(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 April 2012 (12.04.2012)

PCT

(10) International Publication Number
WO 2012/048211 A2

(51) **International Patent Classification**:
F16D 25/10 (2006.01) ***F16D 25/12*** (2006.01)
F16D 25/0638 (2006.01)

(21) **International Application Number**:
PCT/US2011/055243

(22) **International Filing Date**:
7 October 2011 (07.10.2011)

(25) **Filing Language**: English

(26) **Publication Language**: English

(30) **Priority Data**:
10 2010 047 755.9
8 October 2010 (08.10.2010) DE

(71) **Applicant** *(for all designated States except US)*: **BORGWARNER INC.** [US/US]; Patent Department, 3850 Hamlin Road, Auburn Hills, Michigan 48326 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants** *(for US only)*: **HAUCK, Hans Juergen** [DE/DE]; Altenhausen 15/1, 74523 Schwaebisch Hall (DE). **HENZE, Jens** [DE/DE]; Torgauer Strasse 12a, 34292 Ahnatal (DE).

(74) **Agents**: **BROOKS, Cary, W.** et al.; Reising Ethington P.C., P.O. Box 4390, Troy, Michigan 48099-4390 (US).

(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

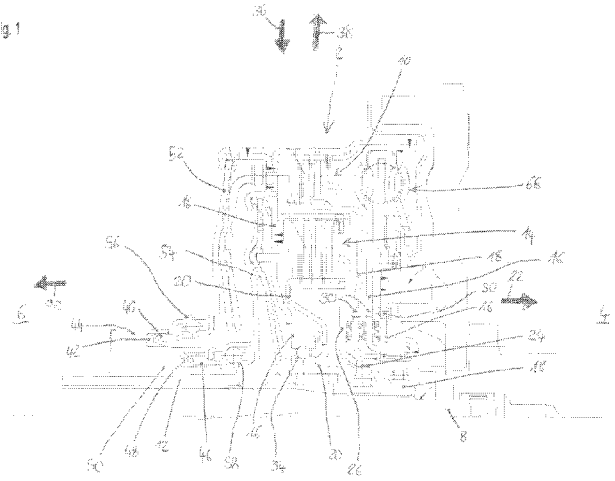
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

[Continued on next page]

(54) Title: DUAL CLUTCH DEVICE

Fig.1



(57) Abstract: The present invention relates to a dual clutch device (2) for arranging in a drivetrain of a motor vehicle between a drive unit (4) and a transmission (6), which dual clutch device has a first clutch arrangement (10), which is assigned to a first transmission input shaft (8), for the selective transmission of torque between the drive unit (4) and the first transmission input shaft (8), and a second clutch arrangement (14), which is assigned to a second transmission input shaft (12), for the selective transmission of torque between the drive unit (4) and the second transmission input shaft (12), the clutch arrangements (10, 14) having a common input side (16) assigned to the drive unit (4), whereas the first clutch arrangement (10) has a first output side (18) assigned to the first transmission input shaft (8) and the second clutch arrangement (14) has a second output side (20) assigned to the second transmission input shaft (12), the second transmission input shaft (12) being formed as a hollow shaft through which the first transmission input shaft (8) extends. According to the invention, the input side (16) is supported on the second transmission input shaft (12) via the second output side (20).

WO 2012/048211 A2

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

DUAL CLUTCH DEVICE

DESCRIPTION

The present invention relates to a dual clutch device for arranging in a drivetrain of a motor vehicle between a drive unit and a transmission, the dual clutch device having a first clutch arrangement, which is assigned to a first transmission input shaft, for the selective transmission of torque between the drive unit and the first transmission input shaft, and having a second clutch arrangement, which is assigned to a second transmission input shaft, for the selective transmission of torque between the drive unit and the second transmission input shaft.

Dual clutch devices for arranging in a drivetrain of a motor vehicle between a drive unit and a transmission are known from practice. Here, the known dual clutch devices are composed of a first clutch arrangement, which is assigned to a first transmission input shaft, for the selective transmission of torque between the drive unit and the first transmission input shaft, and a second clutch arrangement, which is assigned to a second transmission input shaft, for the selective transmission of torque between the drive unit and the second transmission input shaft. Known from practice are in particular dual clutch devices in which the associated clutch arrangements have a common input side assigned to the drive unit, whereas the first clutch arrangement has a first output side assigned to the first transmission input shaft and the second clutch arrangement has a second output side assigned to the second transmission input shaft.

Taking the dual clutch devices known from practice as a starting point, it is an object of the present invention to provide a dual clutch device which can be mounted in a particularly simple manner and as a coherent module on the transmission, wherein it should be possible for the forces acting on the input side as a result of the actuation of the clutch arrangements to be supported in a particularly reliable manner.

Said object is achieved on the basis of the features of patent claim 1. The subclaims relate to advantageous embodiments of the invention.

The dual clutch device according to the invention for arranging in a drivetrain of a motor vehicle between a drive unit, for example an internal combustion engine, and a transmission, for example a dual clutch transmission, has a first clutch arrangement, which is assigned to a first transmission input shaft, for the selective transmission of torque between the drive unit and the first transmission input shaft, and a second clutch arrangement, which is assigned to a second transmission input shaft, for the selective transmission of torque between the drive unit and the second transmission input shaft. The clutch arrangements have a common input side assigned to the drive unit, whereas the first clutch arrangement has a first output side assigned to the first transmission

input shaft and the second clutch arrangement has a second output side assigned to the second transmission input shaft. The second transmission input shaft is formed as a hollow shaft through which the first transmission input shaft extends, preferably concentrically. According to the invention, the input side is supported on the second transmission input shaft via the second output side.

The dual clutch according to the invention can be mounted in a particularly simple manner and as a coherent module on the transmission, wherein the forces acting on the input side as a result of the actuation of the clutch arrangements can be supported in a particularly reliable manner.

In one preferred embodiment of the dual clutch according to the invention, the second output side is formed as an output hub. Here, the output hub is preferably of tubular design with a radially outwardly pointing support surface on which the common input side can be or is supported in the radial direction.

