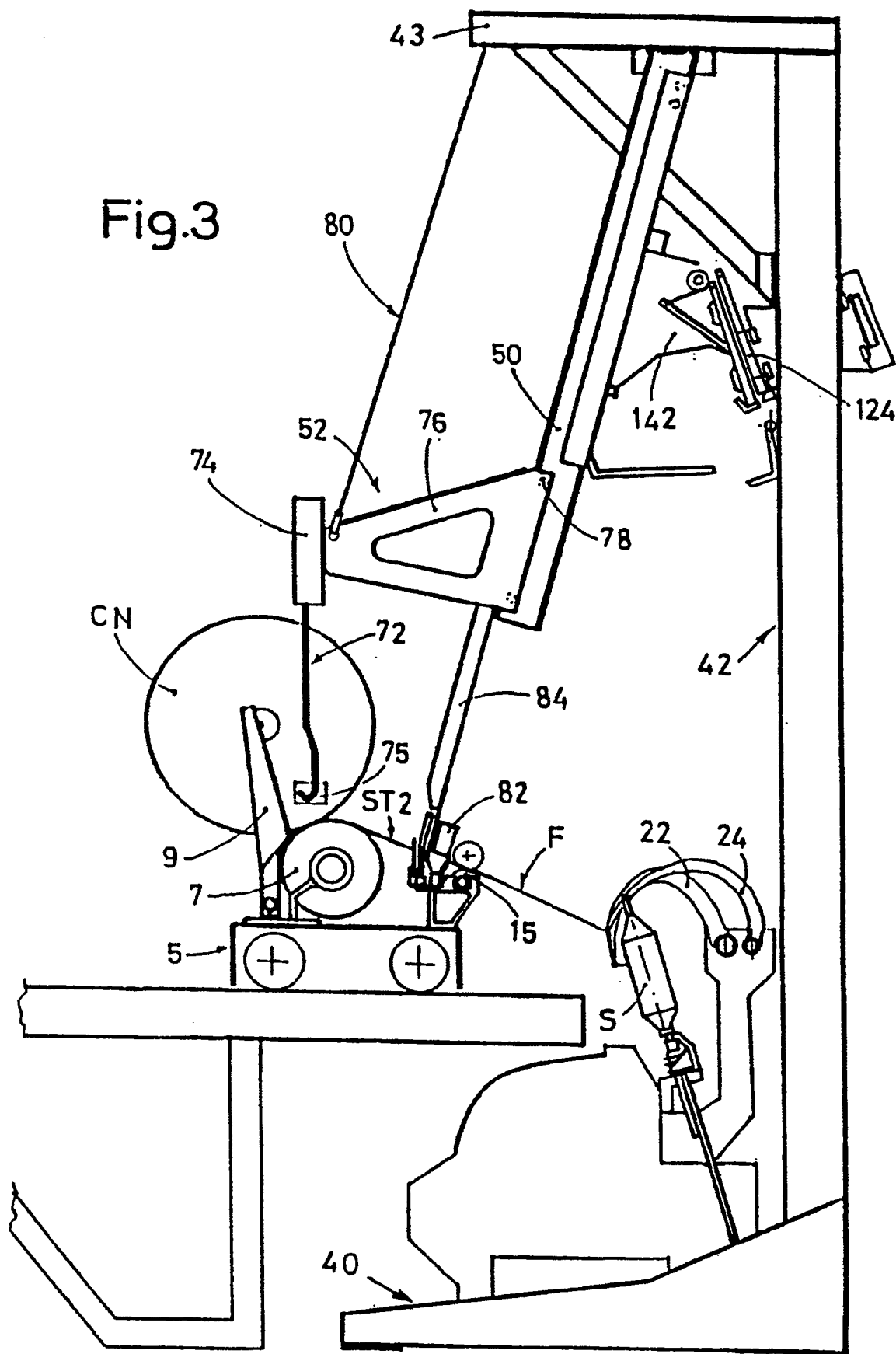


Fig.4

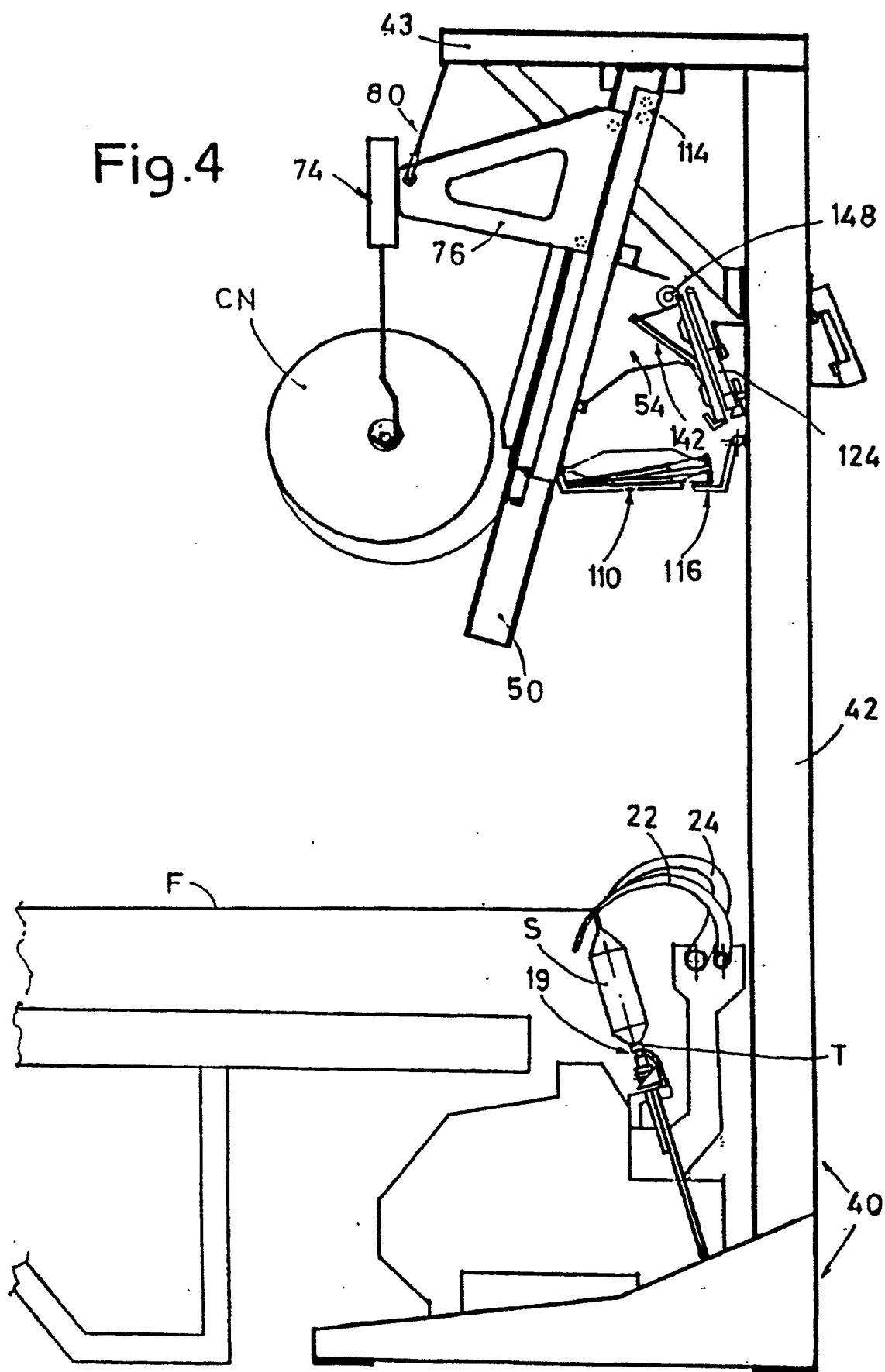


