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(71) Applicant: **G.D. S.p.A**
40133 Bologna (IT)

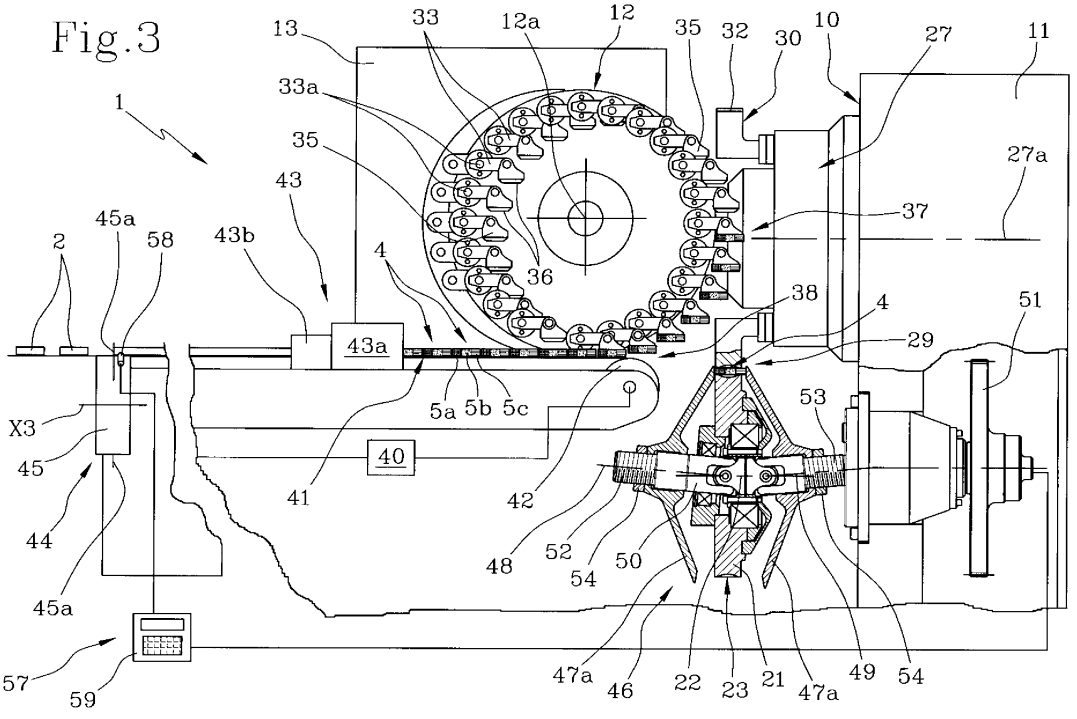
(72) Inventors:
- **Draghetti, Fiorenzo**
  40059 Medicina (Bologna) (IT)
- **Rizzoli, Salvatore**
  40132 Bologna (IT)

(74) Representative: **Ghioni, Carlo Raoul Maria**
Bugnion S.p.A.
Via Goito, 18
40126 Bologna (IT)

(54) A machine for manufacturing composite filters

(57) A machine for manufacturing composite filters comprises two garniture sections (6) generating respective continuous rods (15) of composite filters (2) consisting in a succession of filter plugs (5), extending along substantially parallel predetermined longitudinal feed directions (X1, X2), a station (43) located along the two garniture sections (6), at which the continuous rods (15) are formed, and a cyclic rotary cutter head (44) serving both garniture sections (6), by which the two continuous rods (15) are segmented on a cutting line (T) to produce single composite filters (2). The machine further comprises means (46) of regulating the axial position of corresponding filter plugs (5) in each of the continuous rods (15) relative to the cyclic cutter head (44), in such a way as to realign the two rods (15) in the event of a misalignment between one and the other.

Fig.3



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Description

[0001] The present invention relates to a machine for the manufacture of composite filters.

[0002] Conventionally, the harmful effects of inhaling cigarette smoke are reduced by tipping cigarettes with composite filters, that is to say with filters obtainable by pairing together two or more filter plugs of different type, or rather made of material having dissimilar filtration properties, which are joined permanently together by being enveloped in a single paper plugwrap.

[0003] The plugs, dispensed from respective reservoirs, are transferred by way of assembly machines with trains of fluted rollers, onto a common take-up roller presenting peripheral flutes.

[0004] Each of the take-up flutes accommodates a single composite filter element consisting of two or more plugs having different properties, axially aligned and placed in end-to-end contact.

[0005] The assembled filter elements are then conveyed by rotary transfer means to a garniture section and fashioned into a composite filter rod. Proceeding singly and in succession along the garniture section, the filter elements advance in end-to-end contact along a direction parallel with their longitudinal axis and are wrapped in a strip of paper material to fabricate a continuous filter rod in which the plugs having different filtration properties are alternated at constant pitch.

[0006] The rod is divided up subsequently, by a rotary cutter operating at the outfeed of the garniture section, thereby producing single composite filters each comprising at least one plug of each type.

[0007] In reality, these machines of conventional type for manufacturing composite filters betray serious limitations in terms of production tempo.

[0008] More precisely, it has been found that they are not able to match the output speeds generated by cigarette makers and filter tip attachment machines of the latest generation, and therefore cannot be linked up directly to these same machines.

[0009] The object of the present invention is to provide a machine for manufacturing composite filters, such as will be unaffected by the above noted drawback.

[0010] The stated object is realized, according to the present invention, in a machine for manufacturing composite filters of which the features are as recited in one or more of the appended claims.

[0011] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 illustrates a portion of a machine for manufacturing composite filters, viewed partly as a block diagram and in a side elevation;
- figure 2 is a schematic plan view showing the portion of the machine in figure 1;
- figure 3 is a front elevation view showing the portion of the machine in figure 1 with certain parts cut away and certain parts illustrated in section, better to reveal others;
- figure 4 is an enlarged detail of the machine in figure 1, illustrated in a first configuration;
- figure 5 is an enlarged detail of the machine in figure 1, illustrated in a second configuration.

[0012] With reference to figure 1, numeral 1 denotes a twin track filter maker, in its entirety, equipped to manufacture composite filters 2.

[0013] The machine 1 comprises an assembling unit 3, shown fragmentarily in figure 1, of which the function is to prepare groups 4 of filter plugs 5 having different filtration properties.

