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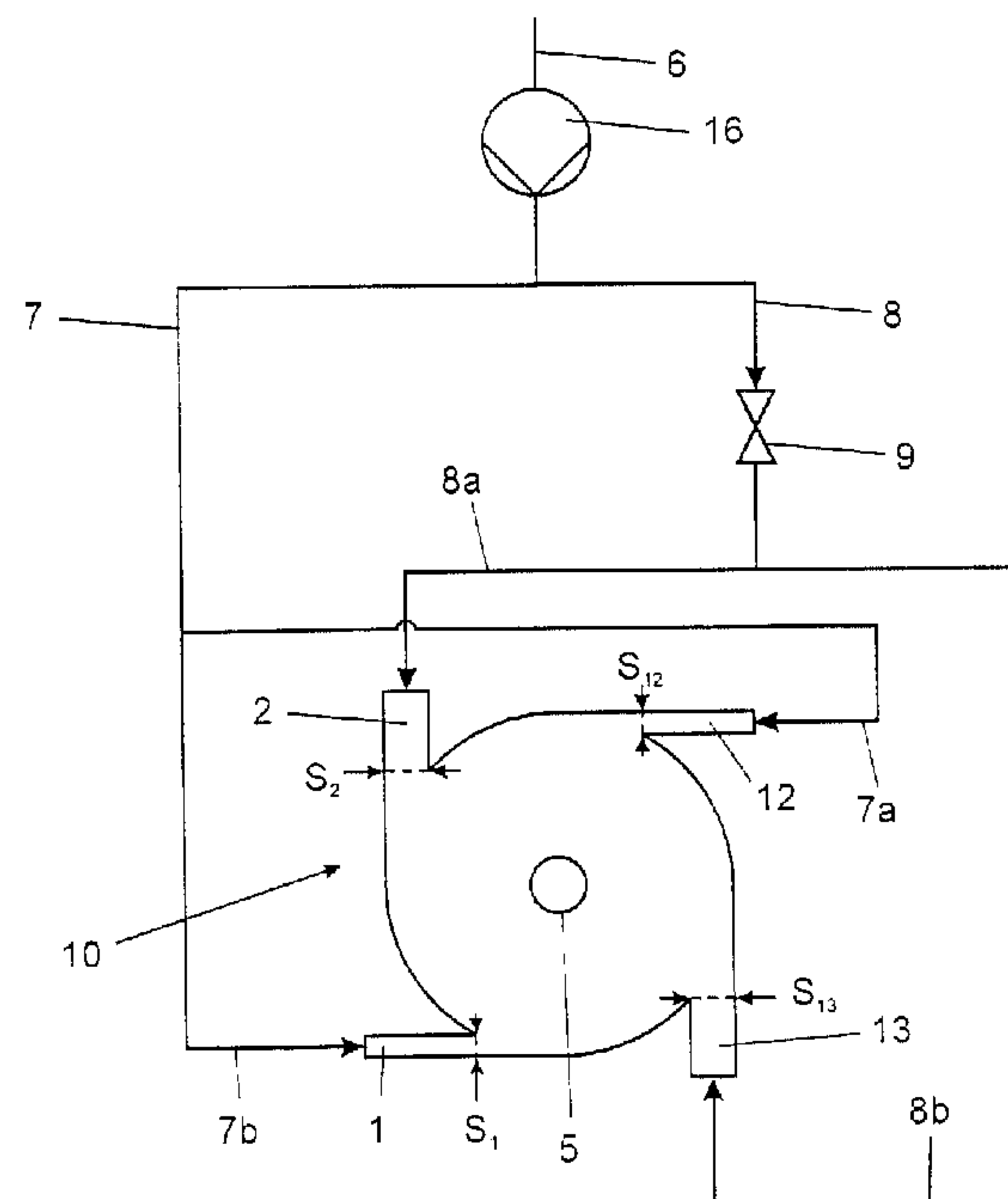
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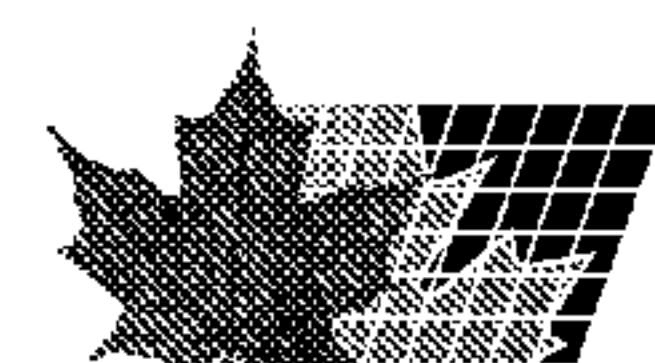
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(54) Titre : PROCEDE ET DISPOSITIF POUR LA SEPARATION MECANIQUE D'UN SYSTEME DISPERSE
(54) Title: METHOD AND DEVICE FOR MECHANICALLY SEPARATING A DISPERSE SYSTEM



(57) **Abrégé/Abstract:**

The invention relates to a method for mechanically separating a disperse system into two or more disperse systems, said systems having different features, in a centrifugal separator, and to a device suited for carrying out the inventive method. Based on the disadvantages of the prior art, the aim of the invention was to create a method of the type in question with which it is possible, without large structural changes, to be able to vary the degree of solids recovery independent of fluid flow rate to a large extent and to influence the size of separation and the sharpness of separation. To these ends, the partial streams (7, 8) are partitioned to feed channels (1, 2) which, in the centrifugal separator, differ in the cross-sectional areas thereof at the points of entry (S_1 , S_2). During the partitioning of the partial streams to more than two tangential feed channels (1, 2, 12, 13), the cross-sectional areas (2) and (13) or (1) and (12) are formed from the sum of the cross-sectional areas of the feed channels which are in contact with the respective partial stream (7 or 8), and therefore the sums of the cross-sectional areas of the respective partial streams (7 or 8) differ at the points of entry (S_2 , S_{13} or S_1 , S_{12}) into the centrifugal separator.





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(54) Title: METHOD AND DEVICE FOR MECHANICALLY SEPARATING A DISPERSE SYSTEM

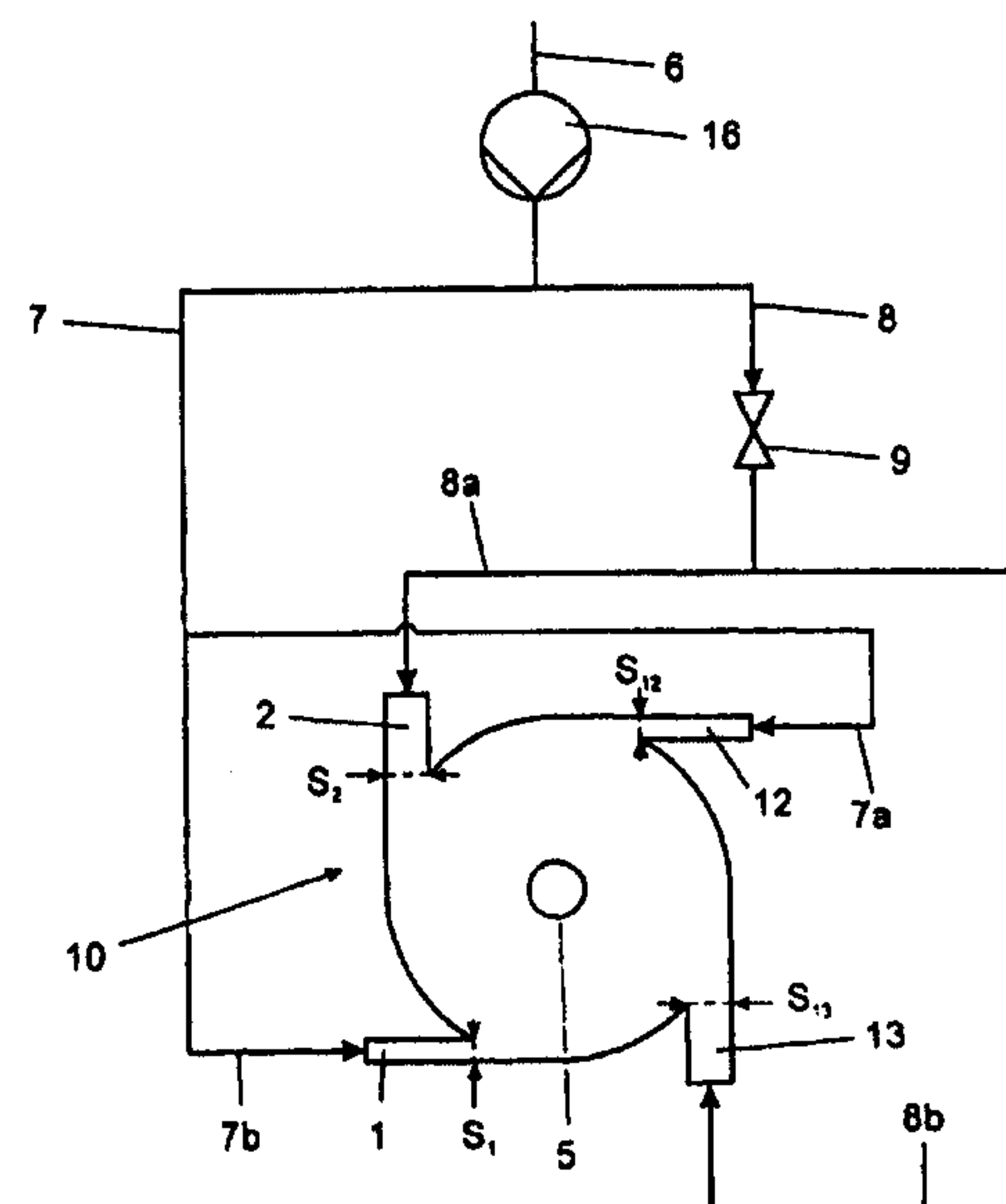
(54) Bezeichnung: VERFAHREN UND VORRICHTUNG ZUM MECHANISCHEN TRENNEN EINES DISPERSEN SYSTEMS

(57) Abstract

The invention relates to a method for mechanically separating a disperse system into two or more disperse systems, said systems having different features, in a centrifugal separator, and to a device suited for carrying out the inventive method. Based on the disadvantages of the prior art, the aim of the invention was to create a method of the type in question with which it is possible, without large structural changes, to be able to vary the degree of solids recovery independent of fluid flow rate to a large extent and to influence the size of separation and the sharpness of separation. To these ends, the partial streams (7, 8) are partitioned to feed channels (1, 2) which, in the centrifugal separator, differ in the cross-sectional areas thereof at the points of entry (S_1 , S_2). During the partitioning of the partial streams to more than two tangential feed channels (1, 2, 12, 13), the cross-sectional areas (2) and (13) or (1) and (12) are formed from the sum of the cross-sectional areas of the feed channels which are in contact with the respective partial stream (7 or 8), and therefore the sums of the cross-sectional areas of the respective partial streams (7 or 8) differ at the points of entry (S_2 , S_{13} or S_1 , S_{12}) into the centrifugal separator.