In a further preferred embodiment of the dual clutch device according to the invention, the forces which act in the axial direction on the input side as a result of the actuation of the clutch arrangements can be or are supported on the second transmission input shaft via the second output side.

In one preferred embodiment of the dual clutch according to the invention, the second output side is able to be supported, or is supported, on the second transmission input shaft in at least one axial direction via a locking ring on the second transmission input shaft. A locking ring can be attached to the second transmission input shaft in a relatively simple manner. Furthermore, the locking ring is particularly space-saving. However, to make it particularly simple for the dual clutch device to be mounted as a coherent module on the transmission, the embodiment described in more detail below is preferred.

Thus, in one particularly preferred embodiment of the dual clutch device according to the invention, the second output side is supported on the second transmission input shaft in at least one axial direction via a retaining nut which can be screwed onto the second transmission input shaft.

In a further particularly preferred embodiment of the dual clutch device according to the invention, a mounting portion, preferably a flange portion, for the detachable fastening of an insertion and screwing tool is provided on the retaining nut, whereas mounting windows are formed in the input side and/or the output sides, which mounting windows are aligned with one another and with the mounting portion in the axial direction such that the insertion and screwing tool can be led to the mounting portion through the mounting windows in the axial direction, such that the dual clutch device, in the fully assembled state, can be connected as a coherent module to the

transmission by means of the retaining nut. The mounting portion or flange portion preferably extends outward in the radial direction proceeding from the threaded portion of the retaining nut.

In a further preferred embodiment of the dual clutch device according to the invention, the input side is supported on the second output side in the radial direction, preferably also in the axial direction, via a rolling bearing. In said embodiment, it is furthermore preferable for the input side to be supported directly on the rolling bearing, for the rolling bearing to be supported directly on the second output side, and/or for the second output side to be supported directly on the second transmission input shaft, in the radial direction. To achieve the abovementioned support in the axial direction too, it is preferable for corresponding axial stops for the rolling bearing to be provided on the input side and on the second output side, wherein the axial stops are formed in one piece with the input side or output side and/or are attached retroactively, if appropriate by means of locking rings. It is particularly advantageous if the rolling bearing transmits the actuating force via the axial stops formed in one piece with the input and output side.

In a further preferred embodiment of the dual clutch device according to the invention, the clutch arrangements are designed as multiplate clutch arrangements, preferably as wet-running multiplate clutch arrangements.

In a further preferred embodiment of the dual clutch device according to the invention, the dual clutch device is designed as a concentric dual clutch device, in which the clutch arrangements are in a radially nested configuration, the second clutch arrangement preferably being formed as the radially inner clutch arrangement.

In a further preferred embodiment of the dual clutch device according to the invention, the first clutch arrangement can be actuated by means of at least one hydraulically drivable first actuating piston, to which is preferably assigned a first pressure chamber delimited by a first pressure chamber housing and by the first actuating piston, and the second clutch arrangement can be actuated by means of at least one hydraulically drivable second actuating piston, to which is preferably assigned a second pressure chamber delimited by a second pressure chamber housing and by the second actuating piston, the pressure chamber housing particularly preferably being formed so as to be at least partially or entirely stationary and/or rotationally fixed, and/or the two pressure chamber housings being integrally connected to one another. As a result of the pressure chamber housings being stationary or rotationally fixed, no centrifugal oil pressure is generated in the pressure chambers. Centrifugal oil compensation is consequently not required. Furthermore, single-piece pressure chamber housings simplify production and assembly.

In a further preferred embodiment of the dual clutch device according to the invention, the clutch arrangement can be actuated by the actuating piston indirectly via a force-transmitting element, the actuating piston and the force-transmitting element preferably being decoupled in terms of rotational drive, if appropriate by means of an engagement bearing between the actuating piston and the force-transmitting element, and the actuating piston particularly preferably being rotationally fixedly connected to the pressure chamber housing.

In a further preferred embodiment of the dual clutch device according to the invention, the force-transmitting element is designed such that the actuating force of the actuating piston can be transmitted, preferably without a lever transmission ratio, in the ratio 1:1 to the clutch arrangement, the force-transmitting element particularly preferably being formed in one piece and/or interacting directly with the engagement bearing and/or the clutch arrangement.

In a further preferred embodiment of the dual clutch device according to the invention, the first and second clutch arrangements are designed in each case as normally-open clutch arrangements. In said embodiment, it is therefore preferable for the abovementioned bearings between the actuating piston and the force-transmitting element to be designed as engagement bearings.

The invention will be explained in more detail below on the basis of exemplary embodiments and with reference to the appended drawings, in which:

figure 1 shows a partial sectional view of a first embodiment of the dual clutch device according to the invention in a sectional illustration,

figure 2 shows a partial sectional view of a second embodiment of the dual clutch device according to the invention in a sectional illustration,

figure 3 shows the dual clutch device of figure 2 as a coherent module during the connection to the transmission by means of the insertion and screwing tool,

figure 4 shows a partial sectional view of a third embodiment of the dual clutch device according to the invention in a sectional illustration, and

figure 5 shows a partial sectional view of a fourth embodiment of the dual clutch device according to the invention in a sectional illustration.

Figure 1 shows a first embodiment of the dual clutch device 2 according to the invention for arranging in a drivetrain of a motor vehicle. Said dual clutch device is arranged between a drive unit 4 and a transmission 6 and has a first clutch arrangement 10, which is assigned to a first transmission input shaft 8, for the selective transmission of torque between the drive unit 4 and the first transmission input shaft 8, and a second clutch arrangement 14, which is assigned to a second transmission input shaft 12, for

the selective transmission of torque between the drive unit 4 and the second transmission input shaft 12.

The clutch arrangements 10, 14 have a common input side 16 assigned to the drive unit 4. The first clutch arrangement 10 has a first output side 18 assigned to the first transmission input shaft 8 and the second clutch arrangement 14 has a second output side 20 assigned to the second transmission input shaft 12. The second transmission input shaft 12 is formed as a hollow shaft through which the first transmission input shaft 8 extends coaxially. The input side 16 is supported on the second transmission input shaft 12 via the second output side 20.