[0014] In the example of the drawings, the groups 4 are composed of three plugs 5 denoted 5a, 5b and 5c respectively, each possessing a given filtration characteristic.

[0015] The machine 1 further comprises two garniture sections 6, downstream of the assembling unit 3, along which composite filters 2 are formed first as continuous rods, each comprising groups 4 of filter plugs 5 ordered in succession and enveloped in a continuous strip 7 of plugwrap material.

[0016] The assembling unit 3 comprises an infeed portion schematized as a block, denoted 8, supplied from reservoirs (not illustrated) containing plugs with different filtration properties, and an outfeed portion 9 comprising a plurality of rotating parts mounted to a vertical bulkhead 10 of the machine frame 11 (see also figure 3).

[0017] The outfeed portion 9 of the unit 3 is connected to the garniture sections 6 by way of a rotating drum 12 carried by a vertical bulkhead 13 placed at right angles to the bulkhead 10 aforementioned and set in rotation clockwise, as viewed in figure 3, about a relative axis 12a.

[0018] Groups 4 of plugs 5 are assembled at the infeed portion 8, each made up of the three aforementioned plugs 5a, 5b and 5c, ordered in axial alignment, whereupon the groups 4 are transferred, moving transversely to their axes, into the aspirating flutes of a take-up roller 14 at the entry point of the outfeed portion 9.

[0019] The take-up roller 14, carried by the vertical bulkhead 10 and rotating anticlockwise as viewed in figure 1 about a relative axis 14a, is furnished with peripheral aspirating flutes 16 spaced apart at a predetermined pitch "p", each accommodating a single group 4 of filter plugs.

[0020] Positioned above the take-up roller 14 and placed substantially tangential to this same roller at a position denoted 17, is a roller 18 set in rotation clockwise about an axis 19 parallel to the axis 14a of the take-up roller and furnished with peripheral aspirating flutes 20 spaced apart at the pitch "p" aforementioned. This same roller 18 is flanked at substantially the same height on the bulkhead 10, and substantially in tangential association, by a further roller 21 set in rotation anticlockwise about an axis denoted 22.

[0021] This further roller 21, which is furnished with

peripheral aspirating flutes 23 spaced apart at a longer pitch "2p" and lies substantially tangential to the aforementioned roller 18 at a position denoted 24, combines with the selfsame roller 18 to create a unit 25 of which the function is to divide the flow of groups 4 of filter plugs 5 released from the take-up roller 14.

[0022] On arriving at the position of tangency 24, more exactly, the groups 4 occupying alternate flutes of the one roller 18 are transferred to the flutes 23 of the other roller 21, spaced apart at the longer pitch "2p" mentioned above.

[0023] Located above the rollers 18 and 21 of the flow dividing unit 25, the machine comprises further rollers 26 and 27 respectively tangential to the former rollers 18 and 21 at positions denoted 28 and 29, and set in rotation anticlockwise and clockwise, respectively, about relative axes 26a and 27a parallel to the axes 19 and 22 of the dividing rollers.

[0024] The rollers 26 and 27 in question are furnished peripherally with swinging arms 30, caused by cam means (not indicated) to rock on pivots 31 parallel with the axes 26a and 27a of the rollers, of which the ends present aspirating flutes 32 such as will take up the groups 4 of plugs released by the rollers 18 and 21 of the flow dividing unit 25 at the respective positions of tangency 28 and 29.

[0025] The groups 4 are transferred by the rollers 26 and 27, moving transversely to their respective axes, onto the aforementioned drum 12 linking the outfeed portion 9 of the assembling unit and the garniture sections 6. The rotating drum 12 presents a plurality of angularly equispaced carriers 33, rotatable about respective axes 33a and projecting from one sector 34 of the drum. Each carrier is equipped at a free end with a respective pick-up head 35 affording two parallel aspirating flutes 36 designed to accommodate two respective groups 4 of filter plugs 5.

[0026] As the drum 12 rotates about its axis 12a, each flute 36 receives a respective group 4 of filter plugs 5 from each roller 26 and 27 at a take-up position 37, whereupon the groups 4 are transferred to a release position 38 and deposited on the two garniture sections 6.

[0027] As illustrated in figures 1 and 2, the rollers denoted 26 and 27 are arranged symmetrically in relation to the trajectory described by the pick-up heads 35 on the carriers 33 of the drum 12, of which the axis 12a is disposed orthogonal to the axes 26a and 27a of the rollers 26 and 27.

[0028] More exactly, given the particular architecture of the rollers 26 and 27 and their positioning relative to the rotating drum 12, the heads 35 of the carriers 33 occupying the take-up position 37 are able to interact simultaneously with a pair of arms 30 of the rollers 26 and 27 to receive two groups 4 of filter plugs 5. The groups 4 are then placed on the respective continuous strips 7 of plugwrap material, typically paper, fed along the relative channels 39 of the garniture sections 6 parallel one with another, axially aligned and in end-to-end contact with the other groups already on the strips 7.

[0029] The two garniture sections 6 follow respective longitudinal directions X1 and X2, running mutually parallel and tangential to the roller 12 at the aforementioned release position 38. In particular, each section 6 comprises an electric motor 40 driving an endless garniture tape 41 looped around two return pulleys 42, as discernible in figure 3.

[0030] The aforementioned strips 7 of paper material are decoiled and fed one onto each tape 41.

[0031] Thus, each garniture tape 41 carries a respective paper strip 7 together with the relative groups 4 of filter plugs 5 through a station 43 where the strip is wrapped progressively around the plugs and closed to form a tube, so that the groups 4 of filter plugs 5 are formed into continuous rods 15.

[0032] The station 43, which is indicated schematically in figures 2 and 3, comprises a pair of garniture tongue devices 43a (shown as blocks in figure 2) by which the continuous strips 7 of paper are curled around the filter plugs 5, and a gumming device 43b (shown as a block in figure 2) by which the two longitudinal edges of each paper strip 7 are glued together.

[0033] The continuous rods 15 fashioned in this way are advanced toward cyclic cutting means consisting of a cutter head 44, by which the selfsame rods 15 are segmented along a predetermined cutting line T to produce single composite filters 2, each consisting in a group 4 made up of the three plugs 5a, 5b and 5c. Importantly, and as indicated in the drawings, the cutting stroke must be made accurately on a line T coinciding with the join between the plugs denoted 5a and 5c of each continuous rod 15.