(57) Zusammenfassung

Die Erfindung betrifft ein Verfahren zum mechanischen Trennen eines dispersen Systems in zwei oder mehrere disperse Systeme mit unterschiedlichen Eigenschaften in einem Zentrifugalabscheider und eine zur Durchführung des Verfahrens geeignete Vorrichtung. Ausgehend von den Nachteilen des bekannten Standes der Technik war es Aufgabe, ein gattungsgemäßes Verfahren zu schaffen, mit dem es möglich ist, ohne große bauliche Veränderungen den Abscheidegrad unabhängig vom Fluiddurchsatz in einer großen Breite variieren zu können sowie die Trennkorngröße und die Trennschärfe zu beeinflussen. Hierzu wird vorgeschlagen, daß die Teilströme (7, 8) auf Zuführungskanäle (1, 2) aufgeteilt werden, die sich in ihren Querschnittsflächen an den Eintrittsstellen (S_1 , S_2) in den Zentrifugalabscheider unterscheiden. Bei einer Aufteilung der Teilströme auf mehr als zwei tangentielle Zuführungskanäle (1, 2, 12, 13) die Querschnittsflächen (2 und 13 bzw. 1 und 12) aus der Summe der Querschnittsflächen der Zuführungskanäle, die mit dem jeweiligen Teilstrom (7 oder 8) in Verbindung stehen, gebildet werden, und sich demzufolge die Summen der Querschnittsflächen der jeweiligen Teilströme (7 oder 8) an der Eintrittsstelle (S_2 , S_{13} bzw. S_1 , S_{12}) in den Zentrifugalabscheider unterscheiden.



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Description**Method and device for mechanically separating a disperse system**

The invention relates to a method for mechanically separating a disperse system into two or more disperse systems with different properties in a centrifugal collector and to a device suitable for performing the method.

As disperse systems there are considered those in which the disperse phase is solid, liquid or gaseous and the dispersion medium is either liquid or gaseous, i.e., fluid. The mechanical separation of such a disperse system of identical particle density into coarse and fine material is called "classification". If separation into different densities is performed, it is known as "sorting". If particles are separated from a liquid or gaseous dispersion medium surrounding them, what takes place is a collection process. So-called centrifugal collectors, also known as cyclones, are used to perform the mechanical separation methods of "classification", "sorting" and "collection".

From German Patent DE-PS 875753 there is known a device for collection, by means of a centrifugal collector, of solid product fractions suspended in a gas stream. Upstream from the

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entry into the centrifugal collector, the total flow is split into two partial streams, which are introduced tangentially into the centrifugal collector at different points, in order to introduce the partial stream enriched with the lower concentration of product thereinto in such a way that collection of the remaining product is not impaired thereby. In the total flow line there is disposed a separating tongue, by which the total flow is separated into two partial streams and in order to achieve the desired preseparation of the coarse product layer.

A method of the class in question and the associated device are known from German Patent DE 3936078 C2. The method designed for open-loop control of the degree of separation of a fluid multiphase mixture is performed using a cyclone collector with a swirl generator. In the process the entire material stream is partitioned by a first partitioning to at least two partial streams, or at least two incoming material streams are used for the cyclone collector, at least one of the partial streams being variable in its magnitude. The partial streams are further partitioned if necessary and then introduced into the feed channels of the swirl generator. The swirl generator possesses a swirl chamber with several tangential feed

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channels, which have the same cross sectional area, and whose number is even.

The disadvantage of this procedure and of the associated device consists above all in that the collection efficiency can be varied only in a very small range, or requires the installation of a relatively large number of tangential feed channels. The latter leads to a substantial cost increase. In addition to the collection efficiency, the separation selectivity and the separation particle size are further important characteristics of mechanical separation of a disperse system. The two last-mentioned characteristic variables can be influenced only slightly by the procedure described in German Patent 3936078 C2.

The object on which the invention was based is to create a method of the class in question with which it is possible, without major structural changes, to be able to vary the collection efficiency in a large range independently of the fluid throughput as well as to influence the separation particle size and the separation selectivity.

According to the invention, the object is achieved by the

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method features specified in claim 1. Suitable embodiments of the procedure are specified in claims 2 to 12. A device for performing the method is the subject matter of claim 13. Suitable alternative embodiments of the device are specified in claims 14 to 25.

The proposed procedure of partitioning the partial streams to tangential feed channels with different cross-sectional areas as the individual value or sum at the entry point into the centrifugal collector leads to a substantial expansion of the closed-loop control range and to improved exertion of influence on the process-related and qualitative parameters during operation. It is of great advantage that, compared with the solutions known from the prior art, the collection efficiency can be subjected to closed-loop control in a relatively large range, independently of the total volume flow. For a large number of areas of use, a mode of operation with three or four tangential feed channels is already adequate. These are either disposed directly on the centrifugal collector, in a manner distributed uniformly along the circumference, or they open into a separate swirl chamber, with which the centrifugal collector is additionally equipped. A centrifugal collector with such a swirl chamber is described in

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detail, for example, in German Patent DE 3936078 C2.

The partitioning of the total volume flow to two partial streams which can be subjected to separate open-loop control via a throttle valve or a pump, and each partial stream is partitioned to one or two tangential feed channels, wherein in the case of two tangential feed channels these differ in their cross-sectional area at the entry point into the centrifugal collector, or in the case of more than two tangential feed channels the sum of the cross-sectional areas is important as a distinctive feature, permits a large number of variations with respect to different setting of the entry momentums of the individual partial streams which are to be directed into the centrifugal collector and which act on the centrifugal acceleration in the collector. Thereby the separation selectivity and the separation particle size can be adjusted to be specific to the product and the adjusting variables can be changed during operation.

It is also essential that the necessary rotational symmetry of the partial streams not be impaired after entry into the centrifugal collector.

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To increase the collection efficiency, the partial stream flowrate which is introduced through the tangential feed channel with the smallest cross-sectional area at the entry point into the centrifugal collector is increased by appropriate adjustment of pump or throttle organ and the other partial stream flowrate is reduced accordingly. The total volume flow therefore remains constant. The partial streams introduced into the centrifugal collector are mixed very thoroughly with one another. Because of the arrangement of the already mentioned swirl chamber, this effect can be further improved, whereby the radial component of the velocity vector increases. In the case of partitioning of the partial streams upstream from the tangential feed channels to two partial stream flowrates, the partial stream flowrate which is allocated to the tangential feed channel with the larger cross-sectional area or to the feed channels with the larger sum of the cross-sectional areas should be amenable to closed-loop by means of a throttle valve integrated into the partial stream line. The throughput of this partial stream can then be influenced by this valve. At constant throughput, the other partial stream flowrate, which is guided via the feed channel with the smaller cross-sectional area into the centrifugal collector, is then necessarily increased. Thereby a large

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closed-loop control range is already achieved for the collection efficiency. Any irregularities which may occur due to different entry momentums of the two, three or four partial stream flowrates can be very largely evened out by installation of an additional swirl chamber in the centrifugal collector. Internals for a certain compulsory guidance of the introduced partial streams should be provided in the swirl chamber. It is important that a free choice can be made for the partial streams and that a partial stream does not result from return flow and is therefore not freely adjustable. The partial streams can be formed either from a total volume flow by partitioning or as separate initial delivery streams, which start out from one or two reservoir vessels and for which material transport takes place through separate delivery organs. A change of volume flow for formation of different partial streams can then be accomplished by changing the speed of the pump being used. The proposed procedure can also be used for such applications in which the collection efficiency is to be maintained constant for variable fluid throughput. In comparison with the inventive solution, the achievable closed-loop control range in the procedure known from the prior art is considerably restricted. For equal cross-sectional areas of all tangential feed channels, only one further partitioning of the

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partial streams in the partition ratio of 2:1 is possible. The two partial streams are introduced into the swirl chamber of the centrifugal collector through symmetrically disposed lines and tangential feed channels. In addition, this solution is suitable only for centrifugal collectors with an additional swirl chamber.

According to a further embodiment of the procedure, the pressure can be measured in order to influence the collection efficiency in the partial stream which is introduced through the feed channel with the smallest cross-sectional area at the entry point into the centrifugal collector. This is maintained at a predetermined value by changing at least one of the other partial stream flowrates. This procedure offers the advantage that, if the charging streams are fluctuating, the separation performance or the collection efficiency of the centrifugal collector can be substantially maintained.

To achieve this procedure, a pressure-measuring instrument is integrated in the feed channel with the smallest cross-sectional area at the entry point into the centrifugal collector. This is coupled with a control valve, which is integrated in one of the feed channels for the other partial streams. The possibility also exists of disposing, in each of

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several of the other partial streams, a control valve, which is then optionally subjected to open-loop control via the pressure-measuring instrument.

A further alternative embodiment then exists in that selected material parameters are measured or determined upstream and/or downstream from the centrifugal collector and, depending thereon, the partial stream flowrate ratio between two or more partial streams and/or the pressure difference between two specified points, one upstream and the other downstream respectively from the centrifugal collector, is varied. This measure is applied in particular if the pressure cannot be used as a variable for open-loop control of the collection process. This is the case in particular if influencing variables change that indeed exert influence on the collection process but not on the pressure. For example, the load of the charging stream can change. In this case, the property of a material stream is measured and used as a guide variable of the closed-loop control system. For example, the particle-size distribution in the stream downstream from the centrifugal collector can be measured by means of a measuring instrument and the pressure upstream from the centrifugal collector as well as the ratio of the partial streams upstream

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from the centrifugal collector can be changed. By this measure it is possible, by appropriate closed-loop control, to maintain constant, for example, the dust content in the clean-gas stream or the average separation particle size of the centrifugal collector.

The necessary control organs for varying the partial stream flowrate ratio and/or the pressure difference can be, for example, a pump or a valve, which can also be used in combination if necessary.

The invention will be explained in the following on the basis of several examples. In the associated drawing,

- Fig. 1 shows a centrifugal collector with two tangential feed channels as a longitudinal section along line B-B in Fig. 2,
- Fig. 2 shows a section along line A-A in Fig. 1,
- Fig. 3 shows the perspective view of the centrifugal collector according to Fig. 1 with an alternative version for partitioning of the partial streams,

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- Fig. 4 shows a centrifugal collector according to Figure 1 with an additional swirl chamber, as a longitudinal section along line B-B in Fig. 5,
- Fig. 5 shows a section along line A-A in Fig. 4,
- Fig. 6 shows a centrifugal collector with three tangential feed channels, which open into a swirl chamber, in perspective view,
- Fig. 7 shows the centrifugal collector according to Fig. 6 as a longitudinal section,
- Fig. 8 shows the top view of the centrifugal collector according to Fig. 6,
- Fig. 9 shows the functional diagram of connections for an alternative version of the partitioning of the partial streams of the centrifugal collector according to Fig. 6,
- Fig. 10 shows a functional diagram of connections for partitioning of the partial streams in a centrifugal collector with four tangential feed channels,
- Fig. 11 shows a functional diagram of connections for partitioning of two separately drawn partial streams to three tangential feed channels of a centrifugal collector and

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Fig. 12 shows a functional diagram of connections for a centrifugal collector with two tangential feed channels and a pressure-measuring instrument.