Fig.5

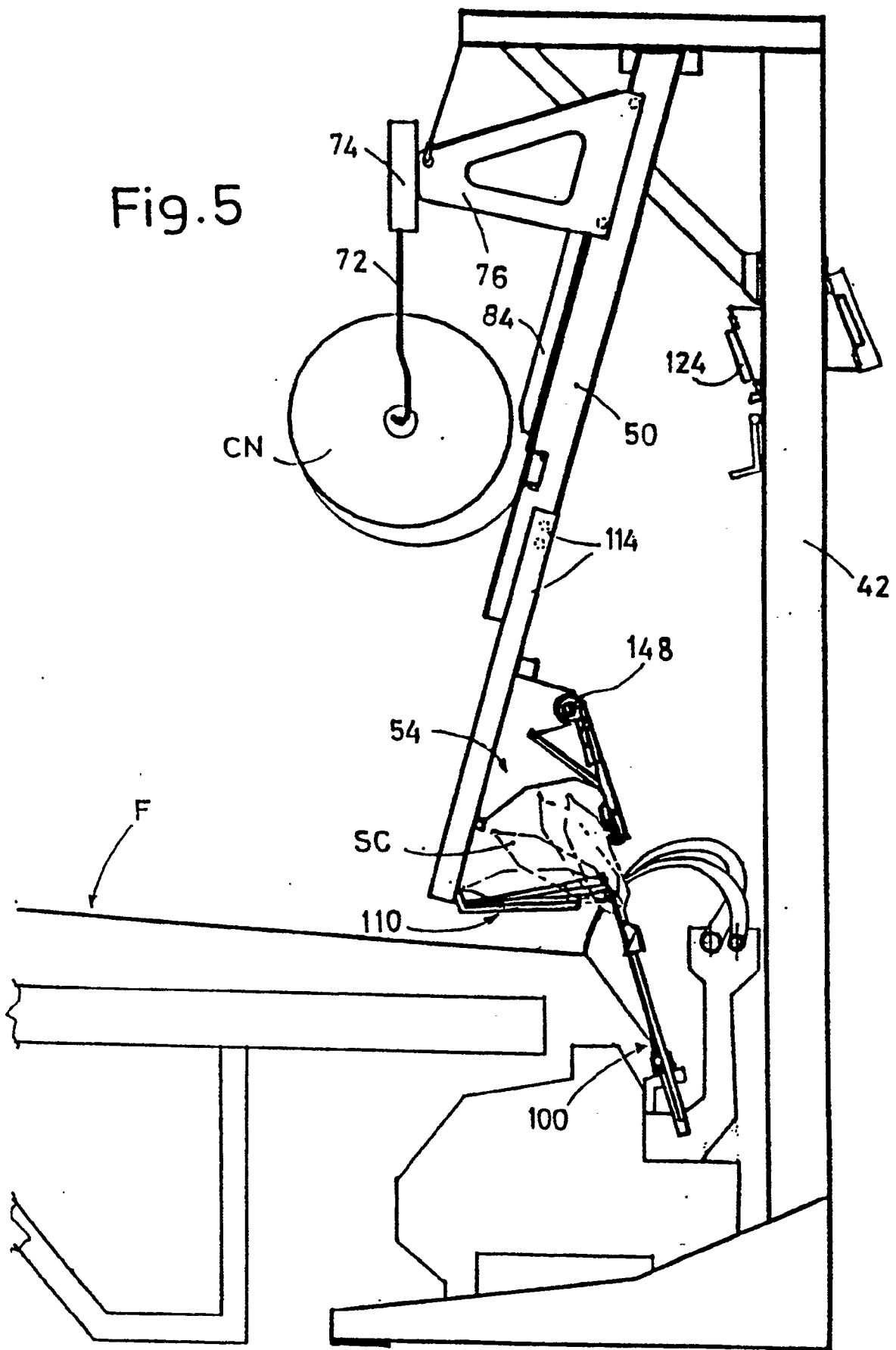
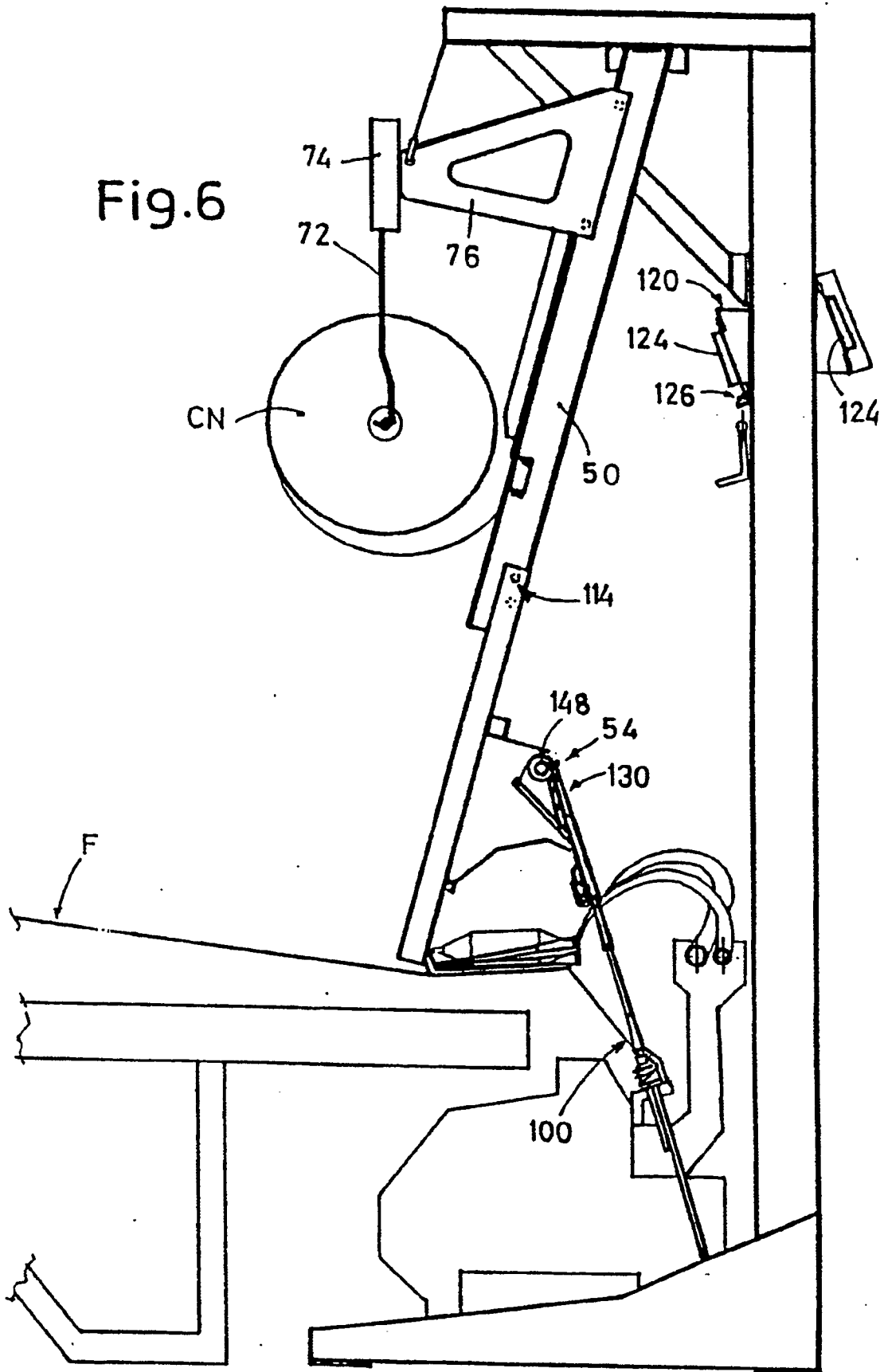