[0034] In particular, the cutter head 44 comprises a rotating drum 45 driven by a respective motor (not illustrated). The drum 45 rotates about an axis X3 substantially parallel to the feed directions X1 and X2 of the continuous rods 15, and presents a surface of revolution supporting two diametrically opposed blades 45a.

[0035] Each blade 45a is angled, in conventional manner, relative to the feed direction X1 and X2 of the two continuous rods 15.

[0036] The composite filters 2 obtained in this way are conveyed to a further machine, namely a filter tip attachment unit (not illustrated), by which each composite filter 2 is joined to a respective cigarette stick.

[0037] Also forming part of the machine 1, associated with the outfeed portion 9 of the assembling unit 3, is a device 46 by means of which to regulate the axial position of the groups 4 of filter plugs 5.

[0038] In effect, the regulating device 46 is associated operationally with the unit 25 dividing the flow of the groups 4 of filter plugs 5 released from the take-up roller 14.

[0039] The device 46 in question comprises at least one pair 47 of discoid elements 47a, mutually opposed to all intents and purposes, which are rotatable about axes 48 and 49 inclined one relative to another at a given

angle and disposed substantially transverse to the bulkhead 10. In a preferred embodiment, the discoid elements 47a will be placed one on either side, at least, of the roller 21 with the aspirating flutes spaced apart at the longer pitch "2p".

[0040] The discoid elements 47a and the interposed roller 21 are keyed in rotation to a constant velocity joint 50, preferably a double cardan type universal joint, transmitting the same speed of rotation to all three components, so that the two discoid elements 47a and the interposed roller 21 rotate together at the same angular velocity, as if centred on the same axis of rotation.

[0041] In reality, each of the two discoid elements 47a and the roller 21 has an axis of rotation different from the others; the discoid elements 47a, in particular, rotate on axes 48 and 49 inclined one relative to another and both in relation to the axis 22 of the roller 21, so that the elements 47a converge on the position of tangency 29 between this same roller 21 and the roller 27 above, as illustrated in figures 3 ad 4.

[0042] The constant velocity joint 50 is set in rotation by a motor 51.

[0043] The rotational axes 48 and 49 of the two discoid elements 47a are necessarily inclined, by reason of the fact that the filter plugs 5 of each group 4 will emerge from the assembling unit 3 distanced marginally one from the next, but need to be placed on the respective garniture sections 6 in close order and with the corresponding ends in mutual contact. Angled one toward the other, accordingly, the discoid elements 47a create a guide channel with convergent walls, so that the plugs 5a-5b-5c distanced marginally one from the next when taken up as a group can be compacted during their passage around the one roller 21 toward the next roller 27.

[0044] The discoid elements 47a are translatable along respective shaft portions 52 and 53 of the constant velocity joint 50, toward and away from the interposed roller 21.

[0045] Located between one shaft portion 53 of the constant velocity joint 50 and the motor 51 is a transmission component 60, substantially coaxial with the motor 51. The transmission component 60 is of substantially cylindrical appearance and can be fixed, as in a first configuration illustrated in figure 4, serving solely as a protective housing for the couplings and linkages between the motor 51 and the shaft portion 53 of the constant velocity joint 50.

[0046] In a second configuration, indicated in figure 5, the transmission component 60 presents an outer lateral surface with a toothed profile denoted 61. The toothed profile 61 engages in mesh with a toothed wheel 62 driven by an actuator 63, so that axial motion can be induced in the transmission component 60. The resulting displacement will be preferably of the order of a few millimetres, and such as to shift the entire regulating device 46 along the axis 22 of the roller 21. The axial position of the discoid elements 47a relative to the interposed roller 21 is adjustable by way of means 54 associated with the shaft portions 52 and 53 of the constant velocity joint 50, at points adjacent to the two elements 47a. Such adjustment means 54 might take the form of manually or automatically operated screw collars, for example, by which the two discoid elements 47a can be translated along the respective axes of rotation 48 and 49 and thus distanced symmetrically from the roller 21.

[0047] The axial position of the discoid elements 47a relative to the interposed roller 21 will need to be adjusted in the event of changing over from one production size of filter 2 to another.

[0048] For convenience, and for reasons to be made clear in due course, the two discoid elements 47a and the interposed roller 21 are also referred to herein collectively as a correction assembly.

[0049] The aforementioned correction assembly can be translated bodily along the rotational axis 22 of the roller 21, during its operation, through the agency of a device 62 connected rigidly to the selfsame assembly.

[0050] The effect of translating the correction assembly bodily when in rotation is to displace the groups 4 of filter plugs 5a-5b-5c axially, and therefore laterally in relation to the take-up position of the flutes 32 presented by the roller 27 above.

[0051] The groups 4 are thus transferred to the rotating drum 12 and released by the drum to the respective garniture section 6 in a position advanced or retarded to a degree from that of the groups placed previously on the selfsame section 6.

[0052] Accordingly, the positioning of the filter plugs in one rod 15 can be varied relative to that of the plugs in the other rod, so as to allow a transverse realignment of the corresponding filter plugs 5 in the two continuous rods 15, and more exactly, a realignment of the filter plugs having the same filtration properties, one with another.

[0053] In the example of the drawings, a second pair 47 of discoid elements 47a identical to the pair already described is associated with the roller denoted 18, of which the aspirating flutes 20 are spaced apart at the pitch denoted "p".

[0054] Here too, the discoid elements 47a associated with the roller 18 having the aspirating flutes at the shorter pitch "p" are mounted to a constant velocity joint, rotating as one with the roller 18 and, by virtue of the constant velocity joint, translatable toward and away from one another in the event of a change from one production size of filter to another.

[0055] In contrast to the correction assembly described above, the discoid elements 47a and the roller denoted 18 are not translatable bodily along the axis 19 of the roller 18; instead, the function of the discoid elements 47a associated with this roller 18 is simply to compact the plugs 5 of each group 4 in the axial direction.

[0056] As shown in figure 1, the discoid elements 47a present an outer edge 55 of substantially circular notched profile, with projecting portions 56 of the notched edge 55 combining, in the manner described previously, to form two lateral containing walls flanking each aspirating

flute and serving to restrain the groups 4 of filter plugs 5 axially at the positions of tangency 28 and 29 between the rollers 18 and 21 beneath and the rollers 26 and 27 above.