Centrifugal collector 10 shown in Figure 1 consists in a manner known in itself of a collection space 3, which is connected to a conical lower part 4 as well as an immersion pipe 5, which protrudes out of collection space 3. Into collection space 3 there open the two tangential feed channels 1, 2 for feeding the disperse system that is to undergo a separation process in centrifugal collector 10. As can be clearly seen in Figure 2, the two feed channels 1, 2 are provided at their entry points S_1, S_2 with different cross-sectional areas. The two tangential feed channels 1, 2 have the same height and in each case a rectangular cross-sectional area, and differ only in their width. Feed channel 1 has broader construction at entry point S_1 than does the other tangential feed channel 2 at the same point S_2 . The decisive factor is the cross-sectional area directly at the entry point into centrifugal collector 10. Up to that point, the tangential feed channels can also have a different cross-sectional profile, such as a conical profile. The shape or contour of the cross-sectional area obviously does not have to be exclusively

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rectangular, but can also be, for example, of circular construction. The mode of operation of this alternative embodiment will be explained in more detail with reference to Figure 3. The entire fluid flow of the disperse system to be separated is drawn from a reservoir vessel and then partitioned into two partial streams 7 and 8. In the partial stream line for partial stream 8, a valve 9 is integrated upstream from the point of connection to tangential feed channel 1. Partial stream 8, which can be varied in its volume flow, is introduced through feed channel 1 with the larger cross-sectional area at entry point S_1 into centrifugal collector 10. The other partial stream 7 is introduced directly through feed channel 2, which at entry point S_2 has a smaller cross-sectional area. If valve 9 is completely opened, a collection efficiency that depends on the collection geometry and the material data develops at constant total volume flow 6. If valve 9 is closed in steps and total volume flow 6 is maintained constant at the same time, the collection efficiency is increased by virtue of the higher velocity at entry point S_2 with the smaller cross-sectional area.

In Figures 4 and 5 there is illustrated an alternative embodiment which, compared with the version according to Figures 1 to 3, is further equipped with an additional swirl

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chamber 11. This is disposed above collection space 3 and has a larger diameter than collection space 3. In its height, swirl chamber 11 is lower than the height of collection space 3. Tangential feed channels 1 and 2 open at the outer circumference of swirl chamber 11 thereinto. In swirl chamber 11, the tangentially introduced partial streams are accelerated toward the central axis of centrifugal collector 10 and evened out. Thereby it is ensured that a particularly high rotational symmetry of the flow is achieved upon entry into collection space 3.

In Figures 6 to 8 there is shown an alternative embodiment with three tangential feed channels 1, 2 and 12 with identical cross-sectional areas at entry points S_1 , S_2 and S_{12} into swirl chamber 11 of centrifugal collector 10. Entry points S_1 , S_2 and S_{12} are disposed in regularly distributed manner over the circumference of swirl chamber 11, and so they each have the same spacing relative to one another. Inside swirl chamber 11 there is disposed around immersion pipe 5 a component 14 with a conical shell surface, whose cone tip points in the direction of collection space 3. Parallel thereto and spaced apart therefrom, there is disposed at the transition point from swirl

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chamber 11 into collection space 3 a conical or hopper-shaped inlet 15 pointing in opposite direction. Thereby preliminary collection of the heavier phase can already take place in the swirl chamber. In this version the inventive effect occurs only if two tangential feed channels, such as 2 and 12, for example, are fed via one feed line 8 and the third feed channel, for example 1, is fed via the other feed line 7. This connection version is shown in Figure 9. The total fluid flow 6 is drawn by means of a delivery pump 16 from the reservoir vessel and partitioned to the two partial streams 7 and 8. Partial stream 7 passes without being subjected to further influence through tangential feed channel 1 into centrifugal collector 10. Partial stream 8 is partitioned into two further sub-partial streams 8a and 8b, a valve 9 being integrated in the line for partial stream 8. Sub-partial stream 8a then passes through tangential feed channel 2 and sub-partial stream 8b passes through tangential feed channel 12 into centrifugal collector 10. The sum of the cross-sectional areas at entry points S_2 and S_{12} of feed channels 2 and 12 is larger than the cross-sectional area at entry point S_1 of feed channel 1. In the present case, the cross-sectional areas of all three feed channels are identical.

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This does not always have to be the case, however, it being essential only that the two tangential feed channels which are connected with a line that is variable in volume flow have in their sum a larger cross-sectional area.

The advantages of this connection version consist above all in a uniform structural layout of the tangential feed channels, whereby the structural complexity is kept small. Moreover, all tangential feed channels can be equipped with the same connecting joints.

In Figure 10 there is illustrated a further inventive alternative embodiment for an arrangement with four tangential feed channels 1, 2, 12 and 13. Feed channels 1 and 12 each have the same cross-sectional area at their entry points S_1 and S_{12} into centrifugal collector 10 and are disposed opposite one another. Both are also true analogously for feed channels 2 and 13 with entry points S_2 and S_{13} . The sums of the cross-sectional areas, of feed channels 1 and 12 on the one hand and of feed channels 2 and 13 on the other hand, however, are different. The total volume flow 6 drawn from one vessel is partitioned to the two partial streams 7 and 8 downstream from the point at

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which delivery pump 16 is integrated. In the line for partial stream 8 there is integrated a valve 9. Downstream from valve 9 partial stream 8 is partitioned to two further sub-partial streams 8a and 8b, which are introduced into centrifugal collector 10 through tangential feed channels 2 and 13 which, at entry points S_2 and S_{13} , have the larger cross-sectional areas in comparison with the two other feed channels 1 and 12. The other partial stream 7 branched off from the total volume flow is also partitioned to two further partial streams 7a and 7b, which are introduced into centrifugal collector 10 through tangential feed channels 1, 12 with the smaller cross-sectional areas at entry points S_1 and S_{12} . At this place it must be emphasized once again that, for example, in the case of four feed channels, it is not the individual cross sections that are of importance but instead the sums of the cross-sectional areas of each one of the partial stream lines 7 and 8 branched off from the total volume flow line 6. In the case of four tangential feed channels, the possibility also exists of a connection version in which the one partial stream, for example 7, is introduced into the centrifugal collector through only one tangential feed channel, and the other partial stream 8, which is subject to closed-loop control via a valve, is

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partitioned to the other three tangential feed channels. Obviously the sum of the three cross-sectional areas is larger than the cross-sectional area that still remains.

Because the tangential feed channels are disposed in pairs facing one another, each with the same cross section at the entry point into the centrifugal collector, improved rotational symmetry is achieved for introduction of different partial stream flowrates.

In Figure 11 there is illustrated yet another alternative embodiment, in which the total volume flow is formed from two separate partial streams 7, 8, which are drawn either from one vessel or from two locally separated vessels and, in fact, via a separate delivery pump 16 and 17 respectively for each partial stream 7, 8.

Partial stream 7 then passes without further partitioning through the tangential feed channel with the smaller cross-sectional area at entry point S, into centrifugal collector 10. The other partial stream 8 is partitioned to two sub-partial streams 8a and 8b, which are directed through tangential feed

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channels 2 and 12 with the larger cross-sectional areas at entry points S_2 and S_{12} into centrifugal collector 10. The decisive factor once again is that the sum of the cross-sectional areas of entry points S_2 and S_{12} is larger than the cross-sectional area that still remains. Closed-loop control of the individual delivery flowrates is accomplished exclusively via closed-loop control of the speed of delivery pumps 16 and 17.

This version offers the following advantages:

In certain disperse systems, the danger exists that they can clog the feed lines, especially in the region of valves. Because of the possible closed-loop control of the material flowrates to be fed exclusively by closed-loop control of the speed via built-in pumps, a clogging danger can be prevented. If the centrifugal collector is operated in suction mode, the pump or the compressor is disposed downstream from the centrifugal collector. Exertion of influence on the delivery flow then takes place via the characteristic of the pump or via the leakage air being sucked in (aerocyclone).

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In Figure 12 there is further shown a centrifugal collector as a functional diagram of connections, which in its design corresponds substantially to the version shown in Figure 3. In tangential feed channel 2 which, in comparison with the other tangential feed channel 1, has the smaller cross-sectional area at the entry point into the centrifugal collector, there is integrated a pressure-measuring instrument 18, which is coupled via a line 19 with control valve 9, which is integrated in the feed line for partial stream 8, which is connected to feed channel 1.

This version is applied in the case of a charging stream whose load remains almost constant and in which the other material properties also do not change. The simplest realization of this measure is achieved by partitioning the total volume flow, the charging stream, into two partial streams, which are introduced directly via a tangential feed channel 1 and 2 respectively into centrifugal collector 10, as shown in Figure 12.

In this case the pressure is measured in feed channel 2, although the measuring point may also be disposed outside this

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channel 2, for example in the feed line to this channel.

Depending on the measured pressure, control valve 9 is changed during throughput fluctuations until the pressure has returned to the desired setpoint value. Thereby the ratio of the two partial streams is simultaneously influenced.

When the change of the charging stream is examined in detail, the following process takes place. For an increasing charging stream, the pressure, without the proposed closed-loop control, would also rise. This means that the swirl velocity in the centrifugal collector would increase, leading to changed collection. If control valve 9 is now opened, the partial stream which is being directed through feed channel 1 with the larger cross-sectional area at the entry point into the centrifugal collector thereinto is increased. The velocity of the partial stream in this feed channel 1 increases only slightly, whereas the velocity of the partial stream in feed channel 2, which at the said entry point has the smaller cross-sectional area, decreases appreciably. Thereby the swirl in the centrifugal collector is maintained constant even at higher charging stream. The manifestation of constant swirl in the

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centrifugal collector is essentially the pressure upstream from the centrifugal collector.