Fig.6



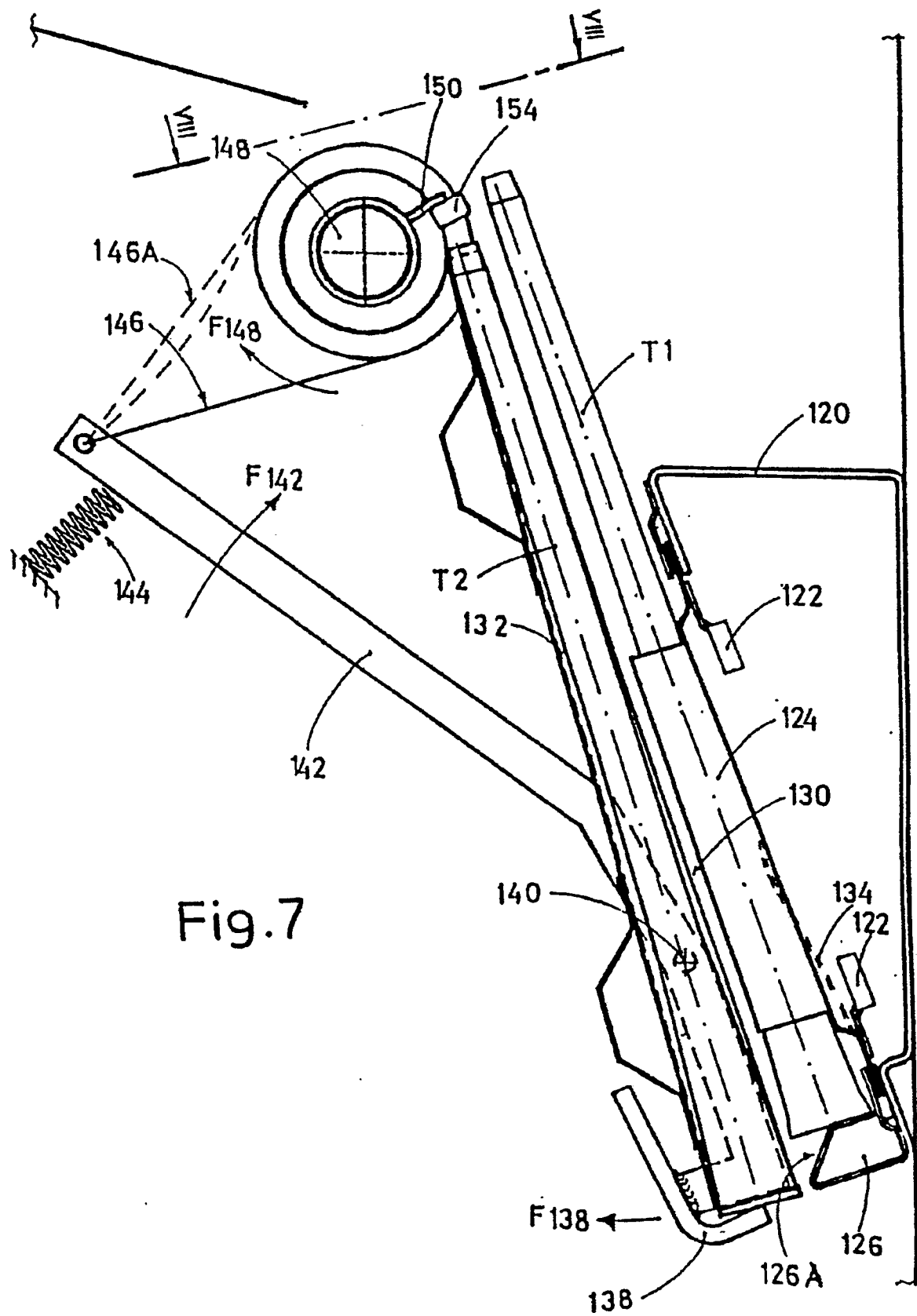


Fig.8

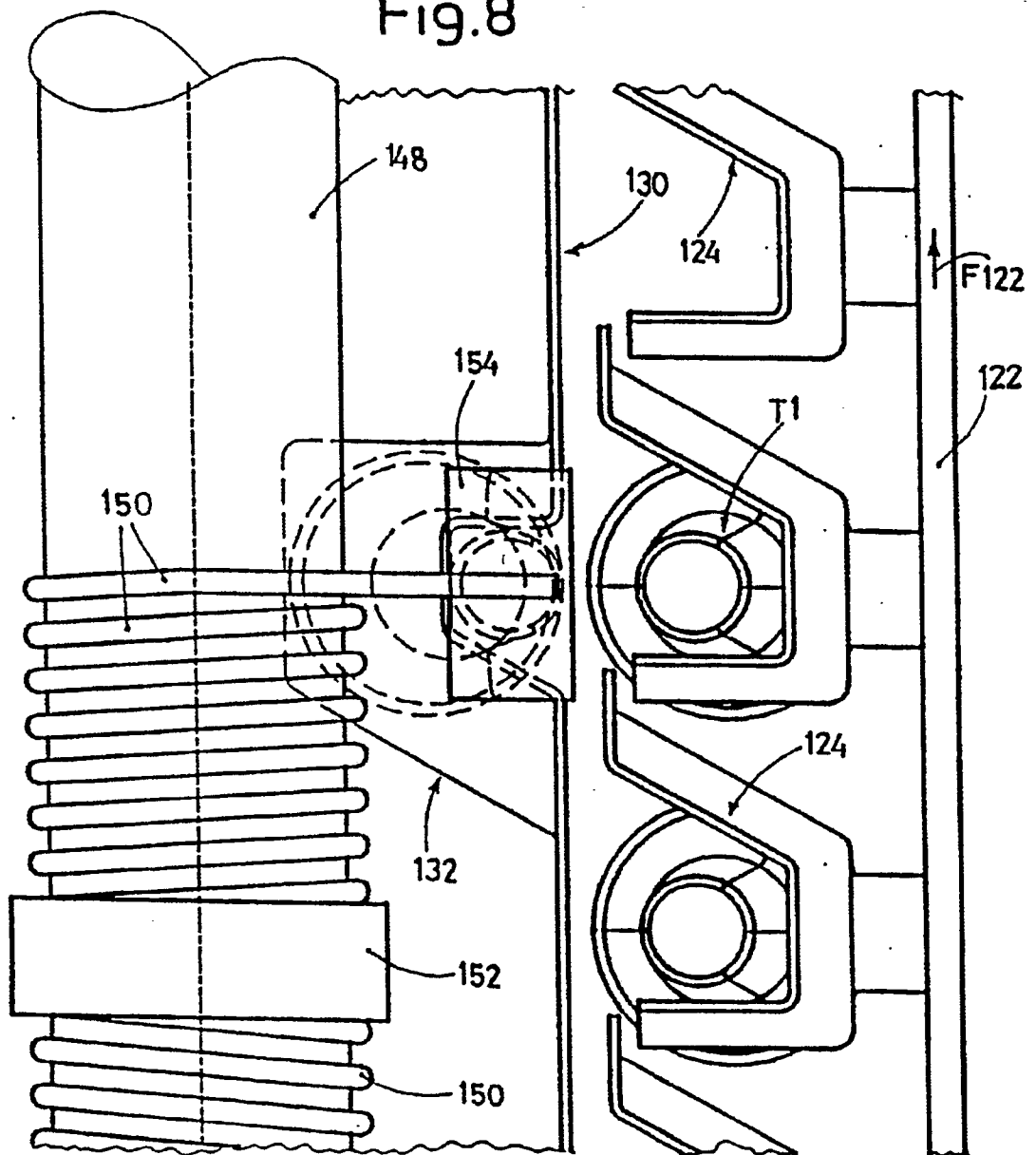


Fig.9