[0057] The device 46 regulating the axial position of the filter plugs is interlocked to control means 57 serving to monitor the relative positions of the filter plugs making up the two continuous rods 15.

[0058] To advantage, the same control means 57 also monitor the position of the filter plugs 5 within the single rods 15 relative to the cutter head 44.

[0059] In this way, it can be guaranteed that all the composite filters 2 cut from the continuous rods 15 will be exactly the same, that is to say comprising identical groups of filter plugs 5 ordered in the same sequence and of the same size.

[0060] More particularly, the control means 57 comprise a sensor 58 deployed near each continuous filter rod 15, capable of identifying the type of filter scrutinized on the basis of physical or chemical properties and thereby determining its relative position, also a master control unit 59 piloting the response of the regulating device 46 to the signals received from the sensors 58.

[0061] In particular, each sensor 58 reads the position of at least one filter plug 5 within the continuous rod 15 and relays a corresponding signal to the master control unit 59, indicated schematically in figure 1. The control unit 59 compares this signal with the input signal relative to the position of the filter plugs 5 making up the other continuous rod 15, and responds in feedback mode by activating the regulating device 46 to correct any positional misalignment between two corresponding plugs 5 of the two continuous rods 15.

[0062] To advantage, the sensors 58 are able similarly to detect a timing error between either of the two rods 15 and the cutter head 44.

[0063] In operation, the flow F of filter plugs from the outfeed portion of the assembling unit 3 is taken up by the corresponding roller 14 and transferred to the next roller 18 in sequence at the relative position of tangency 17. Here, the flow F is split to form two flows F1 and F2, respectively on the one roller 18 and on the adjacent roller 21.

[0064] The filter plugs 2 making up a single group 4 are taken up all at once, distanced marginally one from another; the distance is eliminated by degrees as the groups proceed on the rollers 18 and 21, thanks to the geometry of the discoid elements 47a, which provide a guide channel with convergent sides internally of which the plugs 5 advance while being compacted together.

[0065] Consequently, the groups 4 of plugs 5 are already compacted when taken up from the lower rollers 18 and 21 onto the upper rollers 26 and 27 at the positions of tangency 28 and 29, and conveyed thus to the rotating drum 12 by way of the take-up position 37. Here, each carrier 33 of the rotating drum 12 takes up two groups 4 of filter plugs 5 at a time, as explained above.

[0066] The paired groups 4 of plugs 5 are transferred by the drum 12 to the two garniture sections 6 in such a way as to form two continuous columns of groups 4 on the respective paper strips 7, placed in contact end to end and aligned transversely so that filter plugs 5 of similar type in each column will lie at the same distance from the cutter head 44.

[0067] At a given point near to the cutter head 44, as illustrated in figures 2 and 3, the position of two corresponding filter plugs 5 is detected by the sensors 58, and a relative signal relayed to the master control unit 59. As stated previously, the sensors 58 are able to detect and identify the position of filter plugs 5 already enveloped by the strip 7 of plugwrap material.

[0068] One type of sensor suitable for the purpose in question, by way of example, would be a sensor 58 receptive to a particular kind of material from which one of the filter plugs 5 in each group 4 is manufactured.

[0069] Alternatively, the sensors 58 could be of a type able to measure the density of each advancing filter plug 5 and thus detect its relative position internally of the continuous rod 15.

[0070] Referring to figures 2 and 3, a portion of the cutter head 44 is shown on the left, as viewed by the reader, with the two continuous rods 15 passing through the head 44 from right to left.

[0071] The two assembled rods 15 are illustrated in such a way as to show the filter plugs 5 internally of the wrap, although they would not be visible in practice from the outside.

[0072] The line denoted T is the line on which the continuous rods 15 are segmented by the blades 45a of the cutter drum 44.

[0073] Illustrated to the right of the cutter head 44, as viewed in figures 2 and 3, are portions of the garniture tapes 41 with the strips 7 of paper material conveyed by them, and the filter plugs 5 placed on the strips 7 ready to be wrapped in the material.

[0074] The portions of the garniture tapes 41 shown in the drawings are therefore portions lying upstream of the garniture tongues and gluing station 43.

[0075] Certain of the filter plugs 5 are omitted, better to illustrate the strips 7 of paper material

[0076] Should it happen, when the groups 4 are placed on the paper strips 7, that a transverse misalignment is created between the filter plugs 5 of the two rods 15, with plugs advanced or retarded from the correct position, the difference in the positions occupied by the corresponding plugs is detected by the sensors 58 near the cutter head 44 and a signal is relayed to the master control unit 59.

[0077] The control unit 59 responds by piloting the regulating device 46 to correct the axial position of the filter plugs, which will be shifted right or left, as viewed in figure 3, depending on whether the plugs of the rod 15 composed of groups 4 coming from one roller 21 are in a position advanced or retarded, respectively, relative to the plugs of the rod 15 composed of groups 4 coming from the other roller 18.

[0078] In this situation, only the filter plugs 5 of one

continuous rod 15, and namely the rod associated with the correction assembly, hence with the roller denoted 18, will be repositioned in relation to the plugs 5 of the other rod 15.

[0079] Importantly, the misalignments needing typically to be compensated will always be minimal, ranging from fractions of one millimetre to a few whole millimetres.

[0080] The displacement of the correction assembly is determined by the extent of a misalignment between filter plugs of the same type.

[0081] The sensor 58 is able to detect the margin of drift between the filter plugs 5 of one rod and those of the other rod, and relay a corresponding signal to the control unit 59 and the regulating device 46.

[0082] The regulating device 46 thereupon pilots the correction assembly to reposition gradually until the misalignment has been completely compensated.

[0083] On reaching the new position, the misalignment will be cancelled out and the correction assembly remains in this same position until a further correction signal is generated.

[0084] Self-evidently, all composite filters 2 turned out during the realignment of the two rods 15 are rejected and will not be reclaimable for further processing.

[0085] Selection of the distance between the discoid elements 47a and the roller 18 or 21 interposed between them, through the agency of the adjustment means 54, is made necessary when changing from one production size to another, in other words when changing the overall length of the group 4 of filter plugs prepared by the assembling unit 3.

[0086] The adjustment in question is effected once only, before the machine 1 as a whole is set in motion.