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Claims

1. A method for mechanically separating a disperse system into two or more disperse systems with different properties in a centrifugal collector (10), wherein at least two partial streams (7, 8) are formed from a total volume flow (6) or as separate initial delivery streams, which are introduced through tangential feed channels (1, 2, 12, 13) as rotational flow into the centrifugal separator (10) and the partial streams (7, 8) either
 - a) are introduced in two tangential feed channels (1, 2) with different cross-sectional areas at the entry points (S_1, S_2) into the centrifugal separator (10) thereinto or
 - b) in the case of partitioning of the partial streams (7, 8) to more than two tangential feed channels (1, 2, 12, 13), at least one partial stream (7, 8) is partitioned into further sub-partial streams (7a, 7b, 8a, 8b) and each sub-partial stream is introduced through a tangential feed channel (1, 2, 12, 13) into the centrifugal separator (10), wherein there differ the sums of the cross-sectional areas of the

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tangential feed channels (1, 2, 12, 13) at the entry points (S_1 or S_2 and S_{12} ; or S_1 and S_{12} or S_2 and S_{13}) into the centrifugal collector (10) which are allocated to the respective partial stream (7 or 8),

and at least the partial stream (8) which is allocated to the tangential feed channel (1) with the larger cross-sectional area or to the tangential feed channels (2, 12, 13) with the larger sum of the cross-sectional areas is changed directly by means of an open-loop control organ (9, 17), and the partitioning of the partial streams (7, 7a, 7b, 8, 8a, 8b) to the tangential feed channels (1, 2, 12, 13) is undertaken such that, in the case of required higher circumferential velocity in the centrifugal collector (10), the tangential feed channels (2, 1 or 1 and 12) with the smaller cross-sectional area or sum of the cross-sectional areas at the entry point (S_2 , S_1 or S_1 and S_{12}) into the centrifugal separator (10) are made to admit a larger partial stream (7) or the total volume flow (6) and vice versa.

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2. A method according to claim 1, characterized in that the total volume flow (6) is partitioned into two partial streams (7,8), each of which is introduced into the centrifugal collector (10) through a feed channel (1,2) wherein the partial stream (8) associated with the larger cross-sectional area at the entry point (S_1) into the centrifugal collector (10) is changed by means of a control organ (9).
3. A method according to claim 1, characterized in that the total volume flow (6) is partitioned to more than two partial streams (7, 8, 7a, 7b, 8a, 8b) introduced tangentially into the centrifugal collector (10), wherein at least two tangential partial streams (7a, 7b, 8a, 8b) are branched off from one partial stream (7, 8), and the partial stream (8) whose sub-partial streams (8a, 8b) are introduced through tangential feed channels (2, 12, 13) with the cross-sectional area which is larger in the sum at the entry point (S_2, S_{12}, S_{13}) into the centrifugal collector (10) thereinto is changed by means of a control organ (9).

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4. A method according to one of claims 1 to 3, characterized in that a pump and/or a valve is used as the open-loop control organ (9).
5. A method according to one of claims 1 to 4, characterized in that the partial streams (7, 8) are subjected to closed-loop control independently of one another by change of the delivery flow of the respective pump.
6. A method according to one of claims 1 to 5, characterized in that two separate partial streams (7, 8) form the initial delivery streams, wherein each of these partial streams (7, 8) is changed by a pump (16, 17) and at least one partial stream (8) is partitioned to further sub-partial streams (8a, 8b), which are introduced into the centrifugal collector (10) through tangential feed channels (1, 2, 12, 13).
7. A method according to one of claims 1 to 6, characterized in that the influence on the throughput of the partial streams (7, 7a, 7b, 8, 8a, 8b) is exerted outside the tangential feed channels (1, 2, 12, 13).

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8. A method according to one of claims 1 to 7, characterized in that the partial streams and/or sub-partial streams (7, 7a, 7b, 8, 8a, 8b) introduced into the centrifugal collector (10) are accelerated in the direction of the axis of the centrifugal collector (10) before reaching the working space of the centrifugal collector.
9. A method according to one of claims 1 to 8, characterized in that the partial stream flowrates (7, 8) are drawn from a common or separate reservoir vessels.
10. A method according to one of claims 1 to 9, characterized in that, in the case of constant volume flow (6), in order to reduce the separation particle size, the partial stream (7, 8) with the larger volume flow is decreased and the partial stream with the smaller volume flow is increased, while the forepressure is simultaneously increased.
11. A method according to one of claims 1 to 10, characterized in that, to influence the collection efficiency as a result of pressure fluctuations in the partial stream (7,

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- 8) which is introduced through the feed channel (1, 2, 12, 13) with the smallest cross-sectional point at the entry point (S_1 , S_2 , S_{12} , S_{13}) into the centrifugal collector (10), the pressure is measured and maintained at a constant value, by changing at least one of the other partial stream flowrates.
12. A method according to one of claims 1 to 11, characterized in that, to influence the separation properties, one or more material parameters which characterize the separation process, are measured or determined upstream and/or downstream from the centrifugal collector (10) and, depending thereon, the partial stream flowrate ratio between two or more partial streams (7, 8) and/or the pressure difference between two specified points, one upstream and the other downstream respectively from the centrifugal collector (10), is varied.
13. A device for performing the method, according to at least one of the afore claims, consisting of a centrifugal collector (10) with several tangential feed channels (1, 2, 12, 13), whereby

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- a) in an arrangement of two feed channels (1, 2), these have different cross-sectional area at the entry points (S_1, S_2) into the centrifugal separator (10) and
- b) in an arrangement of more than two tangential feed channels (1, 2, 12, 13) at least two tangential feed channels (2, 12 or 2, 13) are connected via lines (8a, 8b) for sub-partial streams which are branched off from a partial stream line (8), and the sums of the cross-sectional areas at the entry points (S_1 or S_2 and S_{12} ; or S_1 and S_{12} or S_2 and S_{13}) of the feeding channels (1, 2, 12, 13) into the centrifugal separator (10), which are arranged to the respective partial stream line (7 or 8), differentiate; and as well a control organ (9, 17) is tied in at an arrangement of two and also of more than two tangential feed channels (1, 2, 12, 13) at least in the partial stream line (8), which is connected to the tangential feeding channels (1 or 2, 12 or 2, 13) with the larger cross sectional area or the sum of the cross sectional areas on the entry point into the centrifugal collector (10).

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14. A device according to claim 13, characterized in that the tangential feed channels (1, 2, 12, 13) at the entry points (S_1, S_2, S_{12}, S_{13}) into the centrifugal collector (10) have the same height as well as an identical or different width.
15. A device according to one of claims 13 or 14, characterized in that the different cross-sectional areas or the formed sum of the cross-sectional areas differ by more than a factor of four.
16. A device according to one of claims 13 to 15, characterized in that the tangential feed channels (2, 12 or 1, 12 or 2, 13) with identical cross-sectional areas at the entry point into the centrifugal collector (10) are connected via lines (7a, 7b, 8a, 8b) for the sub-partial streams to a common feed line (7, 8) for the partial streams.
17. A device according to one of claims 13 to 16, characterized in that an infinitely adjustable open-loop control organ (9, 16, 17) is integrated in at least one of

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the feed lines (7, 8).

18. A device according to claim 17, characterized in that the open-loop control organ is a pump (16, 17) or a valve (9).
19. A device according to one of claims 13 to 18, characterized in that the central axes of the cross-sectional areas of the tangential feed channels (1, 2, 12, 13) at the entry points (S_1, S_2, S_{12}, S_{13}) into the centrifugal collector (10) lie in one plane and the cross-sectional areas are disposed in uniformly distributed manner.
20. A device according to one of claims 13 to 19, characterized in that the tangential feed channels (1, 2, 12, 13) are disposed such that they lie on the same axial coordinate.
21. A device according to one of claims 13 to 20, characterized in that the feed lines (7, 8, 7a, 7b, 8a, 8b) have different connection cross sections, to the effect that the feed lines (8, 8a, 8b) which are connected to the tangential feed channels (1, 2, 12, 13) whose

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cross-sectional area or sum of the cross-sectional areas at the entry points into the centrifugal collector (10) is the largest have the larger connection cross section.

22. A device according to one of claims 13 to 21, characterized in that, in the line (7) integrated in the feed channel (2) with the smallest cross-sectional area at the entry point into the centrifugal collector (10) or in this feed channel (2) there is integrated a pressure-measuring instrument (18), which is coupled with at least one control valve (9), which is integrated in at least one of the feed channels (1) for the other partial stream flowrates.
23. A device according to one of claims 13 to 22, characterized in that, upstream or downstream from the centrifugal collector (10), there is integrated, for measurement or determination of one or several the separation process characterizing parameters, a measuring instrument which is coupled with at least one control organ for changing the partial stream flowrate ratio and/or the pressure difference between two specified

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points, one upstream and the other downstream respectively from the centrifugal collector (10).

24. A device according to one of claims 13 to 23, characterized in that the centrifugal collector (10) is equipped with a swirl chamber (11), whose diameter is larger than the diameter of the collection space (3) of the centrifugal collector (10) and whose height is smaller than the height of the collection space (3), wherein the tangential feed channels (1, 2, 12, 13) are connected to the swirl chamber (11).
25. A device according to one of claims 13 to 24, characterized in that the number of tangential feed channels (1, 2, 12, 13) is restricted to four.

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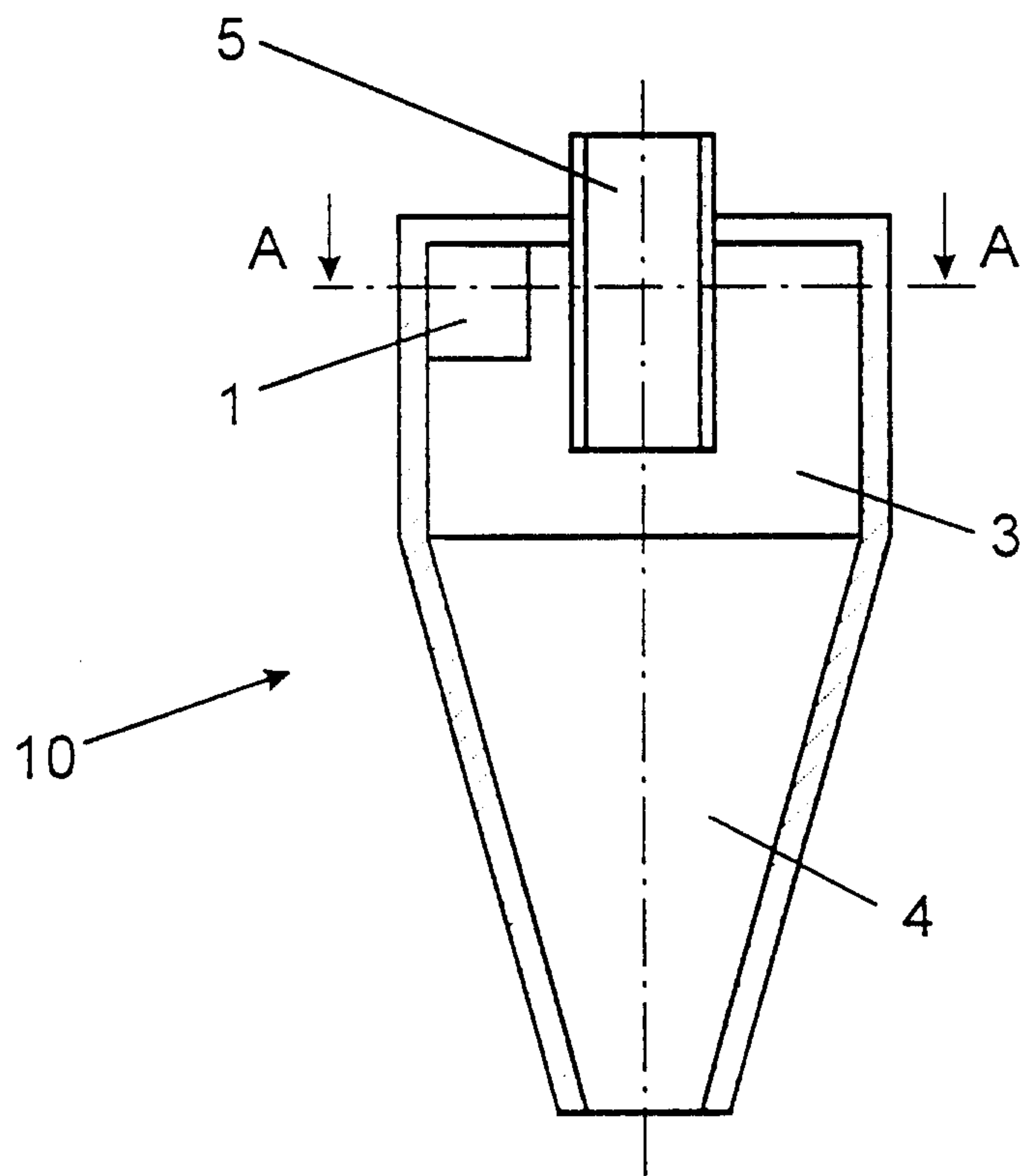