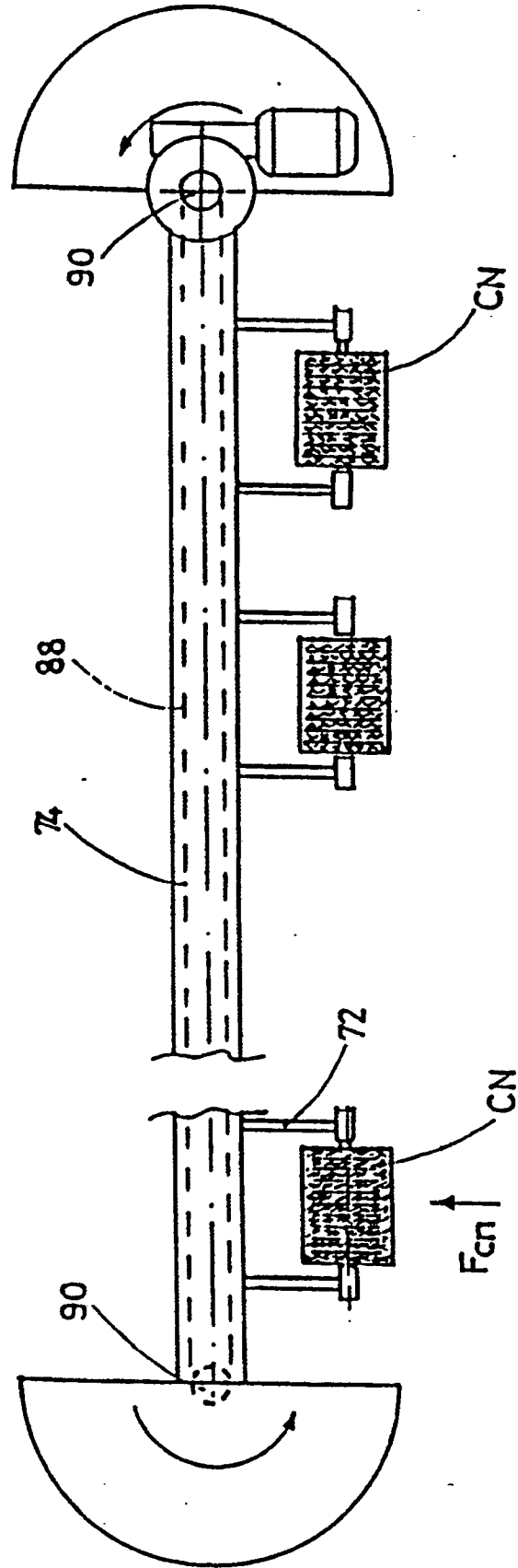


Fig.10

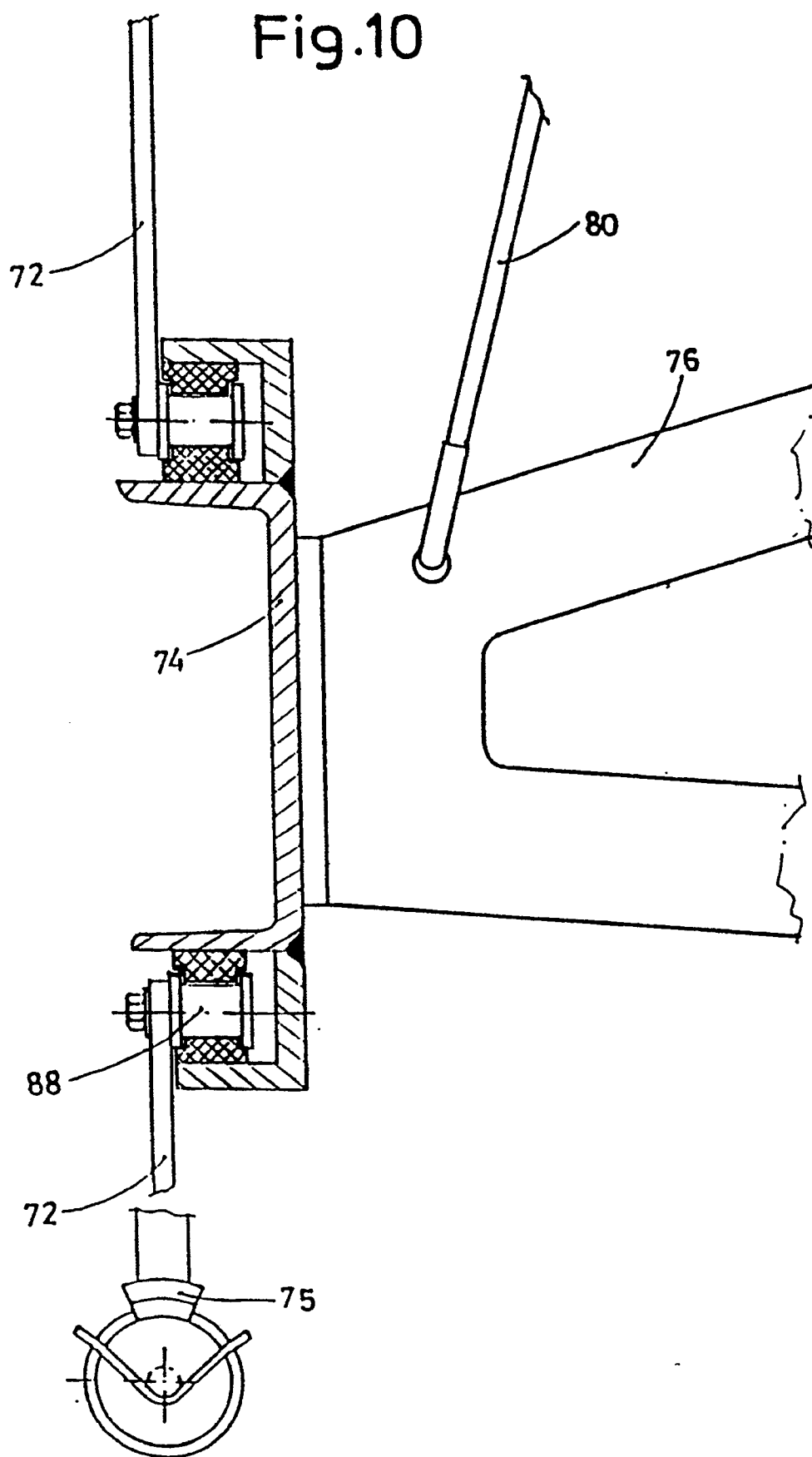


Fig. 11