The dual clutch device 2 can be mounted in a particularly simple manner and as a coherent module on the transmission 6, wherein the forces acting on the input side 16 as a result of the actuation of the clutch arrangements 10, 14 can be supported in a particularly reliable manner.

The second output side 20 is formed as an output hub, which is of substantially tubular design. The forces which act in the axial direction 22 on the input side 16 as a result of the actuation of the clutch arrangements 10, 14 can be or are supported on the second transmission input shaft 12 via the second output side 20. For this purpose, the second output side 20 is supported on the second transmission input shaft 12 in the axial direction 22 via a locking ring 24 which can be screwed onto the second transmission input shaft 12.

A mounting portion 26, preferably a flange portion, for the detachable fastening of an insertion and screwing tool 28 shown in figure 3 is provided on the retaining nut 24, whereas mounting windows 30 are formed in the input side 16 and/or the output sides 18, 20, which mounting windows are aligned with one another and with the mounting portion 26 in the axial direction 22, 32 such that the insertion and screwing tool 28 can be led to the mounting portion 26 through the mounting windows 30 in the axial direction 32, such that the dual clutch device 2, in the fully assembled state, can be connected as a coherent module to the transmission 6 by means of the retaining nut 24.

The input side 16 is supported on the second output side 20 in the radial direction 22, 32 and in the axial direction 36, 38 via a rolling bearing 34. Here, the input side 16 is supported directly on the rolling bearing 34, the rolling bearing 34 is supported directly on the second output side 20, and the second output side 20 is supported directly on the second transmission input shaft 12, in the radial direction 22, 32 toward the inside.

The clutch arrangements 10, 14 are designed as multiplate clutch arrangements, preferably as wet-running multiplate clutch arrangements. Here, the dual clutch device

2 is designed as a concentric dual clutch device 2, the second clutch arrangement 14 being formed as the radially inner clutch arrangement 14.

The first clutch arrangement 10 can be actuated by means of at least one hydraulically drivable first actuating piston 40, to which is preferably assigned a first pressure chamber 42 delimited by a first pressure chamber housing 44 and by the first actuating piston 40, and the second clutch arrangement 14 can be actuated by means of at least one hydraulically drivable second actuating piston 46, to which is preferably assigned a second pressure chamber 48 delimited by a second pressure chamber housing 50 and by the second actuating piston 46. The actuating pistons 40, 46 are formed preferably as annular pistons. The two pressure chamber housings 44, 50 are formed so as to be stationary and/or rotationally fixed. Furthermore, the two pressure chamber housings 44, 50 are formed in one piece with one another or integrally connected to one another.

The clutch arrangements 10, 14 can be actuated by the actuating pistons 40, 46 indirectly in each case via a force-transmitting element 52, 54. The actuating piston 40, 46 and the associated force-transmitting element 52, 54 are decoupled in terms of rotational drive by means of an engagement bearing 56, 58 between the actuating piston 40, 46 and the force-transmitting element 52, 54. The actuating pistons 40, 46 are in each case rotationally fixedly connected to the pressure chamber housing 44, 50, which may be realized for example by means of a corresponding positively locking connection.

In the first embodiment according to figure 1, the force-transmitting elements 52, 54 are in each case of lever-like design, such that they transmit the actuating force of the actuating pistons 40, 46 with a lever transmission ratio. In the present example, the force-transmitting elements 52, 54 may be formed for example as plate springs. Although not illustrated in figure 1, in the case of a lever-shaped force-transmitting element such as the force-transmitting elements 52, 54, it is preferable for these to transmit the actuating force of the actuating pistons 40, 46 to the associated clutch arrangement 10, 14 in the ratio 1:1.

Figure 2 shows a second embodiment of the dual clutch device 2 according to the invention, wherein the second embodiment according to figure 2 substantially corresponds to the first embodiment according to figure 1, such that only the differences will be discussed below, the same reference numerals are used for identical or similar parts, and the above description otherwise applies correspondingly.

In contrast to the first embodiment, the force-transmitting elements 52, 54 in the second embodiment according to figure 2 are designed so as to transmit the actuating force of the actuating pistons 40, 46 to the associated clutch arrangement 10, 14 in each

case without a lever transmission ratio, in the ratio 1:1. Also, in contrast to the force-transmitting elements designed as plate springs in the first embodiment, the force-transmitting elements 52, 54 do not make any inherent contribution to the restoring or disengagement of the clutch arrangements 10, 14, such that in the second embodiment according to figure 2, additional restoring springs are used which act between the input side 16 on the one hand and the respective force-transmitting element 52, 54 on the other hand. It can also be seen from figure 2 that the force-transmitting elements 52 and 54 are formed in each case in one piece and interact both directly with the associated engagement bearings 56, 58 and also directly with the associated clutch arrangement 10, 14. In contrast, in the first embodiment according to figure 1, the force-transmitting element 52 or 54 does not interact directly with the associated clutch arrangement 10, 14; in fact, in each case one movable ring with actuating fingers (without reference numeral) is provided which interacts at one side with the force-transmitting element 52 or 54 and at the other side with the plate pack of the clutch arrangement 10 or 14.

Figure 3 illustrates the process during the mounting of the dual clutch device 2 as a module on the transmission 6, as has already been mentioned above. Thus, the dual clutch device 2 - preferably together with the force-transmitting elements 52 and 54 - can be pushed as a coherent module onto the transmission input shafts 8, 12 such that the internal toothing of the first output side engages into the external toothing of the first transmission input shaft 8, and the second output side 20 or the internal toothing thereof engages into the external toothing of the second transmission input shaft 12. When the dual clutch device 2 formed as a module has been pushed sufficiently far on to the transmission input shafts 8, 12, the retaining nut 24 which has likewise been led to the second transmission input shaft 12, or to that end side thereof which points in the axial direction 22, can subsequently be screwed onto the second transmission input shaft 12 such that the second output side 20, and therefore also the input side 16 via the rolling bearing 34 and the second output side 20, are supported in the axial direction 22 on the retaining nut 24 and therefore on the second transmission input shaft 12. For this purpose, the insertion or screwing tool 28 shown in figure 3 is led to the assembly portion 26 of the retaining nut 24 through the mounting window 30 in the axial direction 32, such that the retaining nut 24 can be screwed onto the second transmission input shaft 12 by means of the insertion and screwing tool 28. The insertion and screwing tool 28 should practically be designed such that the dual clutch device 2, which is formed as a module, can be held and led to the transmission 6 and placed onto the transmission input shafts 8, 12 by means of the insertion and screwing tool 28, such that the mentioned screwing operation can subsequently be carried out.