Fig. 1

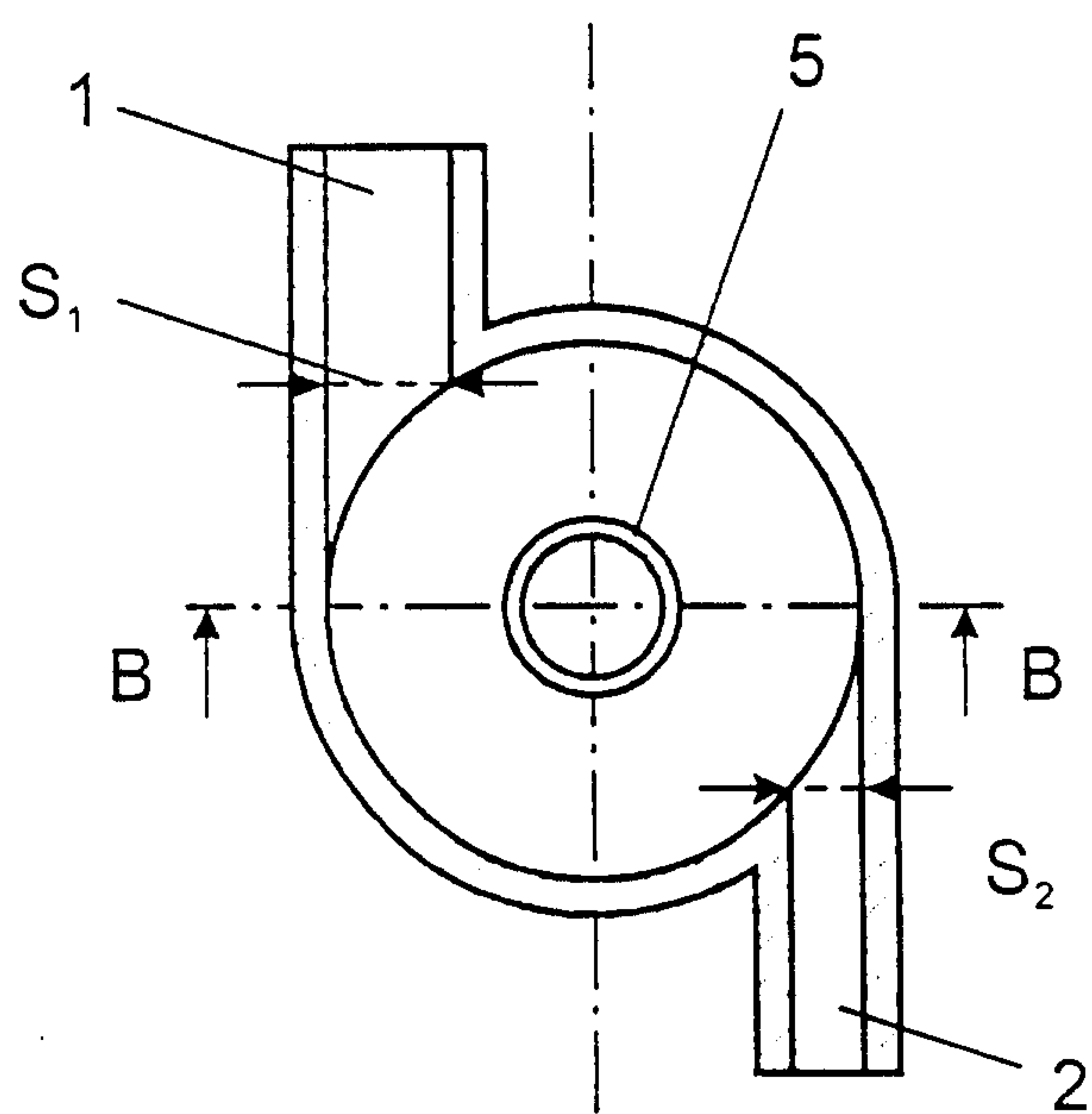


Fig. 2

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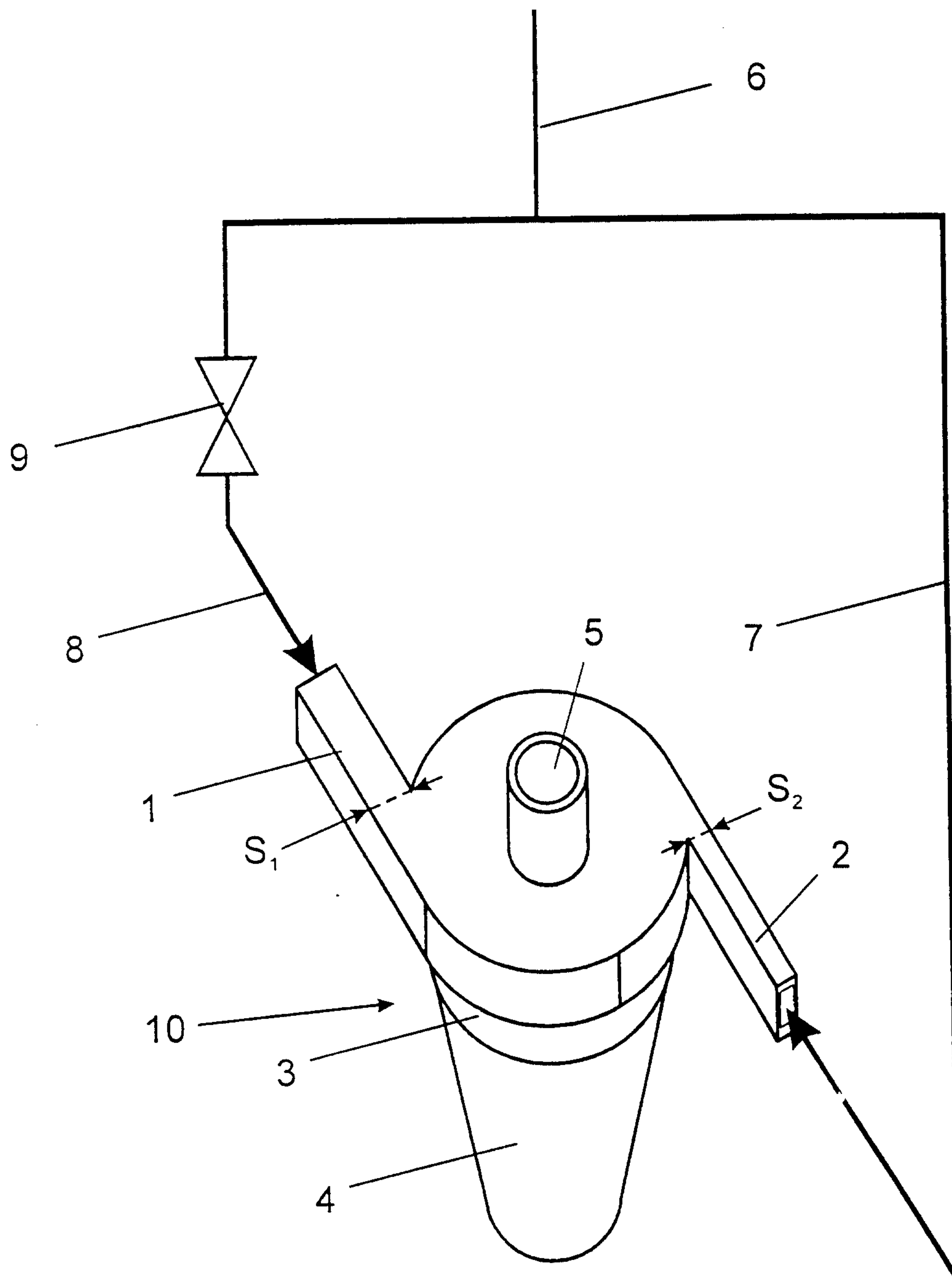