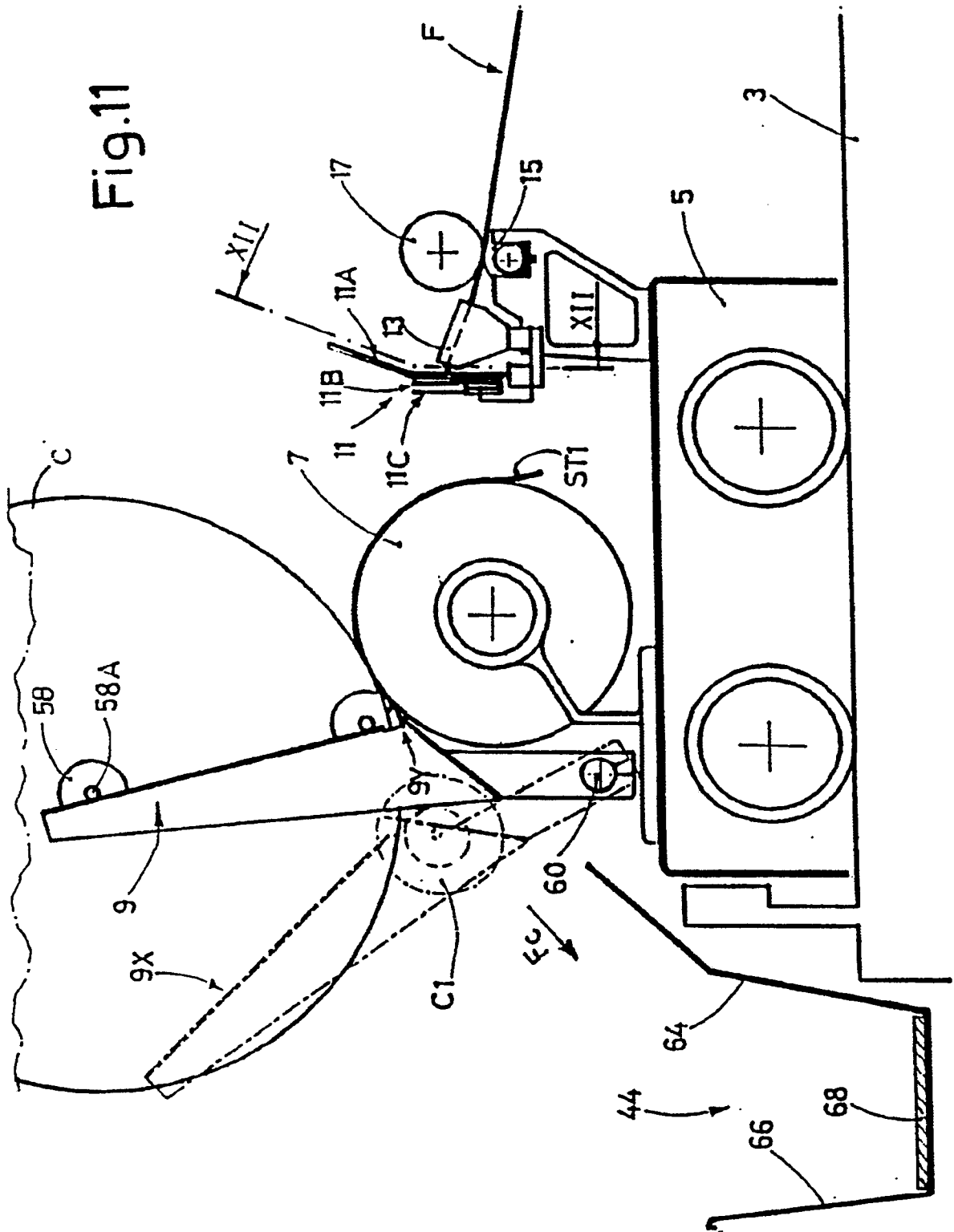


Fig.12

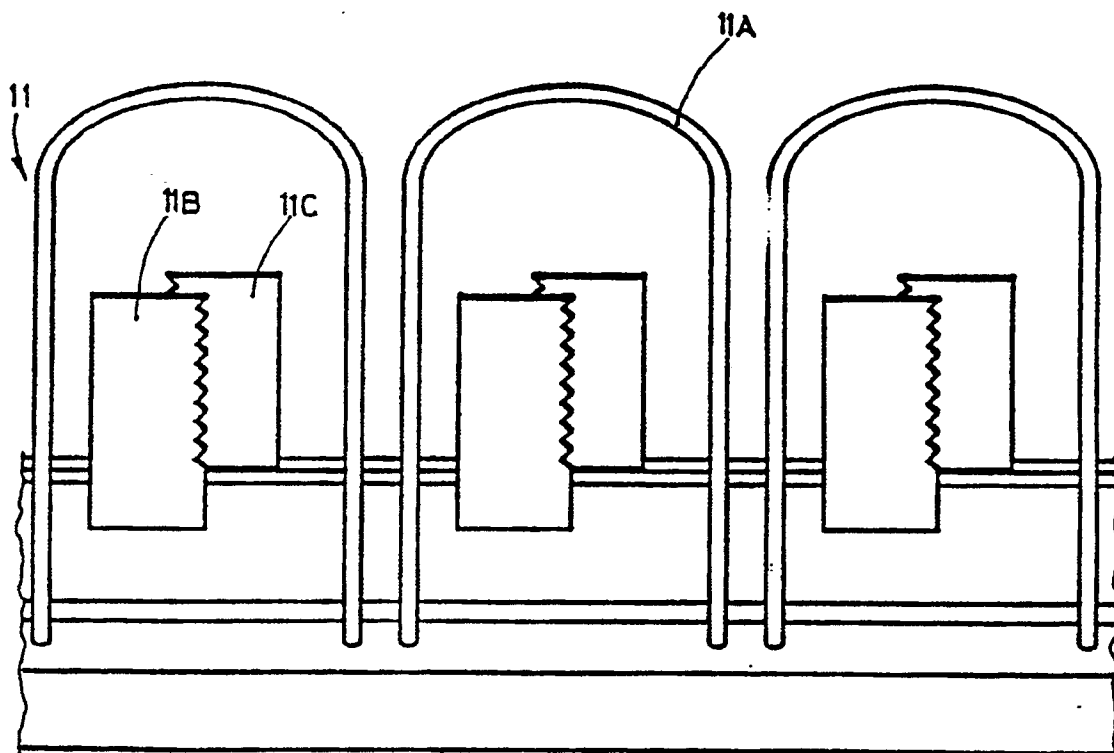
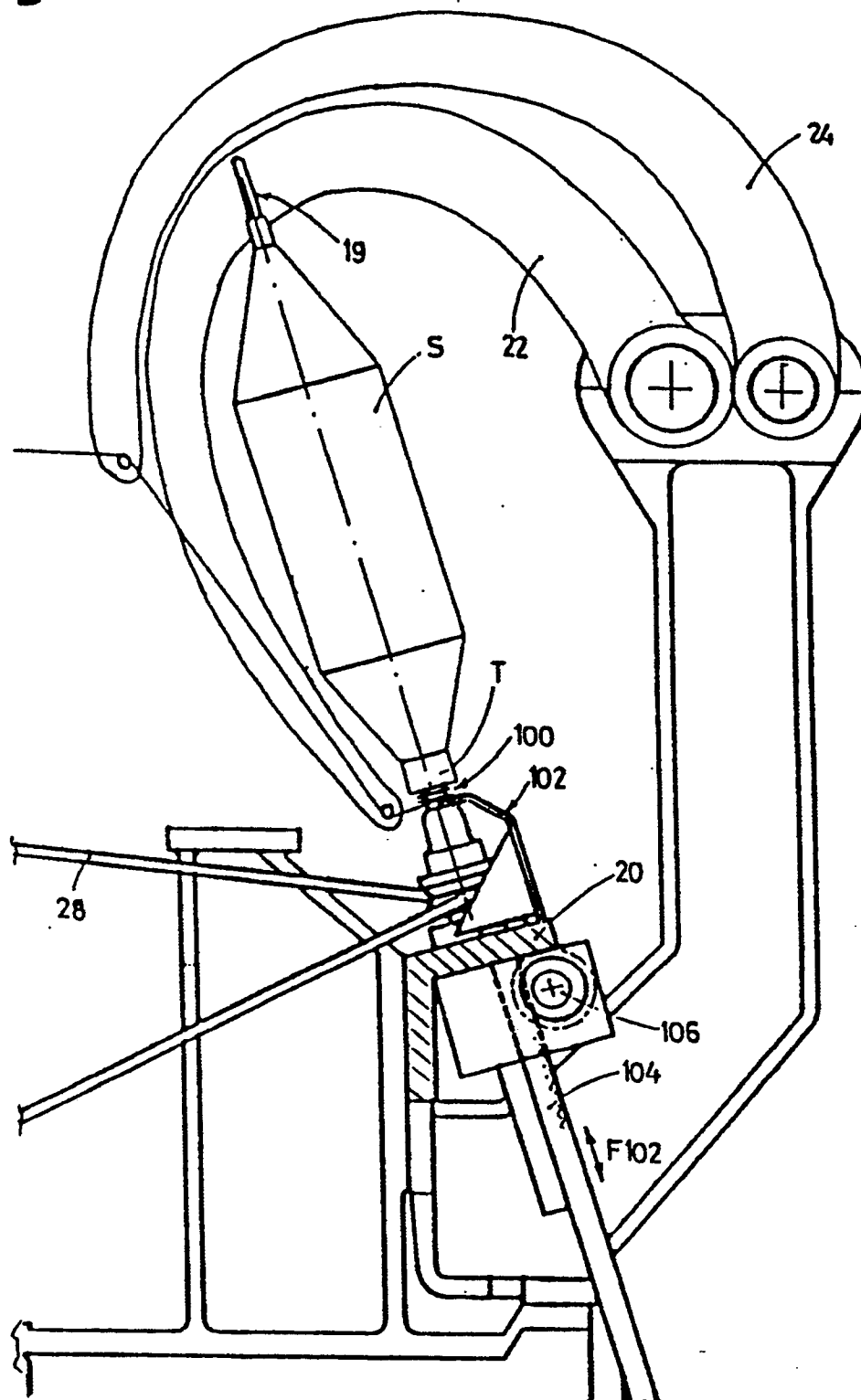