Claims

1. A machine for manufacturing composite filters (2), **characterized**
in that it comprises:

- two garniture sections (6) generating two continuous rods (15) of composite filters (2), each consisting in a respective succession (FI, F2) of filter plugs (5), extending along predetermined longitudinal feed directions (X1, X2) substantially parallel one with another;
- conveyor means (18, 21, 26, 27) by which the filter plugs are transferred from an assembling unit (3) to the two garniture sections (6);
- a station (43) located along the two garniture sections (6), at which the continuous rods (15) are formed;
- a cyclic rotary cutter head (44) serving both garniture sections (6), by which the two continuous rods (15) are segmented on a common cutting line (T) to produce single composite filters (2) ;
- control means (57) monitoring the position of the constituent plugs (5) of each continuous rod (15), relative to the cyclic cutter head (44) ;
- means (46) interlocked to the control means (57), by which to regulate the alignment between constituent plugs (5) of similar type in the two continuous rods (15).

2. A machine as in claim 1, wherein the regulating means (46) operate upstream of the station (43) at which the continuous rods (15) are formed, and act on at least one of the garniture sections (6).

3. A machine as in claim 2, wherein the regulating means (46) operate at the conveyor means (18, 21, 26, 27) and act on one of the garniture sections (6).

4. A machine as in claim 1, wherein conveyor means (18, 21, 26, 27) comprise a first roller (18) and a second roller (21), functioning respectively as a transport roller (18) and a correction roller (21), by which the succession (F) of filter plugs (5) taken up from the assembling unit (3) is advanced and divided to create a first flow (F1) and a second flow (F2).

5. A machine as in claim 4, wherein means (46) regulating the position of the filter plugs (5) comprise at least a first pair (47) of mutually opposed and inclined discoid elements (47a) operationally associated with at least the second correction roller (21).

6. A machine as in claim 4, wherein the discoid elements (47a) and the correction roller (21) are keyed to a constant velocity joint (50), in such a way that the pair (47) of discoid elements (47a) and the roller (21) rotate at the same angular velocity, notwithstanding each is inclined relative to the others.

7. A machine as in claim 5, wherein the second correction roller (21) is flanked by and interposed between the discoid elements (47a) of the first pair (47), combining to form a correction assembly.

8. A machine as in claim 7, wherein the correction assembly (47, 21) is driven by a motor (51).

9. A machine as in claim 7, wherein the correction assembly (47, 21) is translatable bodily relative to the motor (51), through the agency of a device (61,62,63) regulating the axial position of the selfsame assembly

10. A machine as in claim 5, wherein the distance between the discoid elements (47a) of the first pair (47) and the interposed correction roller (21) is adjustable by sliding the selfsame elements (47a) toward or away from one another.

11. A machine as in claim 4, comprising a second pair (47) of discoid elements (47a), identical to the first pair (47), associated with the first transport roller (18).

12. A machine as in claim 11, wherein the first roller (18) is flanked by and interposed between the discoid elements (47a) of the second pair (47), combining to form a transport assembly (47, 18).

13. A machine as in claim 12, wherein the transport assembly (47, 18) is driven by a relative motor.

14. A machine as in claim 12, wherein the transport assembly (47, 18) is keyed to a constant velocity joint (50), in such a way that the pair (47) of discoid elements (47a) and the interposed roller (18) rotate at the same angular velocity, notwithstanding each is inclined relative to the others.

15. A machine as in claim 10, wherein the distance between the discoid elements (47a) of the second pair (47) and the interposed transport roller (18) is adjustable by sliding the selfsame elements (47a) toward or away from one another.

16. A machine as in claim 1, wherein conveyor means (18, 21, 26, 27) comprise a rotating drum (12) by which the filter plugs (5) are transferred to the garniture sections (6).

17. A machine as in claim 4, wherein conveyor means (18, 21, 26, 27) comprise linking elements by which the filter plugs (5) are transferred from the first roller (18) and the second roller (21) to the rotating drum (12).

18. A machine as in claim 17, wherein the linking elements consist in a third roller (26) and a fourth roller (27) interposed respectively between the first transport roller (18) and the rotating drum (12) and between the second correction roller (21) and the rotating drum (12).

19. A method of manufacturing composite filters, **characterized**
in that it comprises the steps of:

- feeding two successions of filter plugs (5) to two garniture sections (6) generating continuous rods (15) of composite filters (2);
- regulating the alignment between the two successions of filter plugs (5) advancing side by side along the two garniture sections (6);
- regulating the position of the succession of filter plugs (5) relative to a cutting line (T);
- dividing up both the continuous rods (15) on the line (T) of the cut to generate a plurality of composite filters (2) identical one with another.

20. A method as in claim 19, wherein the step of feeding a succession of filter plugs (5) includes the step of arranging a plurality of plugs (5) in longitudinal alignment and in end to end contact on a strip (7) of paper material.

21. A method as in claim 19, wherein the step of regulating the alignment between the two successions of filter plugs (5) advancing side by side includes the step of displacing the filter plugs (5) of one rod (15) longitudinally, forward or back.

22. A method as in claim 21, wherein the step of displacing the filter plugs (5) of one rod (15) longitudinally, forward or back, is continued until filter plugs (5) of corresponding type presented by the two rods (15) are aligned one with another.