Fig. 3

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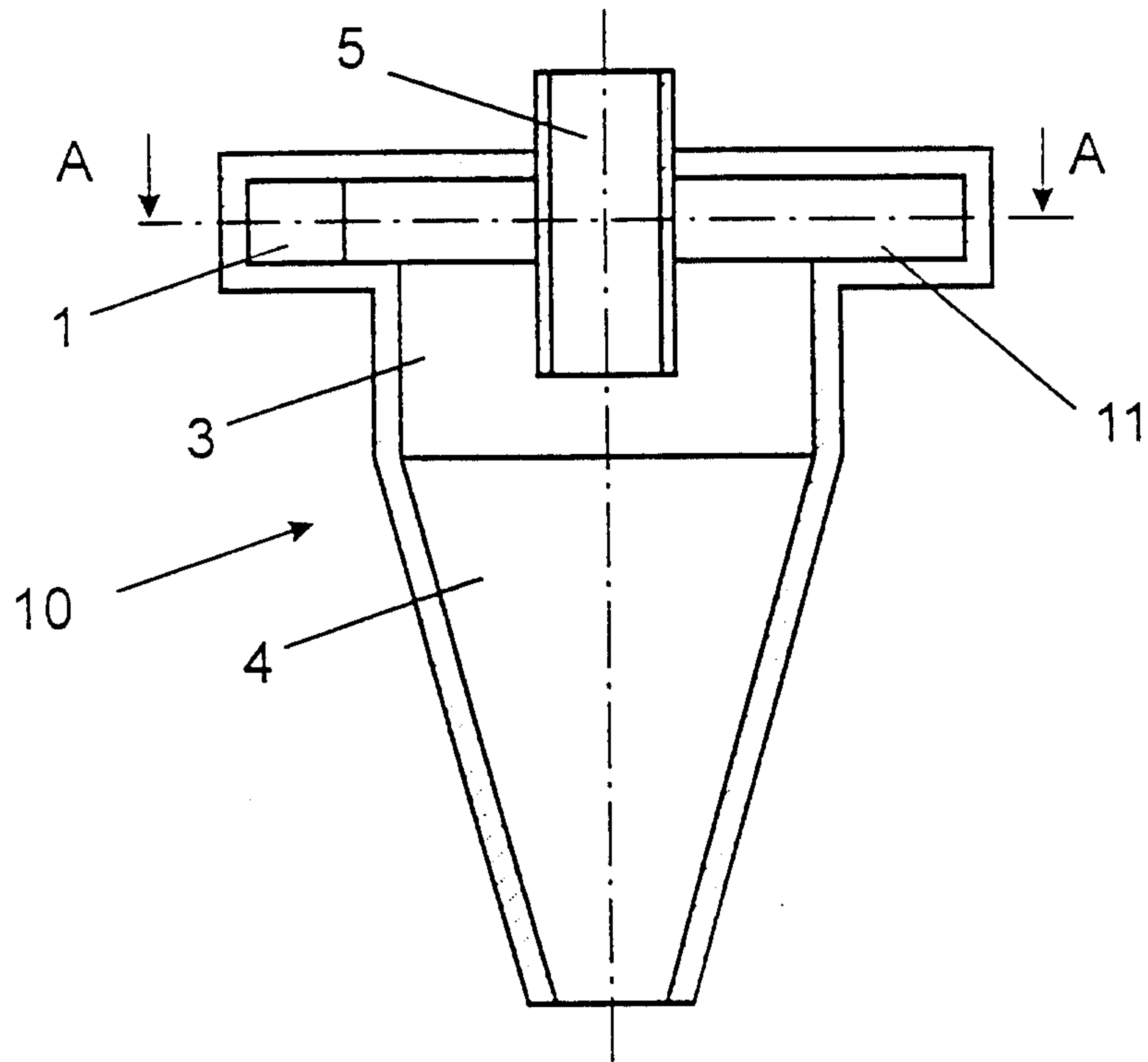


Fig. 4

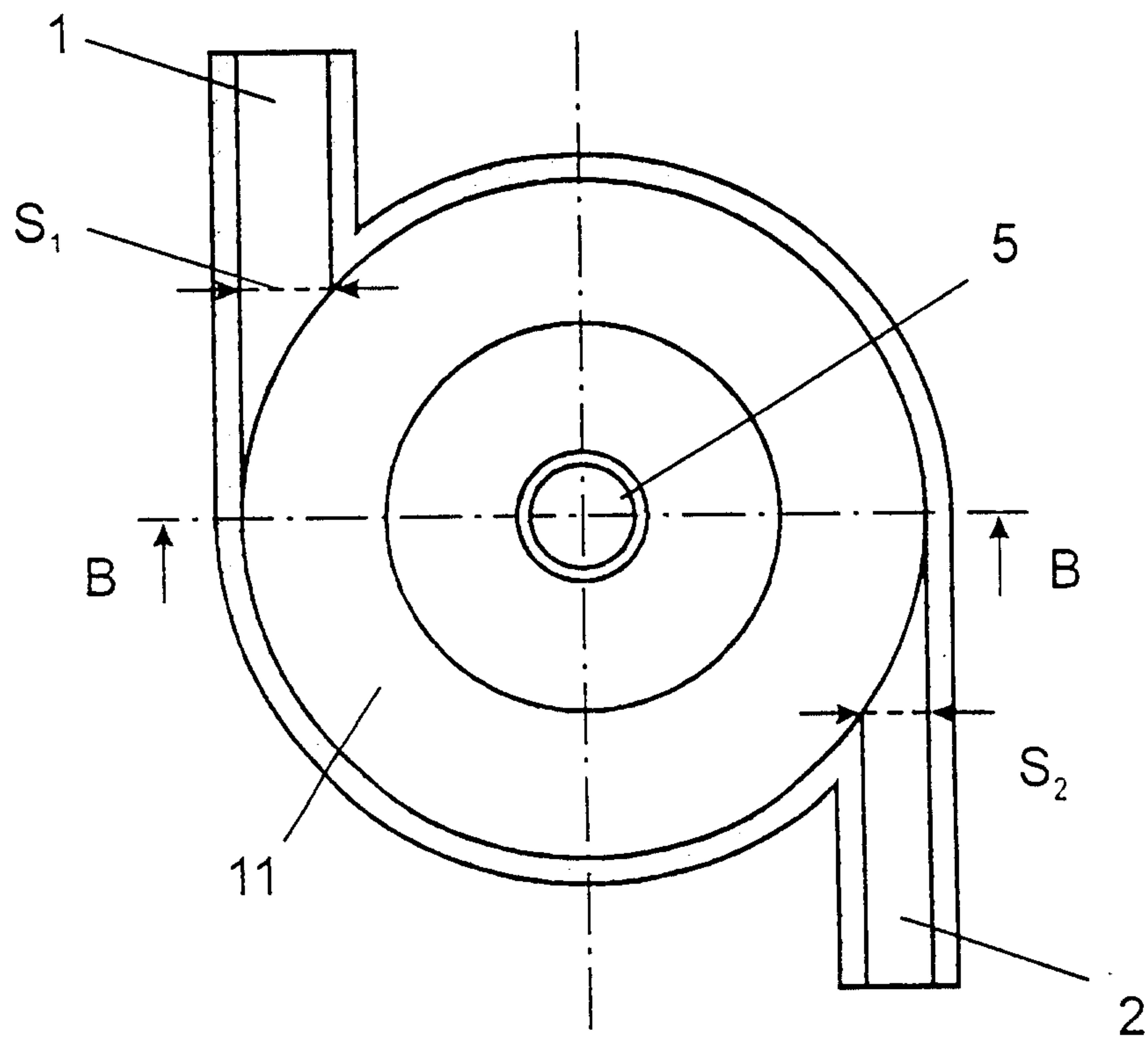


Fig. 5

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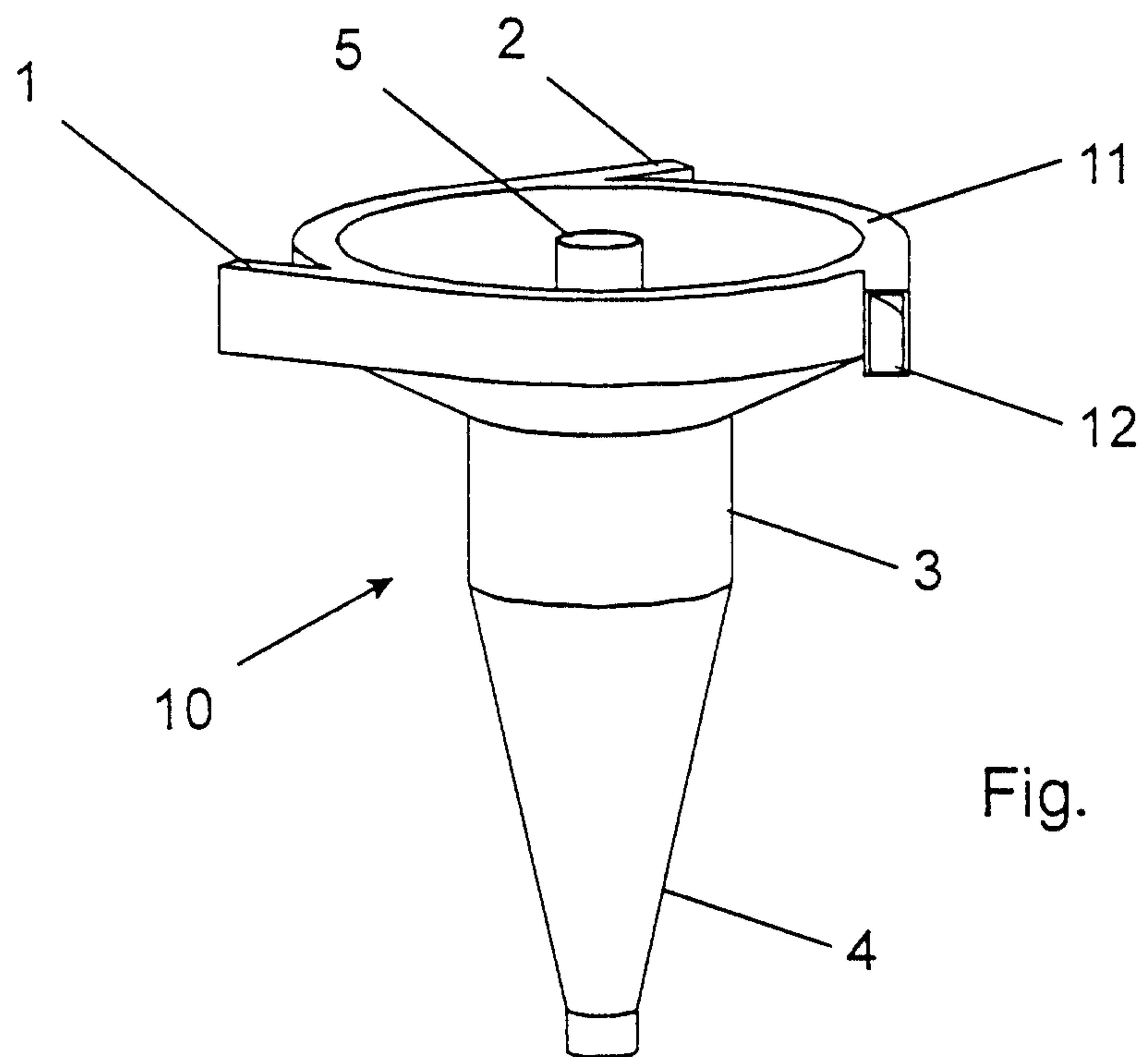