Fig.13



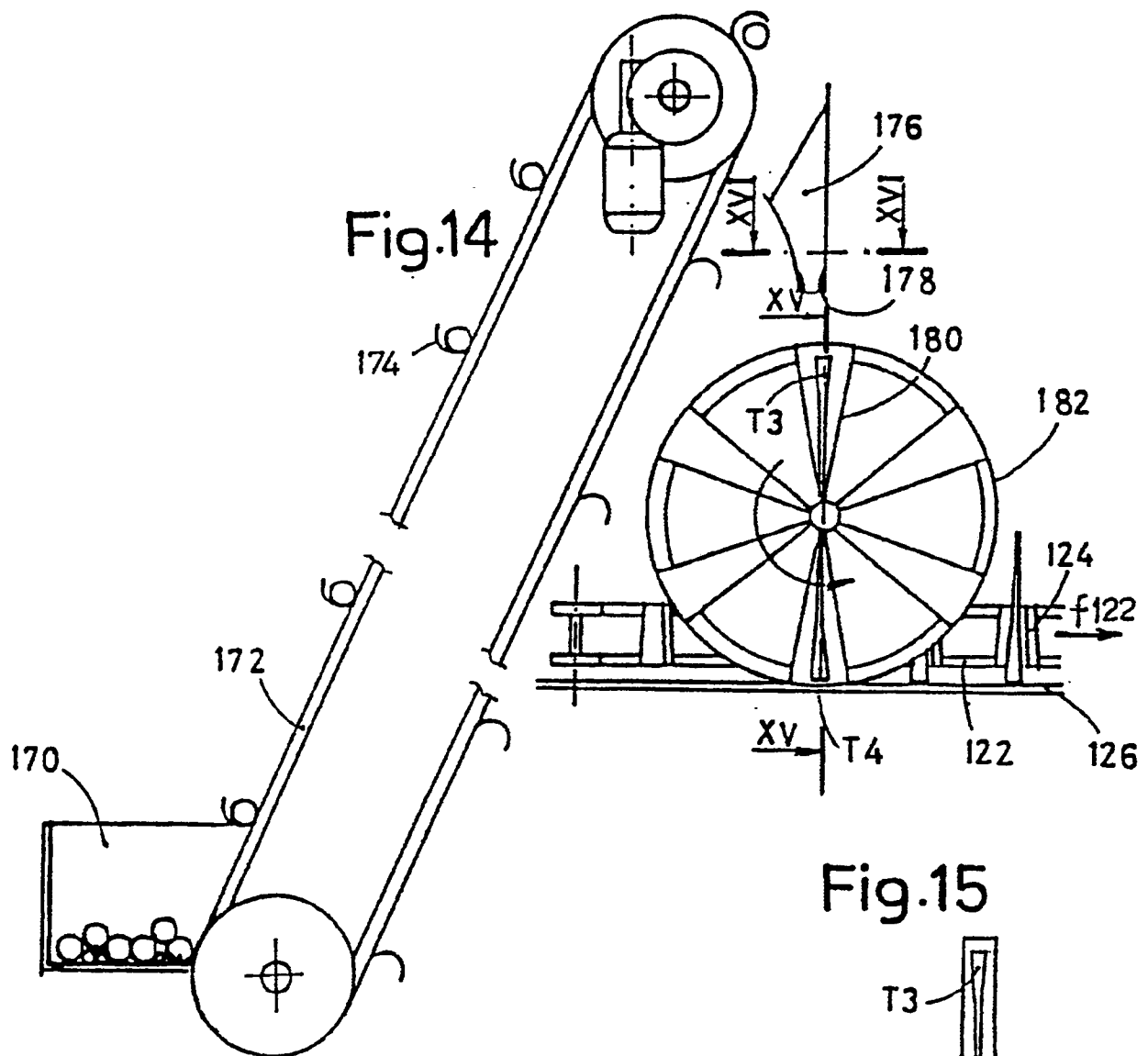
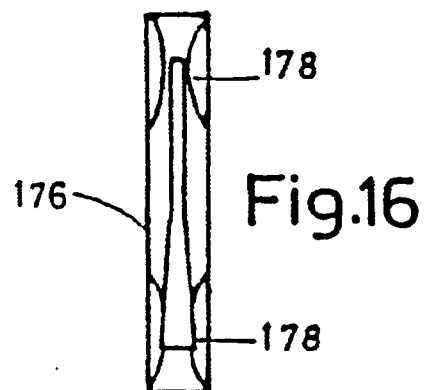
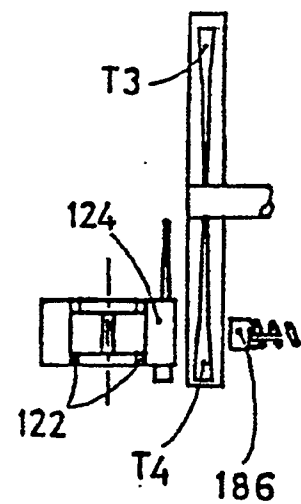