Since a lever-like force-transmitting element 52, 54 is dispensed with, it is also possible in the second embodiment according to figures 2 and 3 for the engagement bearings 56, 58 to be arranged at the same level with respect to the axial directions 22, 32, or for the engagement bearing 56 which is situated further out in the radial direction 38 to be offset in the axial direction 22 toward the dual clutch device 2 to a greater extent than the engagement bearing 58.

Figure 4 shows a third embodiment of the dual clutch device 2 according to the invention, which third embodiment substantially corresponds to the first and second embodiments according to figures 1 to 3, such that only the differences will be discussed below, the same reference numerals are used for identical or similar parts, and the above description otherwise applies correspondingly.

As can be seen from figure 4, in the third embodiment, in contrast to the first and second embodiments, the second output side 20 is supported on the second transmission input shaft 12 in the axial direction 22 by means of a locking ring 60 on the second transmission input shaft 12. The design is simplified in this way, but the mounting of the dual clutch device 2 as a module on the transmission 6 would be made more difficult by the use of the locking ring 60 instead of the above-described retaining nut 24, for which reason it is preferable for the retaining nut 24 described with reference to figures 1 to 3 to also be used in the embodiment according to figure 4. Whereas the outer plate carriers of the input side 16 in figures 1 to 3 are welded to one another, the outer plate carrier 62 of the inner second clutch arrangement 14 in the third embodiment is plugged together with the other parts of the input side 16 in the axial direction 32, before being fixed axially to the other parts of the input side 16 by means of a locking ring 64. Said plug-type connection permits particularly simple assembly and production of the individual parts of the input side 16, and may preferably also be used in the other embodiments described here.

Figure 5 shows a fourth embodiment of the dual clutch device 2 according to the invention, wherein the fourth embodiment substantially corresponds to the second embodiment according to figures 2 and 3, such that only the differences will be discussed below, the same reference numerals are used for identical or similar parts, and the above description otherwise applies correspondingly.

As can be seen from figure 5, it is also the case in the fourth embodiment - as was already the case in the third embodiment - that a locking ring 60 is used for supporting the second output side 20 in the axial direction 22. As has already been mentioned above, however, it may be advantageous in this embodiment, too, for the above-described retaining nut 24 with the mounting portion 26 to be used instead of the locking ring 60, wherein in this case, too, the corresponding mounting windows 30

should be provided. It can also be seen from figure 5 that the two engagement bearings 56 and 58 have been brought even closer together in the axial direction 22, 32, and are arranged at approximately the same level with respect to the axial direction 22, 32. This is possible in particular because use is made of the force-transmitting elements 52, 54 which have already been described above with regard to figure 2, and which specifically are not of lever-shaped or lever-like design.

Furthermore, a further advantageous feature is shown in the fourth embodiment according to figure 5. The force-transmitting element 52 or 54 does not interact directly with the associated engagement bearing 56 or 58, but rather the engagement bearing 56 or 58 interacts with the respective force-transmitting element 52 or 54 in the axial direction 22, 32 via a spacer 64, 66. The spacers 64, 66 are preferably held in an exchangeable manner on the respective force-transmitting element 52, 54. Through corresponding selection of the spacers 64, 66 before the mounting of the dual clutch device 2 on the transmission 6, the air play of the two clutch arrangements 10 and 14 can be predefined or set. Although not shown in the embodiments according to figures 1 to 4, it is preferable for the spacers 64 and 66 described with reference to figure 5 to be provided in said embodiments, too, in order to be able to set the air play of the clutch arrangements 10, 14 in a particularly simple manner.

In all of the above-described embodiments according to figures 1 to 5, it is furthermore preferable for a torsional vibration damper 68 to be provided between the input side of the clutch arrangements 10, 14 and the drive unit 4, which torsional vibration damper is particularly preferably arranged together with the dual clutch device 2 in a clutch wet chamber, as can be seen in particular from figures 1 to 4, whereas the torsional vibration damper 68 has not been illustrated in figure 5 for reasons of clarity.

LIST OF REFERENCE NUMERALS

2	Dual clutch device
4	Drive unit
6	Transmission
8	First transmission input shaft
10	First clutch arrangement
12	Second transmission input shaft
14	Second clutch arrangement
16	Input side
18	First output side
20	Second output side
22	Axial direction
24	Retaining nut
26	Mounting portion
28	Insertion and screwing tool
30	Mounting window
32	Axial direction
34	Rolling bearing
36	Radial direction
38	Radial direction
40	First actuating piston
42	First pressure chamber
44	First pressure chamber housing
46	Second actuating piston
48	Second pressure chamber
50	Second pressure chamber housing
52	First force-transmitting element
54	Second force-transmitting element
56	First engagement bearing
58	Second engagement bearing
60	Locking ring
62	Outer plate carrier
64	First spacer
66	Second spacer
68	Torsional vibration damper

CLAIMS

1. A dual clutch device (2) for arranging in a drivetrain of a motor vehicle between a drive unit (4) and a transmission (6), which dual clutch device has a first clutch arrangement (10), which is assigned to a first transmission input shaft (8), for the selective transmission of torque between the drive unit (4) and the first transmission input shaft (8), and a second clutch arrangement (14), which is assigned to a second transmission input shaft (12), for the selective transmission of torque between the drive unit (4) and the second transmission input shaft (12), the clutch arrangements (10, 14) having a common input side (16) assigned to the drive unit (4), whereas the first clutch arrangement (10) has a first output side (18) assigned to the first transmission input shaft (8) and the second clutch arrangement (14) has a second output side (20) assigned to the second transmission input shaft (12), the second transmission input shaft (12) being formed as a hollow shaft through which the first transmission input shaft (8) extends, wherein the input side (16) is supported on the second transmission input shaft (12) via the second output side (20).