Fig. 6

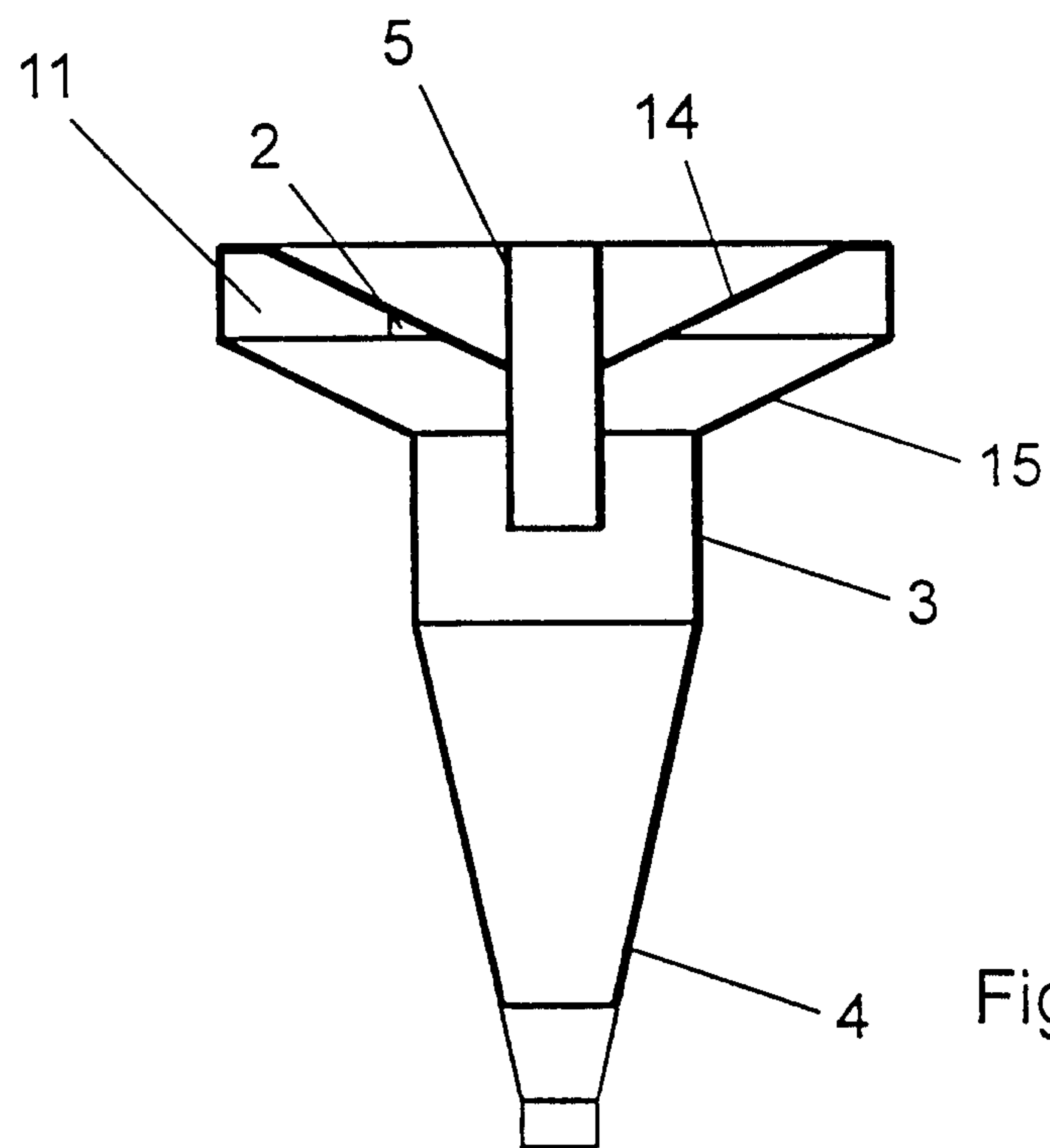


Fig. 7

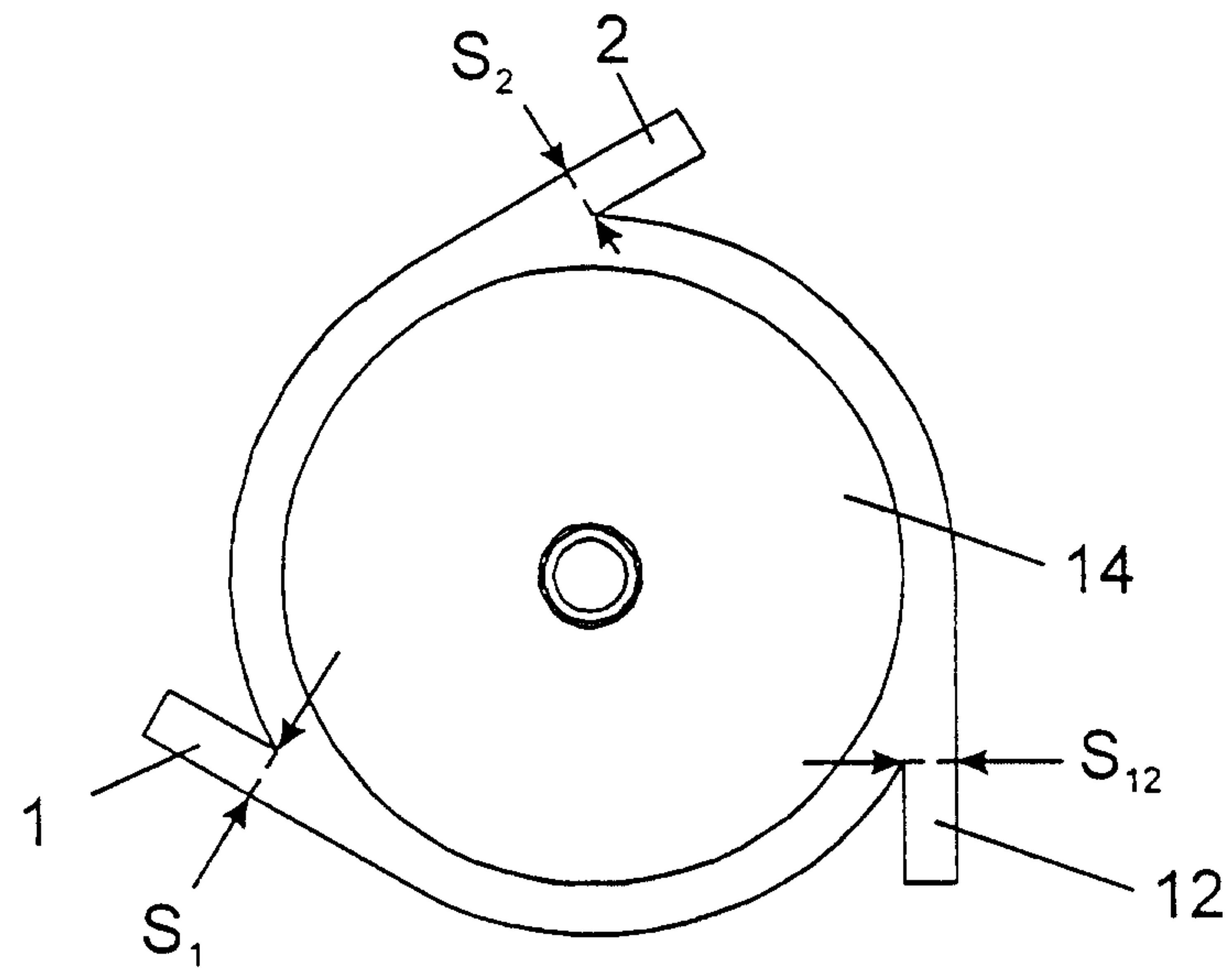


Fig. 8

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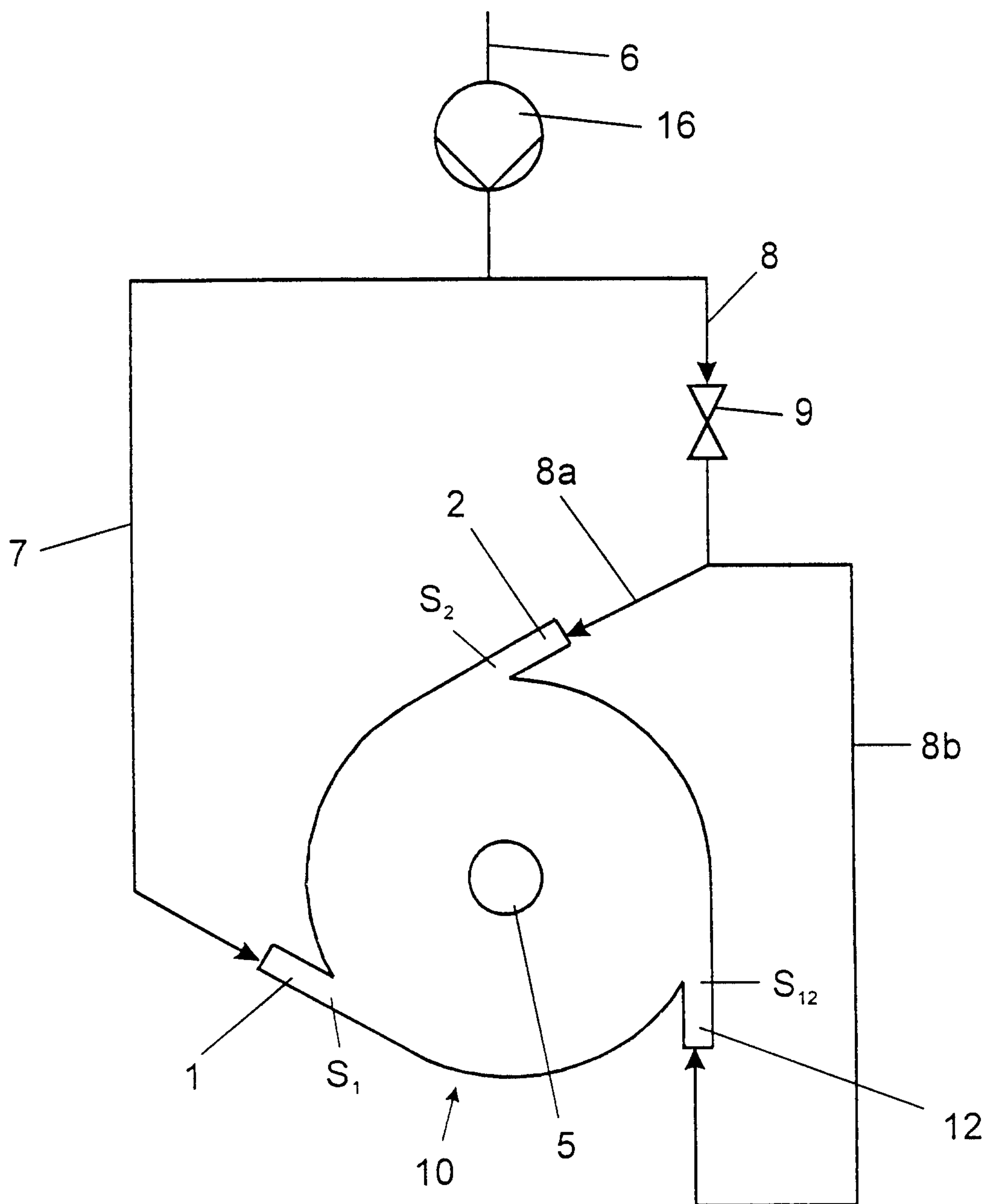