Fig.15



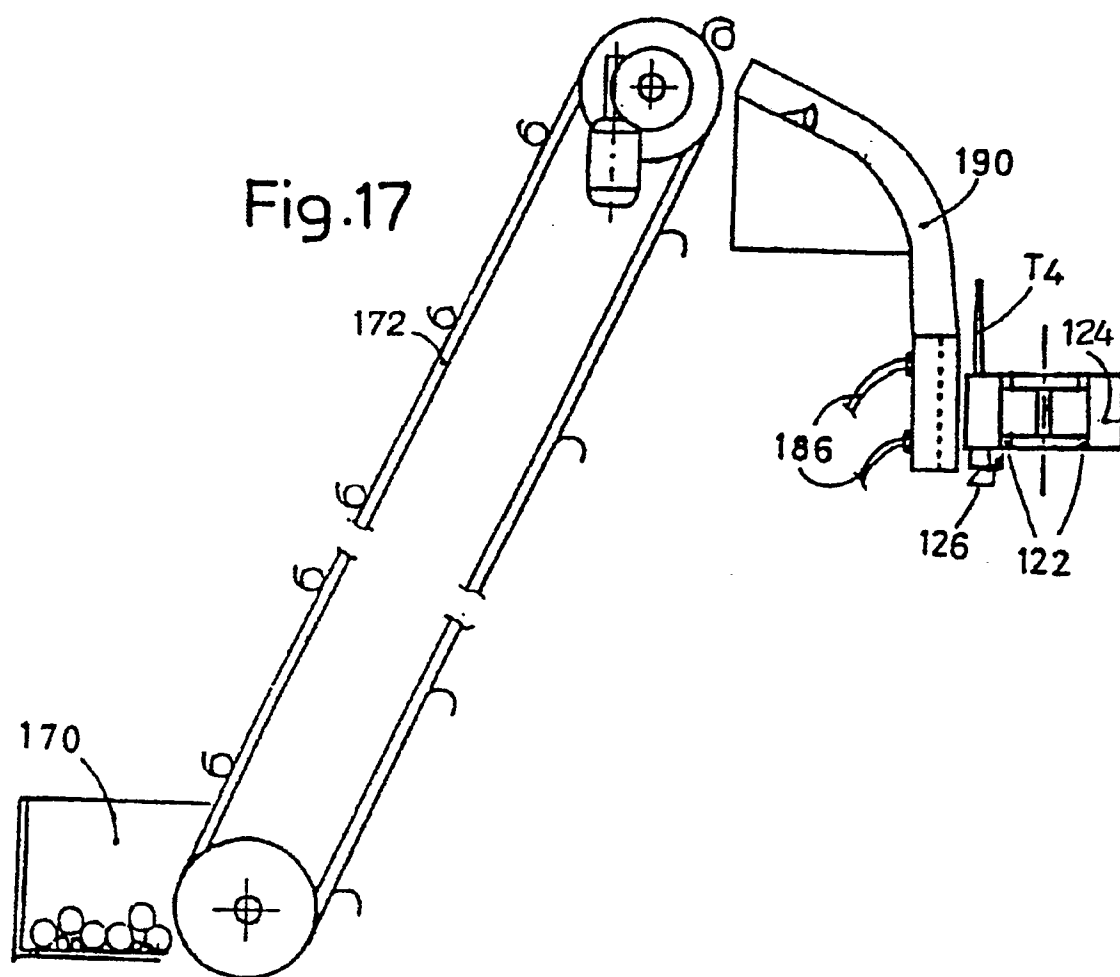


Fig.18

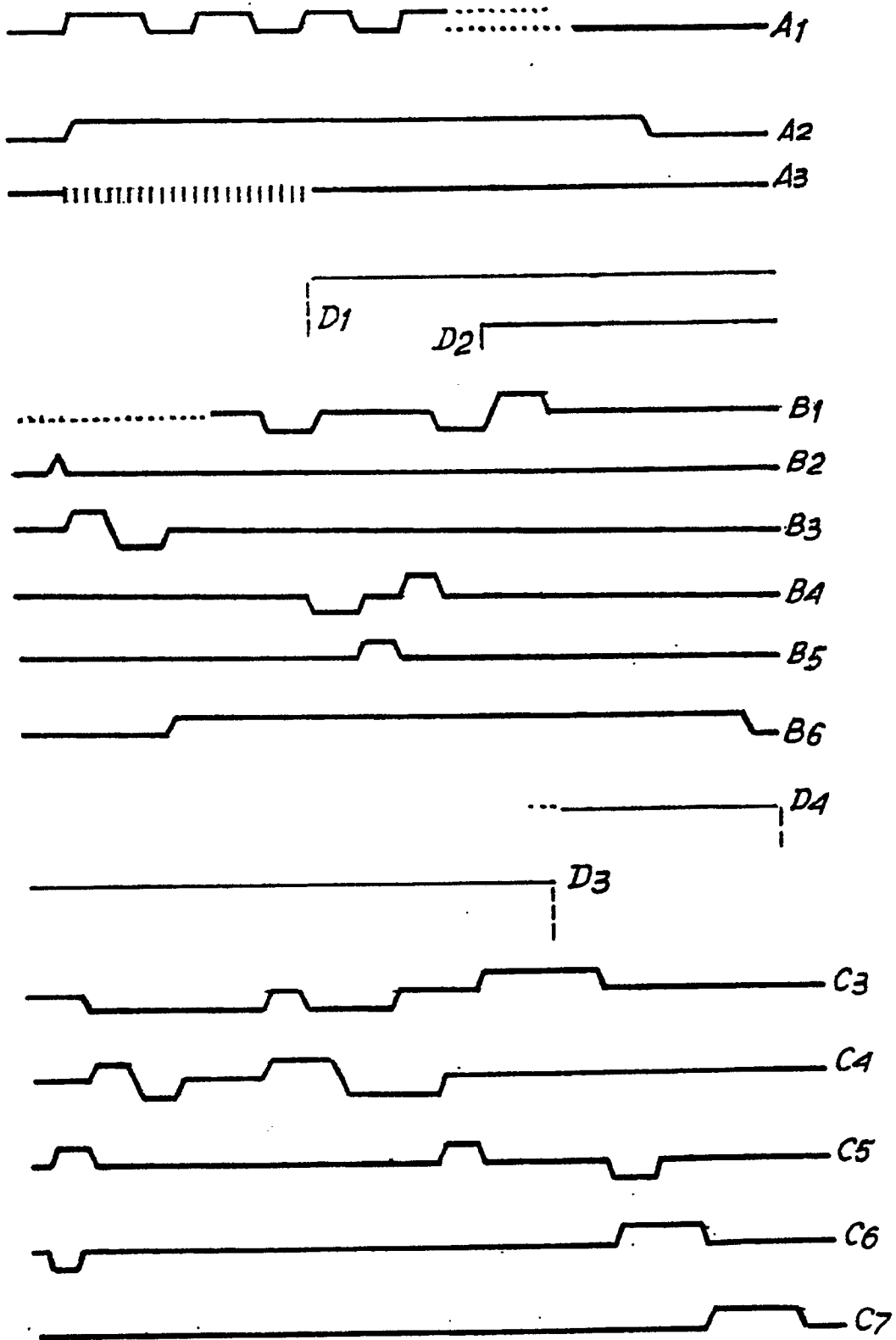


Fig.19

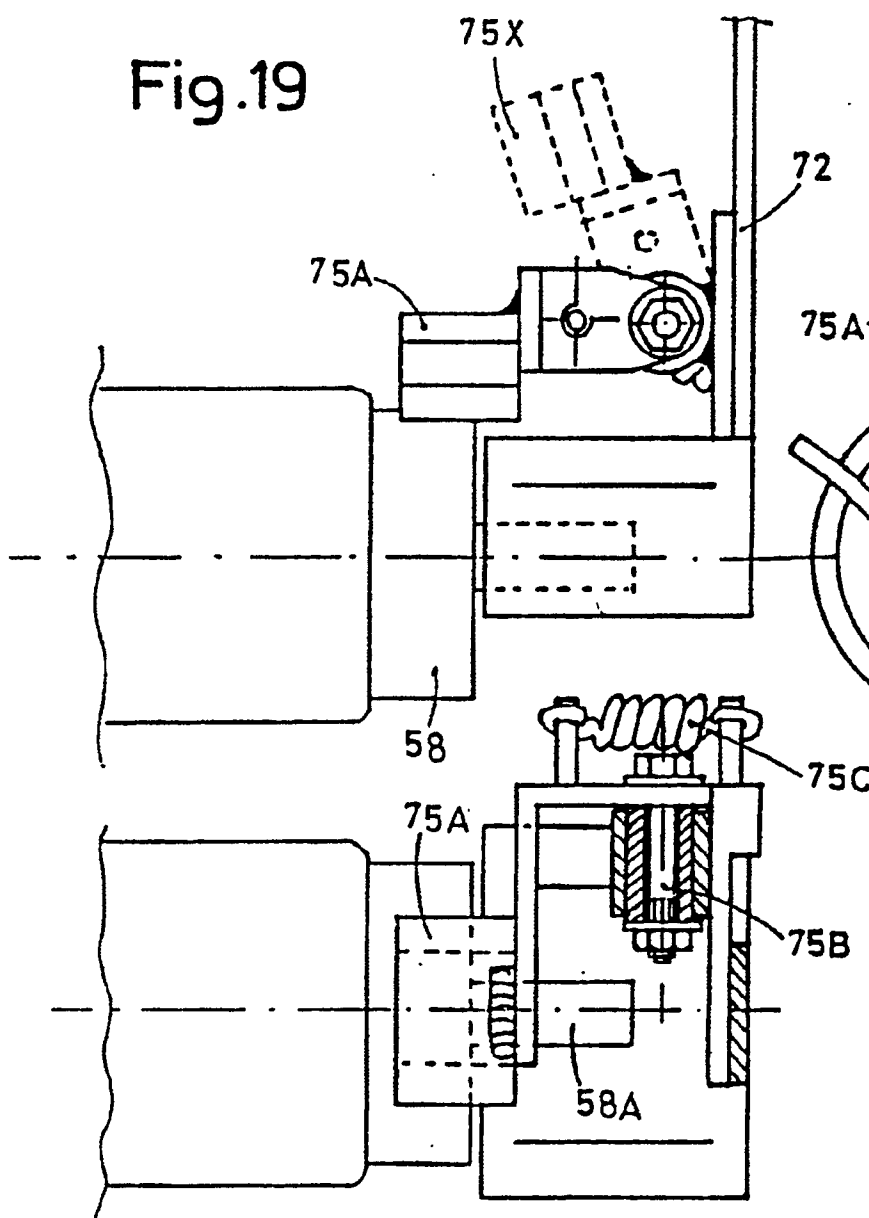


Fig.21