2. The dual clutch device (2) as claimed in claim 1, wherein the second output side (20) is formed as an output hub.

3. The dual clutch device (2) as claimed in either of claims 1 and 2, wherein the forces which act in the axial direction (22) on the input side (16) as a result of the actuation of the clutch arrangements (10, 14) can be or are supported on the second transmission input shaft (12) via the second output side (20), the second output side (20) being able to be supported, or being supported, on the second transmission input shaft (12) in at least one axial direction (22) via a locking ring (60) on the second transmission input shaft (12).

4. The dual clutch device (2) as claimed in one of the preceding claims, wherein the second output side (20) is supported on the second transmission input shaft (12) in at least one axial direction (22) via a retaining nut (24) which can be screwed onto the second transmission input shaft (12).

5. The dual clutch device (2) as claimed in claim 4, wherein a mounting portion (26), preferably a flange portion, for the detachable fastening of an insertion and screwing tool (28) is provided on the retaining nut (24), whereas mounting windows (30) are formed in the input side (16) and/or the output sides (18, 20), which mounting windows are aligned with one another and with the mounting portion (26) in

the axial direction (22, 32) such that the insertion and screwing tool (28) can be led to the mounting portion (26) through the mounting windows (30) in the axial direction (32), such that the dual clutch device (2), in the fully assembled state, can be connected as a coherent module to the transmission (6) by means of the retaining nut (24).

6. The dual clutch device (2) as claimed in one of the preceding claims, wherein the input side (16) is supported on the second output side (20) in the radial direction (36, 38), preferably also in the axial direction (22, 32), via a rolling bearing (34).

7. The dual clutch device (2) as claimed in one of the preceding claims, wherein the clutch arrangements (10, 14) are designed as multiplate clutch arrangements, preferably as wet-running multiplate clutch arrangements.

8. The dual clutch device (2) as claimed in one of the preceding claims, wherein the dual clutch device (2) is designed as a concentric dual clutch device (2), the second clutch arrangement (14) being formed preferably as the radially inner clutch arrangement (14).

9. The dual clutch device (2) as claimed in one of the preceding claims, wherein the first clutch device (10) can be actuated by means of at least one hydraulically drivable first actuating piston (40), to which is preferably assigned a first pressure chamber (42) delimited by a first pressure chamber housing (44) and by the first actuating piston (40), and the second clutch arrangement (14) can be actuated by means of at least one hydraulically drivable second actuating piston (46), to which is preferably assigned a second pressure chamber (48) delimited by a second pressure chamber housing (50) and by the second actuating piston (46), the pressure chamber housing (44, 50) particularly preferably being formed so as to be at least partially or entirely stationary and/or rotationally fixed, and/or the two pressure chamber housings (44, 50) being integrally connected to one another.

10. The dual clutch device (2) as claimed in claim 9, wherein the clutch arrangement (10, 14) can be actuated by the actuating piston (40, 46) indirectly via a force-transmitting element (52, 54), the actuating piston (40, 46) and the force-transmitting element (52, 54) preferably being decoupled in terms of rotational drive, if appropriate by means of an engagement bearing (56, 58) between the actuating piston (40, 46) and the force-transmitting element (52, 54), and the actuating piston (40, 46)

particularly preferably being rotationally fixedly connected to the pressure chamber housing (44, 50).

11. The dual clutch device (2) as claimed in claim 10, wherein the force-transmitting element (52, 54) is designed such that the actuating force of the actuating piston (40, 46) can be transmitted, preferably without a lever transmission ratio, in the ratio 1:1 to the clutch arrangement (10, 14), the force-transmitting element (52, 54) particularly preferably being formed in one piece and/or interacting directly with the engagement bearing (56, 58) and/or the clutch arrangement (10, 14).