Fig. 9

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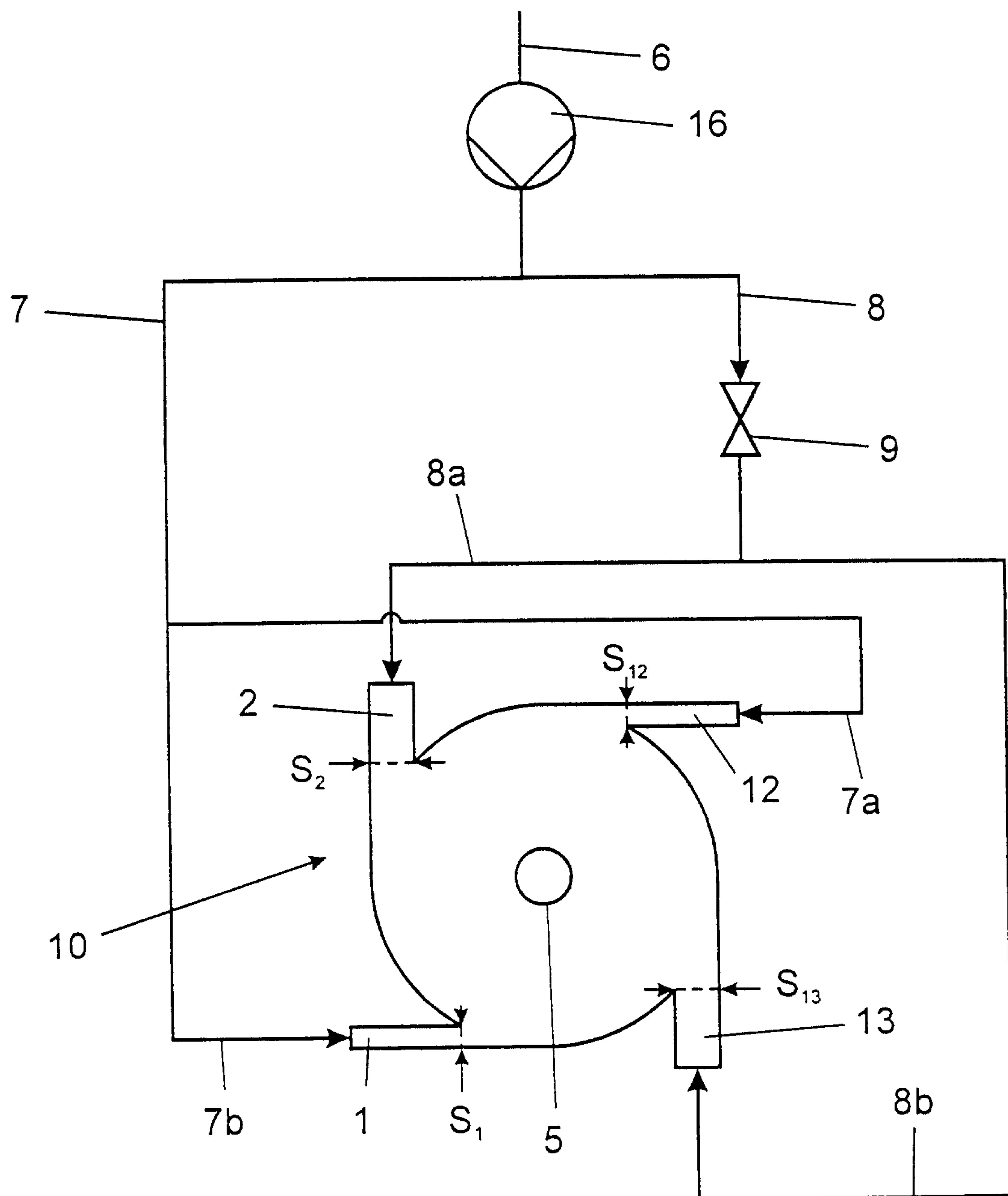


Fig. 10

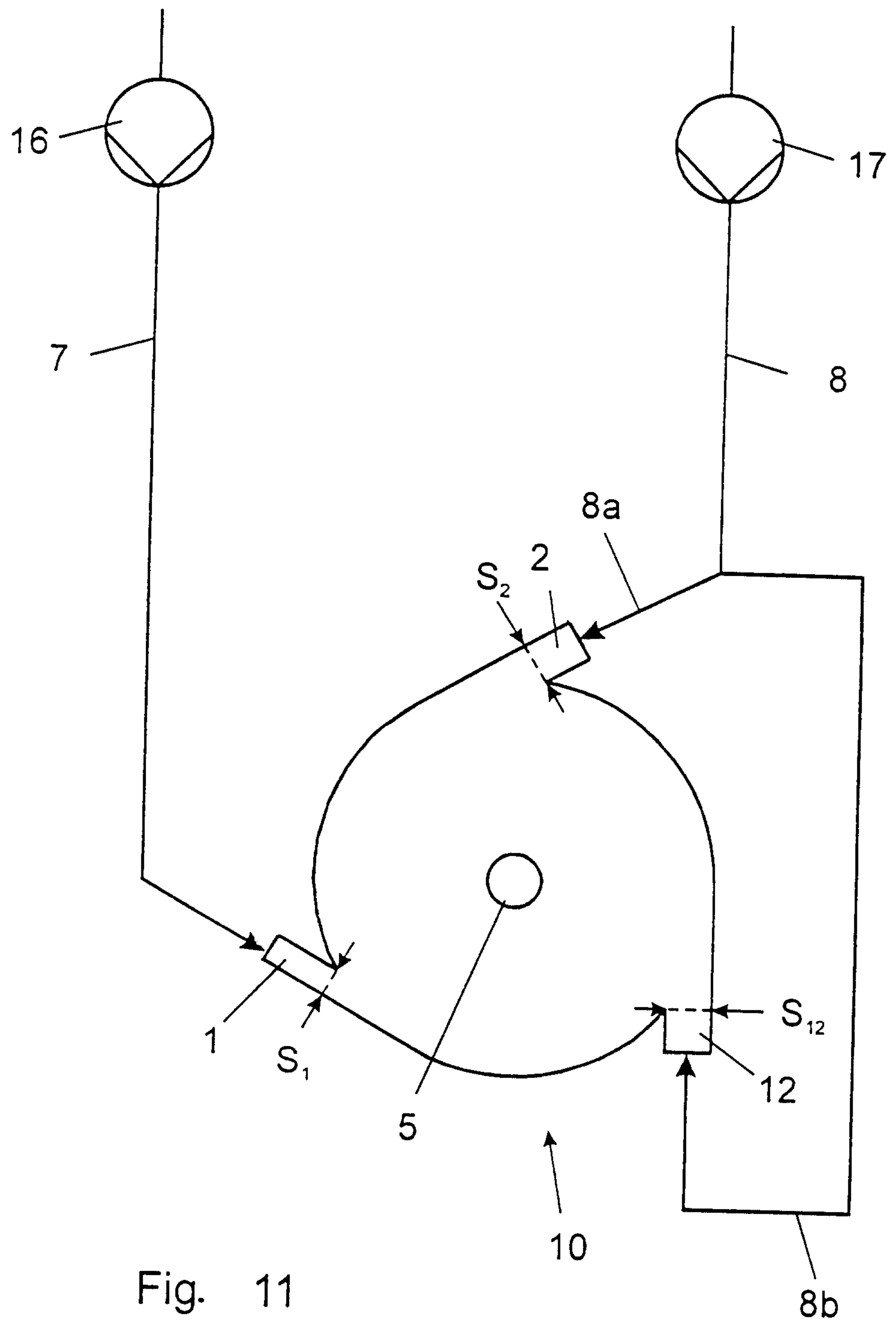


Fig. 11

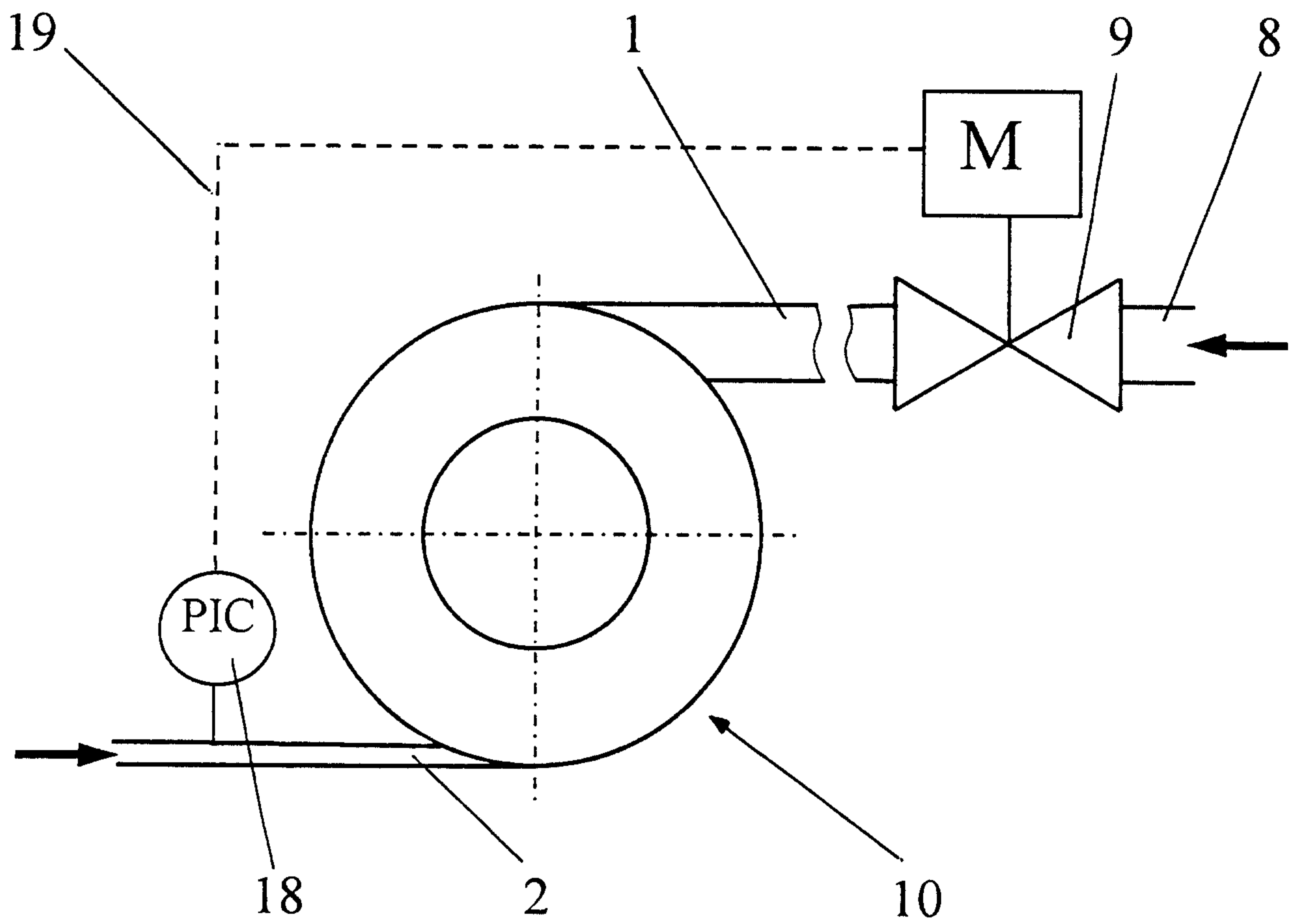


Fig. 12