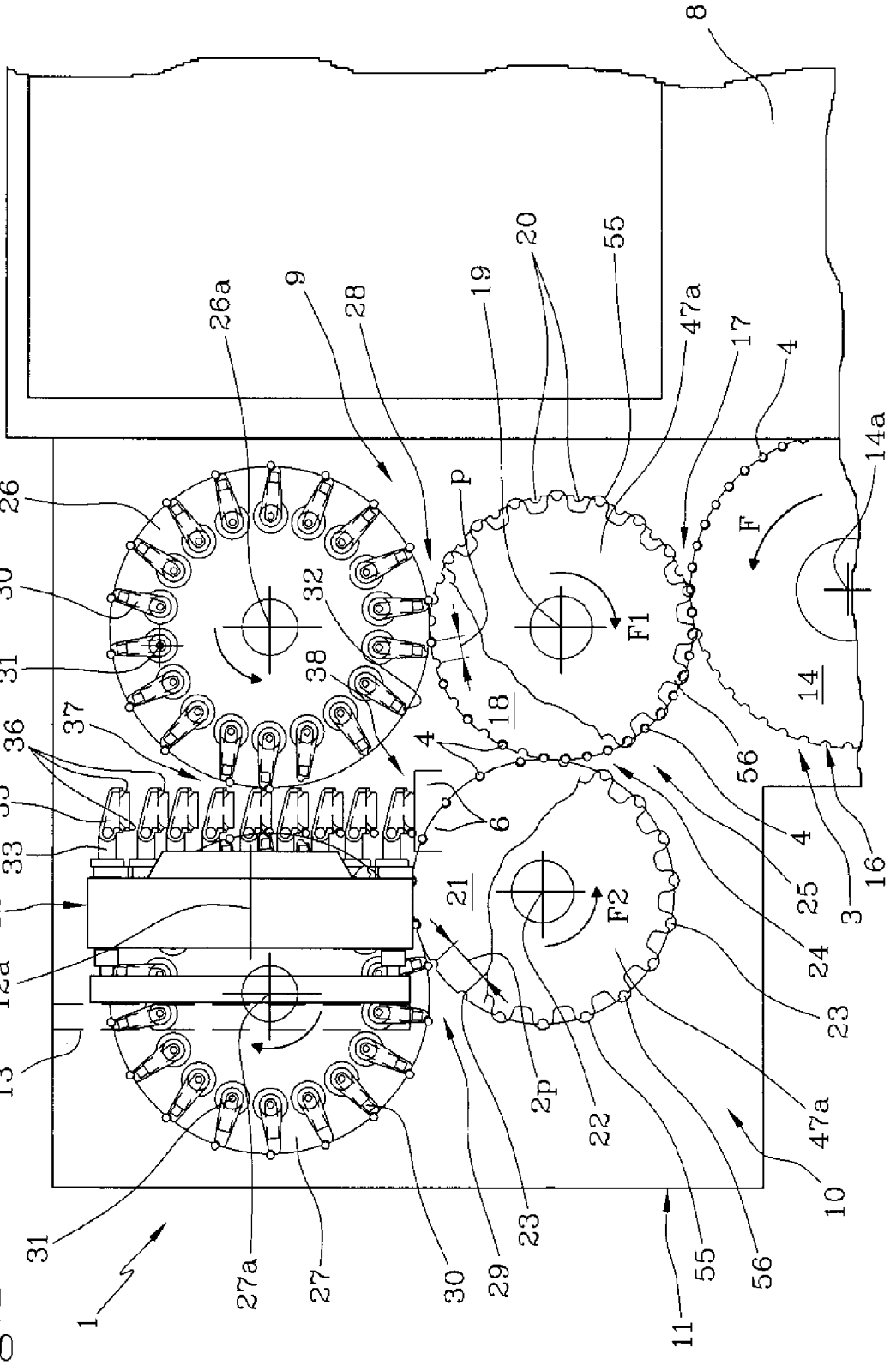
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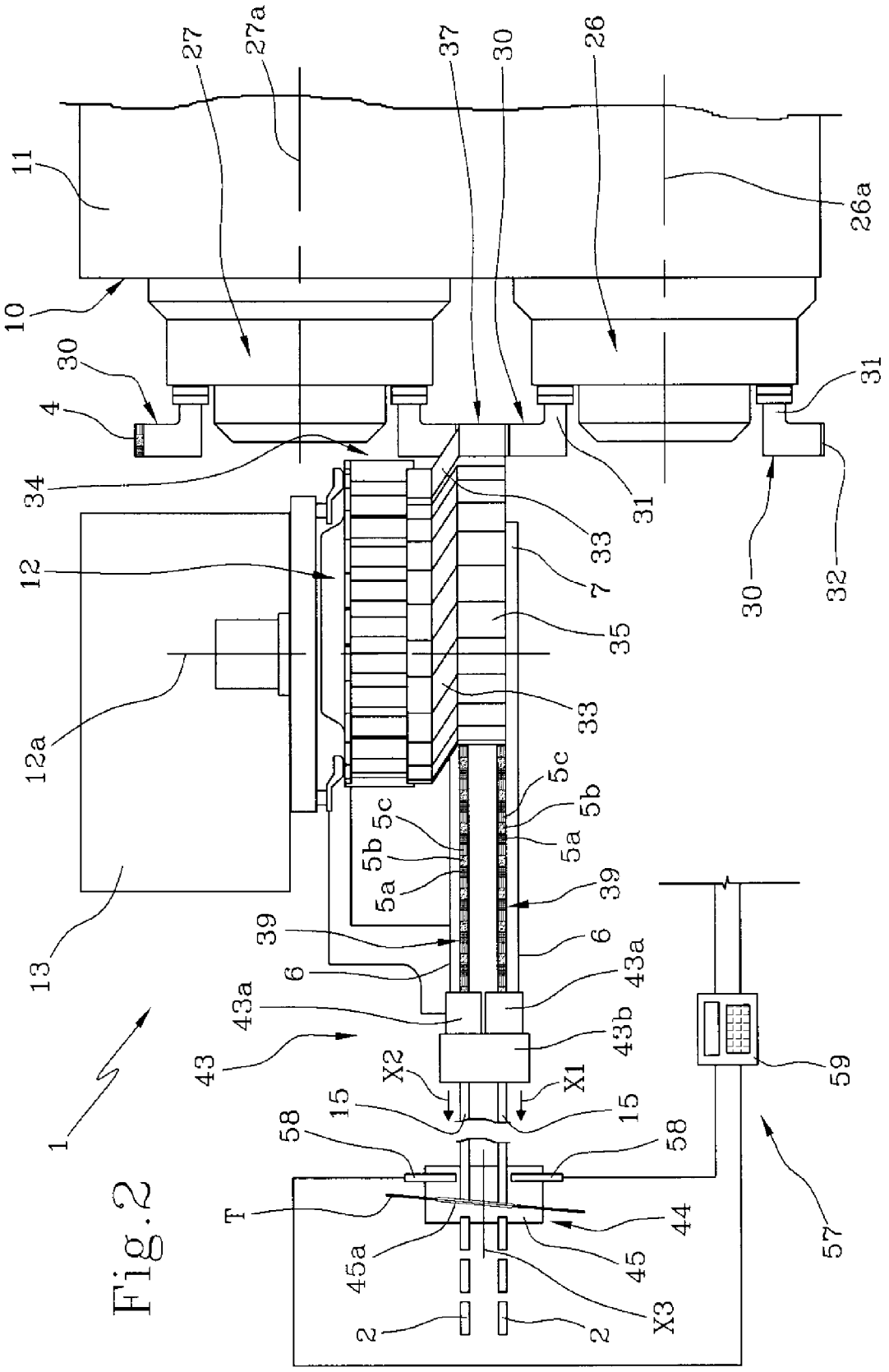
Fig.1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