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(54) Machine for making tobacco industry products

Maschine zur Herstellung von Tabakindustrieprodukten

Machine de fabrication de produits de l'industrie du tabac

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EP 2 641 482 B1

Description

[0001] This invention relates to a machine for making tobacco industry products.

[0002] It should be noted that the term "tobacco industry products" is used to denote, for example, cigarettes, filter-tipped cigarettes, cigarette filters of any kind, in particular, filters composed of two or more segments, cigarette packets, whether hard or soft, cigarette packages and other products similar to these.

[0003] Figure 1 schematically illustrates in its entirety a prior art making machine, denoted by the numeral 100, comprising a base having a vertical wall which supports a plurality of operating elements 101.

[0004] The operating elements 101 are, for the most part, rotary drums which revolve about horizontal axes of rotation and which are mounted on the vertical supporting wall.

[0005] More specifically, the rotary drums are provided with a plurality of suction cavities for receiving and withholding the tobacco products during processing.

[0006] Every making machine 100 also comprises an air suction system 103 for the rotary drums and designed to generate a predetermined negative pressure at the respective suction cavities.

[0007] The suction system 103 of prior art making machines 100 comprises an air suction source 102 and a main manifold 105 extending along the machine 100 and in fluid communication with the source 102.

[0008] The rotary drums 101 are connected to respective compartments 104 formed internally of the base and connected to the main manifold 105 through flow openings 106.

[0009] More specifically, the compartments 104 are delimited by the vertical wall supporting the rotary drums 101 and by internal partition sectors, defining large spaces within the base, as illustrated in Figure 2. In use, the air suction source 102 generates a predetermined negative pressure inside the main manifold 105 and, through the flow openings 106, inside each of the compartments 104, so that the rotary drums 101 connected to the compartments 104 are subject to the negative pressure generated inside the selfsame compartments 104. A similar solution is also known, for example, from DE10200806031.

[0010] The suction system 103 described above is referred to technically as a "comb system" in that it has a main section, that is, the main manifold 105, which branches into successive use locations, that is, the compartments 104.

[0011] This constructional solution is not free of disadvantages, however.

[0012] In effect, in the suction system 103, the distribution of the air suction flow rates is not uniform since the air suction flow tends to be weaker at the use locations or compartments 104 which are furthest away from the source 102.

[0013] Also, when some use locations are in need of

a boost in the air suction flow rate, the source 102 increases the air flow rate in the entire system, even where not needed.

[0014] Further, the suction system 103 is inefficient in terms of energy consumption and not reactive in responding to transients in that it is slow to restore normal operating conditions since emptying out the compartments 104 takes a long time and a lot of energy from the source 102.

[0015] Moreover, turbulence may be created inside the compartments 104 which reduces the efficiency of the suction system 103.

[0016] This invention has for an aim to provide a machine for making tobacco products which overcomes the above mentioned disadvantages.

[0017] More specifically, the aim of this invention is to provide a machine for making tobacco products which comprises a suction system which allows uniform distribution of air suction flow rates to the use locations and which reacts quickly to transients and restores the machine to normal operating conditions.

[0018] The technical purpose indicated and the aims specified are achieved by a machine for making tobacco industry products comprising the technical features set out in the independent claims 1 and 2.

[0019] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it, and in which:

- Figure 1 is a schematic front view of a prior art machine for making tobacco industry products;
- Figure 2 is a perspective view of a detail from Figure 1;
- Figure 3 is a perspective view of a suction system of a machine for making tobacco industry products according to this invention;
- Figure 4 is schematic front view of the suction system of Figure 3.

[0020] With reference to Figures 3 and 4, the numeral 1 schematically indicates a machine for making tobacco industry products which comprises a base 2 having a vertical front wall 3 and a vertical rear wall 9 facing the vertical front wall 3.

[0021] The making machine 1 comprises a plurality of operating elements 4 supported by the vertical front wall 3.

[0022] The operating elements 4 are rotary drums 5, each revolving about a respective axis of rotation which is substantially horizontal relative to the vertical wall 3.

[0023] The machine 1 comprises an air suction system 6 comprising at least one suction source 7. More specifically, the source 7 generates a predetermined negative pressure as a function of the working conditions of the operating elements 4.

[0024] Preferably, the suction system 6 comprises a single source 7 capable of serving the entire system 6.

[0025] More specifically, the suction system 6 compris-

es a tubular structure 8 which connects the source 7 directly to the operating elements 4.

[0026] Unlike the prior art, the tubular structure 8 of the suction system 6 is defined by a plurality of conduits 10, 14 which branch off from the source 7 towards the operating elements 4 placing the latter in direct fluid communication with the source 7 itself.