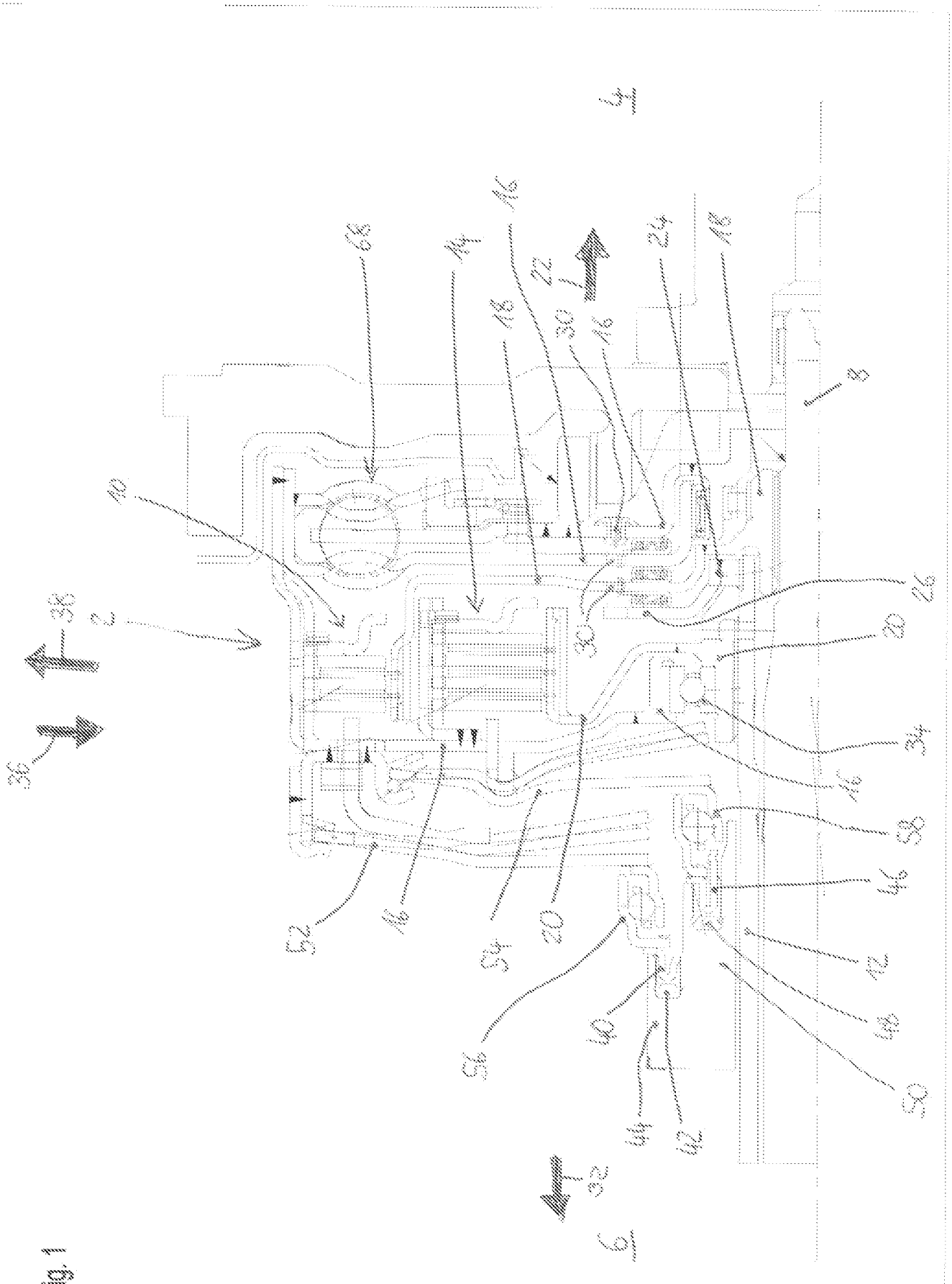

4
66
14
16
22
24
18
16
30
16
8
10
26
2
36
36
40
28
34
16
38
46
52
16
54
20
12
48
40
56
50
44
42
32
6