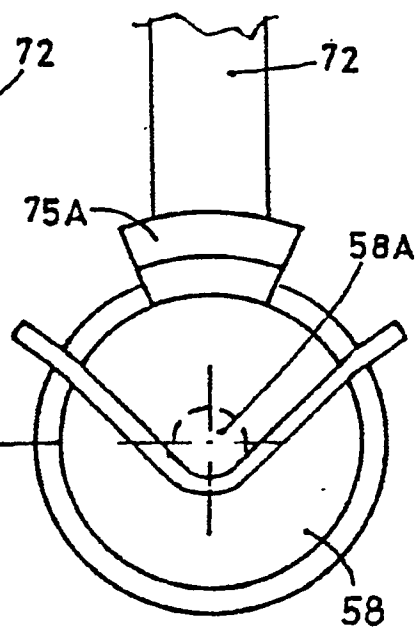


Fig.20

Fig. 24

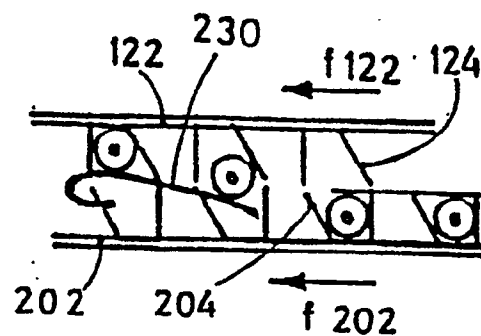


Fig. 22

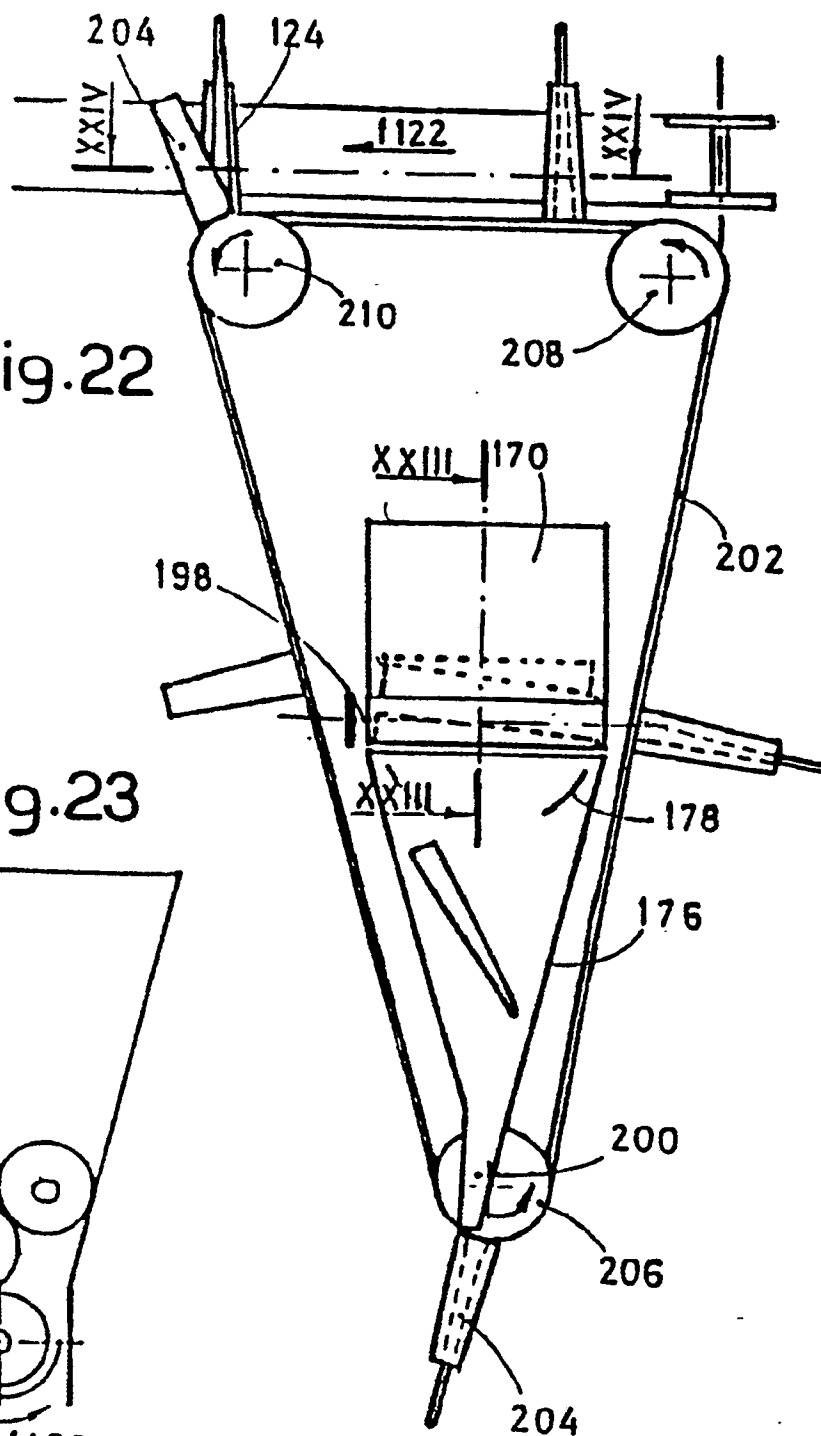


Fig. 23