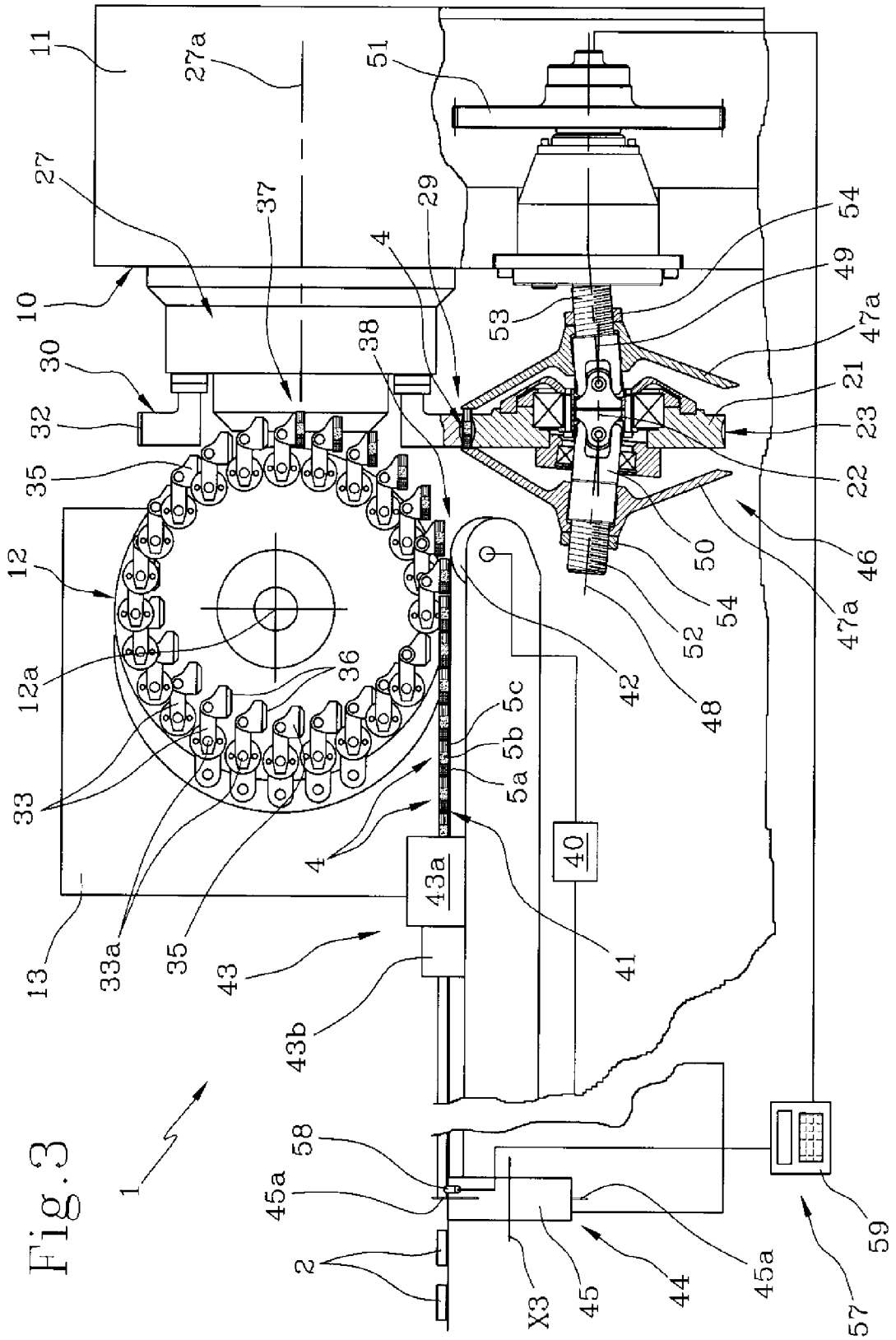
32
33
12a
5c
5b
5a
5c
5b
5a
39
39
6
6
43a
43a
43b
43
X2
X1
59
15
15
58
58
T
44
45a
45
57
2
2
X3
1
13