Fig. 1

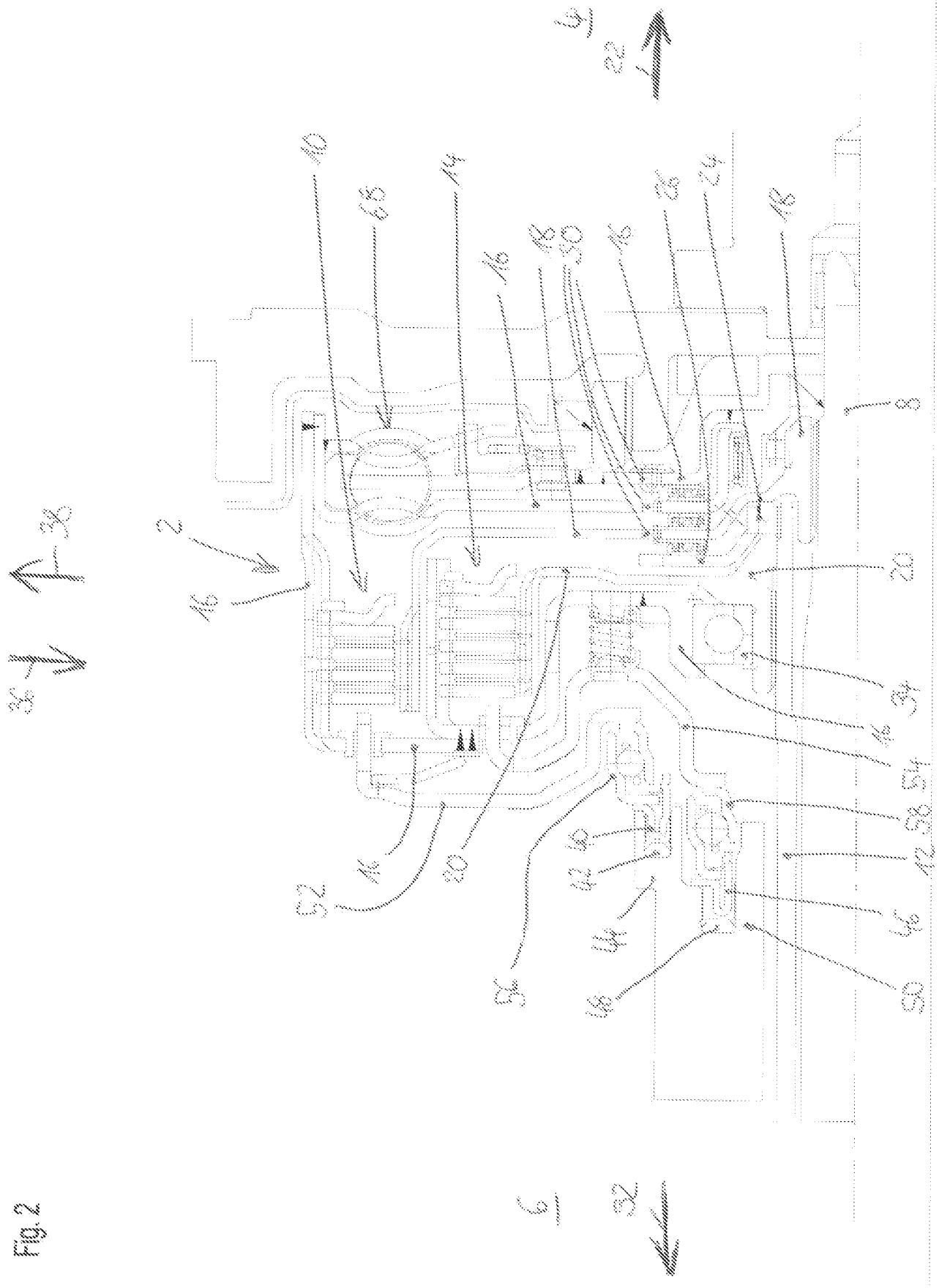

10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68

Fig. 2

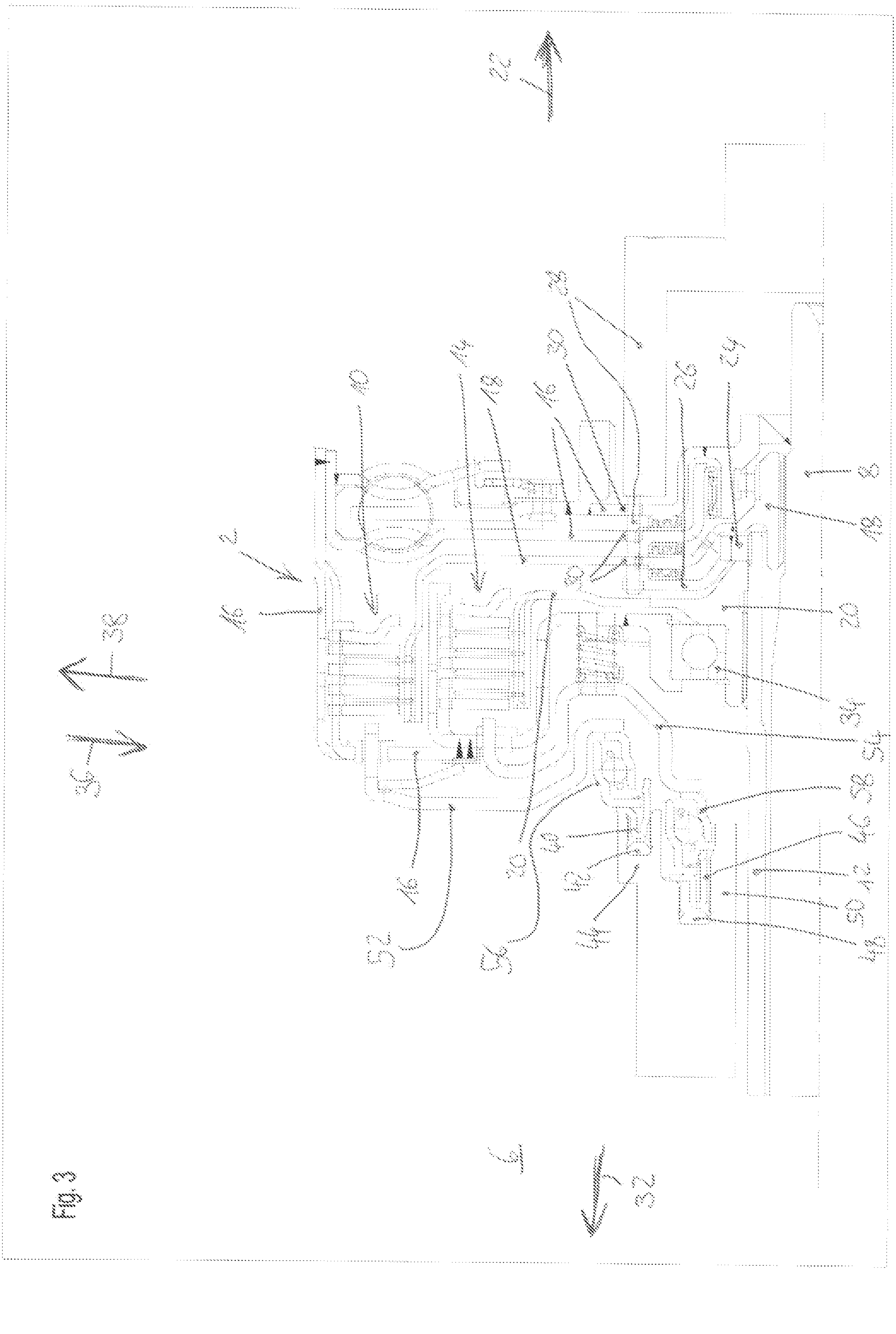


Fig. 3

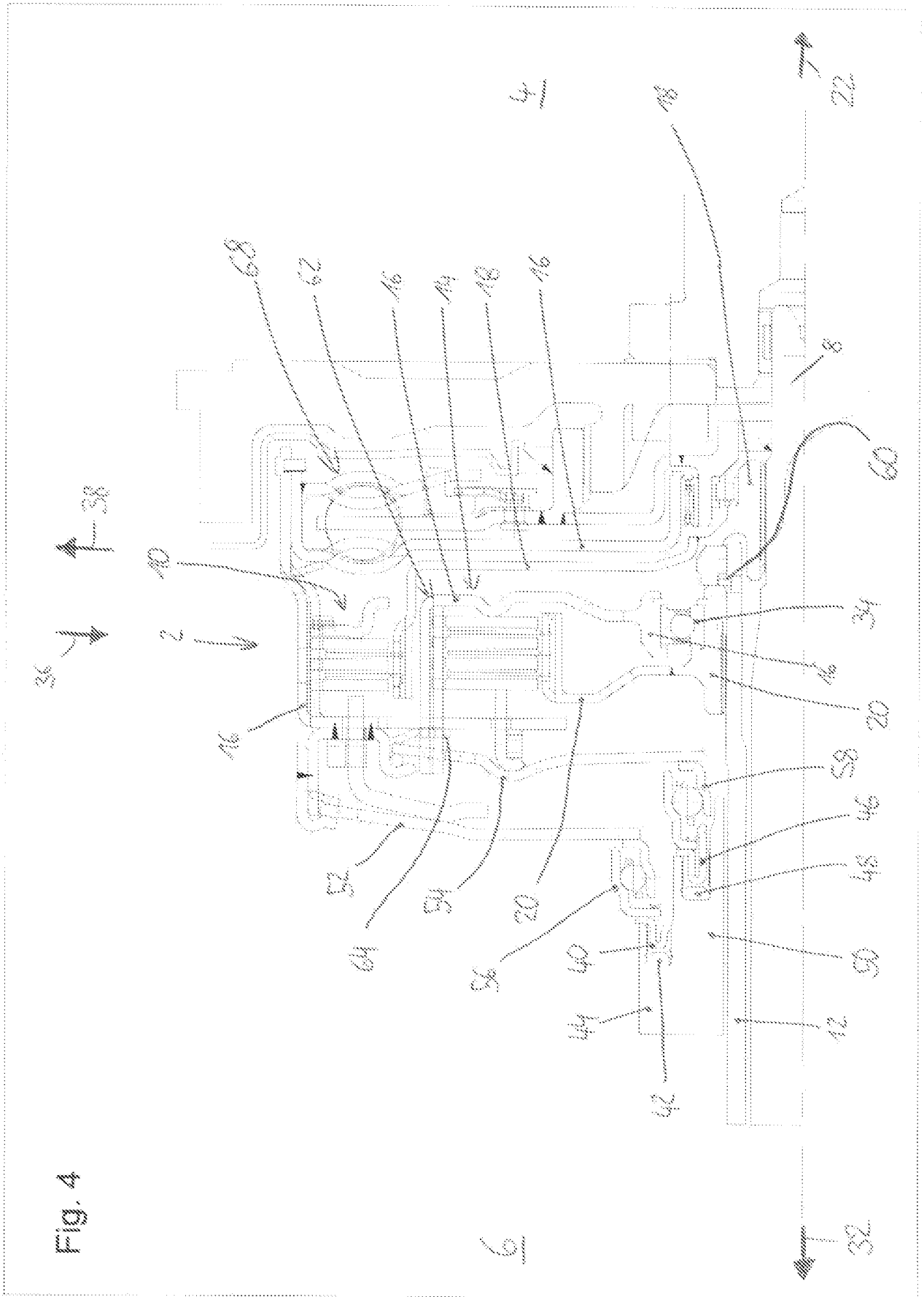

41
18
22
68
62
16
14
18
16
6
8
38
10
2
36
34
4
20
16
58
56
46
52
54
20
64
26
30
58
44
12
42
50
52

Fig. 4

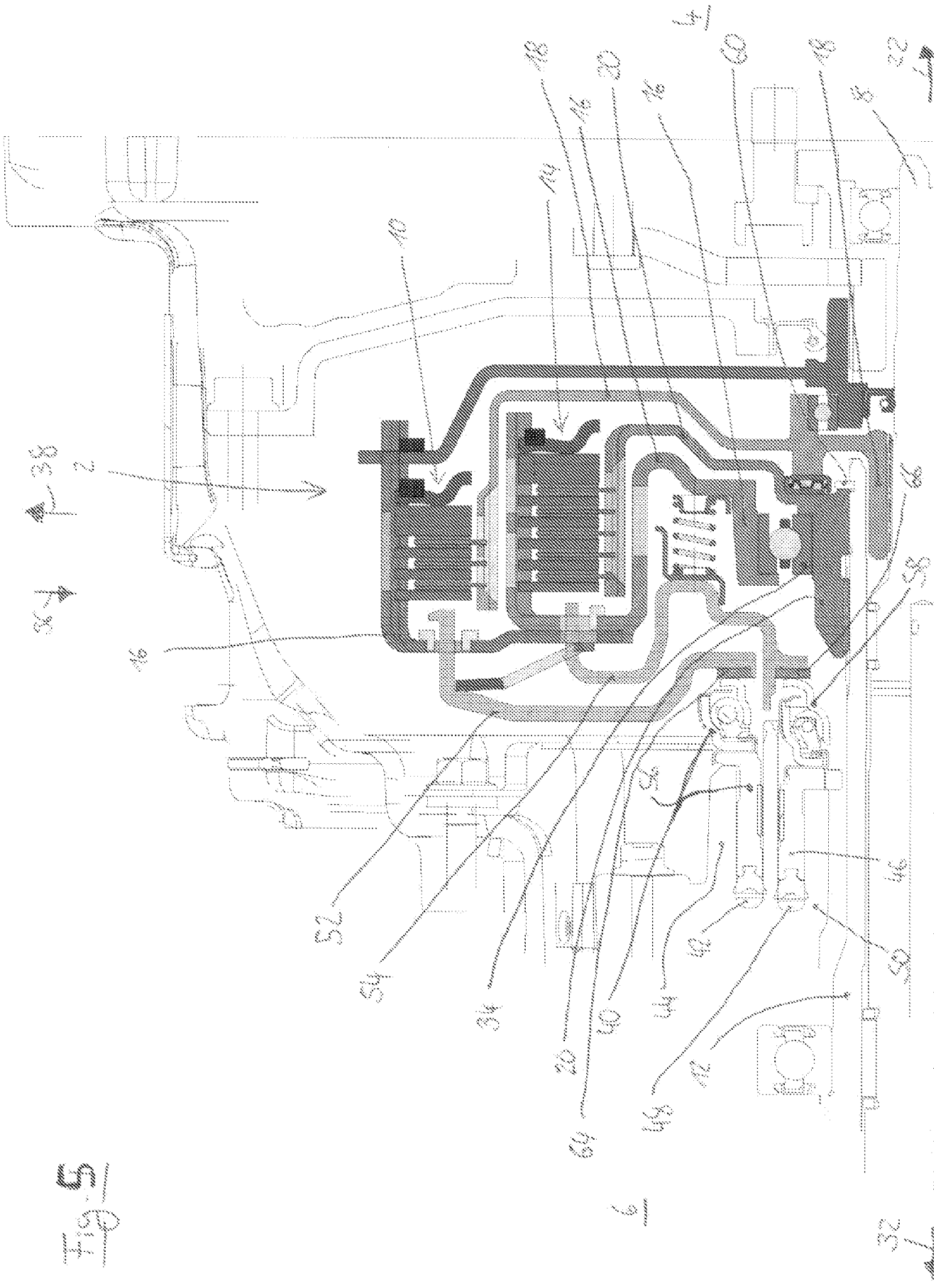


FIG. 5
1
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64