Fig.2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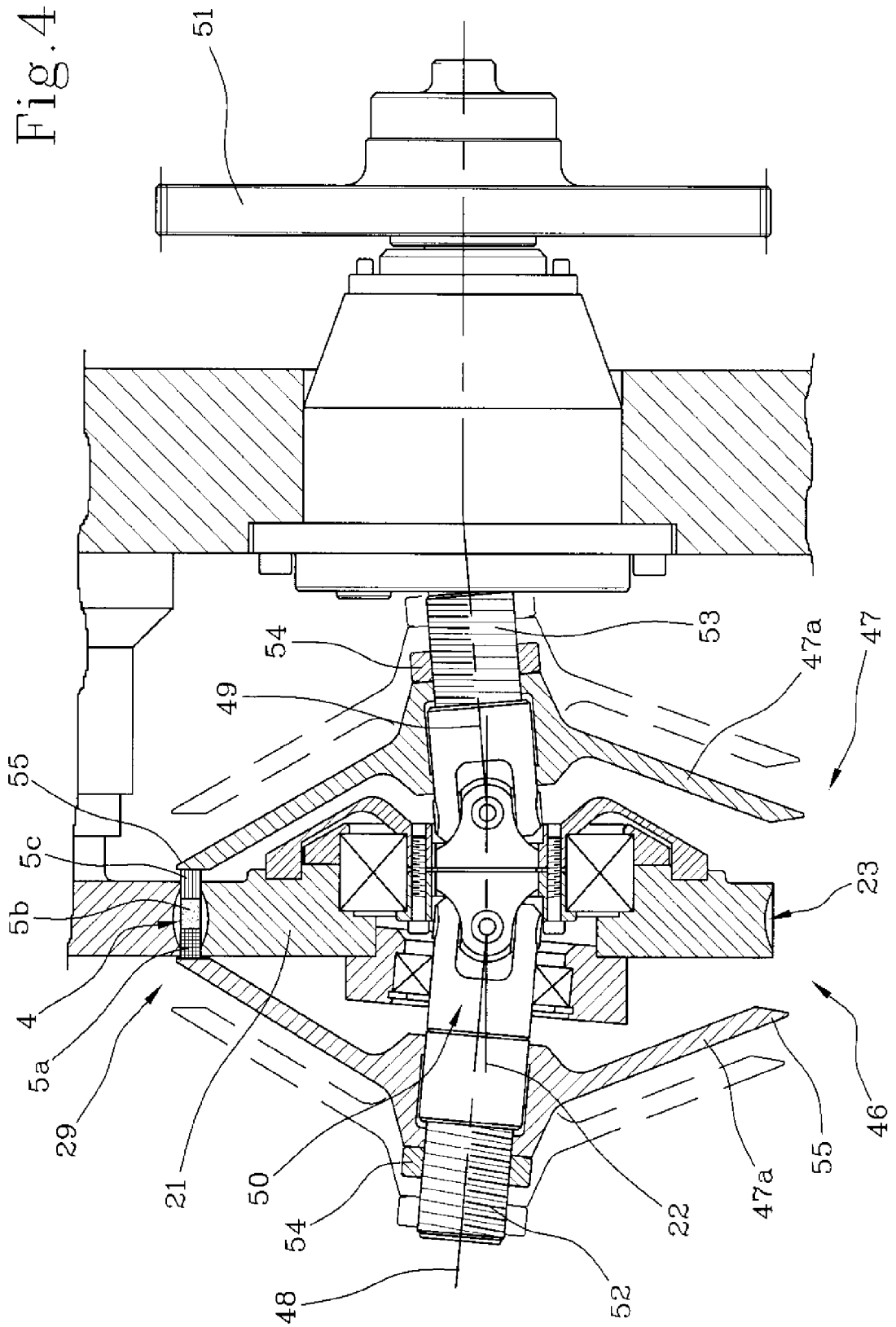
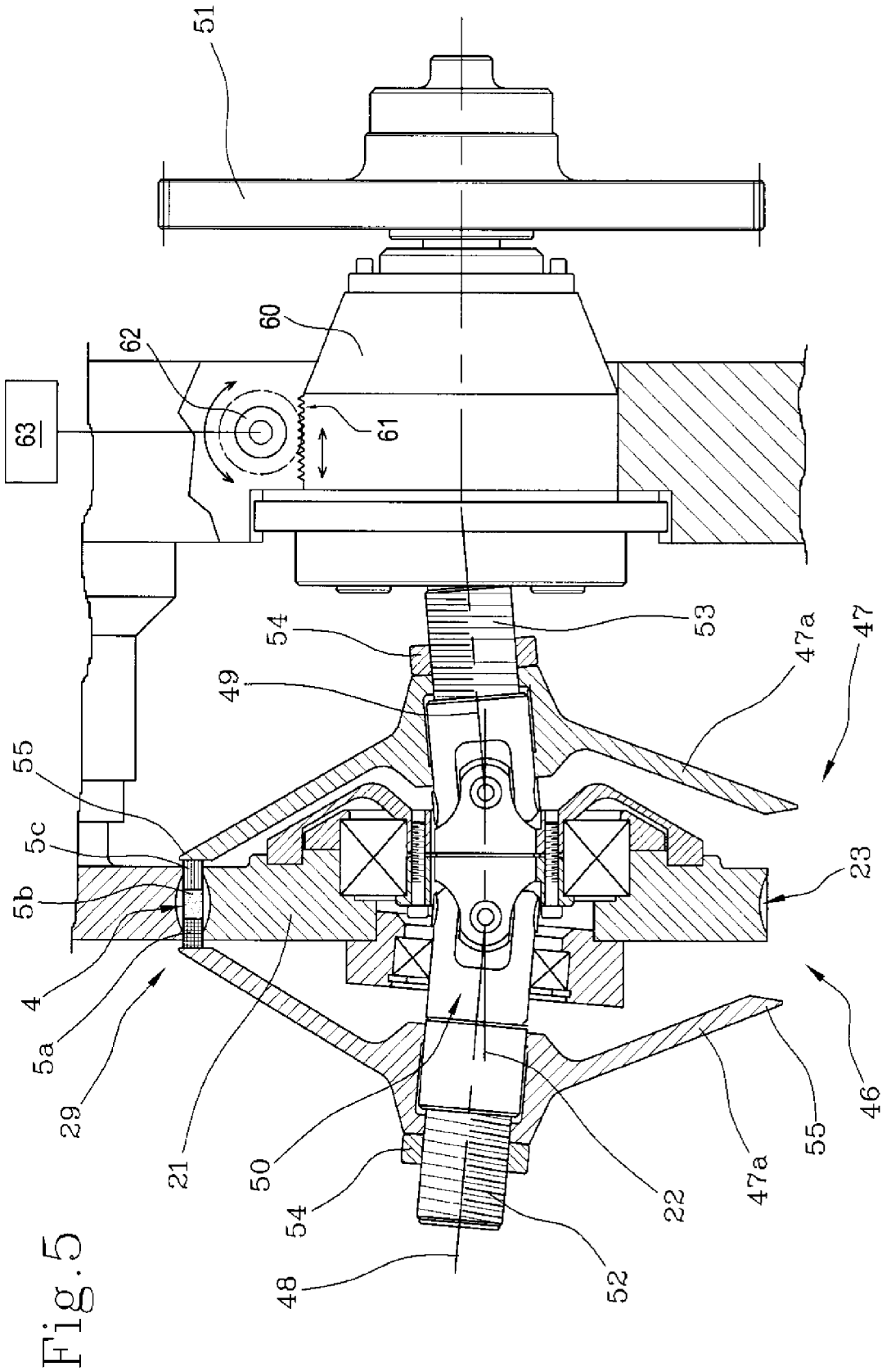
50
46
54
52
47a
12a
36
42
48
5a 5b 5c
33
4
40
43a
41
13
33a
35
43
43b
1
58
45a
2
X3
45
44
45a
57
59

Fig.3

Fig.4

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61
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47a
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5c
5b
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5a
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21
50
54
22
47a
55
46
48
52

Fig.5

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
Munich	12 February 2008	MARZANO MONTEROSSO

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