[0027] The tubular structure 8 allows the space occupied by the suction system 6 in the base 2 to be significantly reduced since the large empty spaces constituted by the aforementioned compartments are no longer necessary.

[0028] Preferably, the conduits 10, 14 of the tubular structure 8 have a substantially rectangular cross section.

[0029] Advantageously, tubular structure 8 means a structure made as a single component designed to be installed inside the base 2 of the machine 1.

[0030] More specifically, again by way of example, the single component is interposed between the vertical front wall 3 and the vertical rear wall 9.

[0031] The tubular structure 8 is ring-shaped and is formed by a main conduit 10 having two inlet openings 11 in communication with the source 7.

[0032] The tubular structure 8 comprises a main ring 12 and at least one secondary ring 13. In the embodiment described, there are four secondary rings 13.

[0033] The main ring 12 is formed by the main conduit 10 and each secondary ring 13 is formed by at least one secondary conduit 14 extending from the source 7 and in fluid communication with the main conduit 10.

[0034] Each secondary ring 13 is thus formed by at least one secondary conduit 14 and by at least part of the main conduit 10.

[0035] More specifically, each secondary conduit 14 has an inlet opening 15 in communication with the source 7 and a connecting opening 16 in communication with the main conduit 10. Consequently, the secondary conduits 14 of each secondary ring 13 are connected to the main conduit 10.

[0036] That means the secondary conduits 14 of the tubular structure 8 also place the main conduit 10 in direct communication with the source 7 through the connecting openings 16.

[0037] The configuration of the tubular structure 8 is defined both by the main conduit 10 and by the arrangement of the secondary conduits 14. More specifically, the main ring 12 and each secondary ring 13 have a substantially polygonal shape having, at their vertices, rounded conduit stretches 17 and, along their sides, straight conduit stretches 18.

[0038] This configuration is substantially dependent on the arrangement of the operating elements 4 on the vertical front wall 3 of the machine 1, in order for the operating elements 4 to be connected directly to the source 7.

[0039] In order to place the operating elements 4 in fluid communication with the source 7, the tubular structure 8 comprises a plurality of branches 19 connecting

the operating elements 4.

[0040] More specifically, at each branch 19, the tubular structure 8 has a corresponding fitting 19a for connecting the respective operating element 4.

[0041] More specifically, the main conduit 10 comprises a plurality of branches 19 disposed one after the other along the tubular structure 8, and each secondary conduit 14 comprises at least one branch 19. The branches 19 have respective outlet openings 20 at which they are connected directly to the operating elements 4 through the fittings 19a.

[0042] Preferably, the branches 19 are located along the straight conduit stretches 18 because they are not subject to the concentrated load losses which occur at the rounded conduit stretches 17.

[0043] In the embodiment described, each straight conduit stretch 18 of the main conduit 10 has at least two branches 19 and each straight conduit stretch 18 of the respective secondary conduit 14 has one or more branches 19.

[0044] The arrangement of the branches 19 and the configuration of the tubular structure 8 determine a path P along which the air drawn into conduits 10, 14 circulates.

[0045] As illustrated in Figure 4, the air circulating along the path P supplies each operating element 4 through at least two air flow routes formed by at least one secondary conduit 14 and at least part of the main conduit 10.

[0046] In other words, the source 7 is capable of generating a predetermined negative pressure in each operating element 4 by causing the air to flow in the main ring 12 and in the secondary rings 13 along the path P.

[0047] This is possible because the source 7 is simultaneously in communication with the two inlet openings 11 of the main conduit 10 and with the inlet openings 15 of the secondary conduits 14 connected to the main conduit 10 and, therefore, the air feeds the operating elements 4 by way of at least two flow routes.

[0048] In order to regulate the suction air flow generated by the source 7 and circulating in the tubular structure 8, the suction system 6 comprises flow regulator means 21 positioned along the tubular structure 8 itself. More specifically, the flow regulator means 21 are positioned both along the main conduit 10 and along the secondary conduits 14, in such a way as to regulate the flow of air drawn into the main ring 12 and into each secondary ring 13.

[0049] Advantageously, the ring shape of the tubular structure 8 of the suction system 6 makes it possible to equally divide the suction flow rates since, as stated above, each operating element 4 is in communication with the source 7 by way of at least two flow routes through the main conduit 10 and the secondary conduits 14. Moreover, the direct communication between the operating elements 4 and the source 7 greatly improves the reactivity of the suction system 6 to transients, that is to say, to conditions of non-equilibrium, allowing normal op-

erating conditions to be restored in a short space of time.

[0050] In an alternative embodiment, the connecting conduits 10, 14 of the tubular structure 8 are built into the base 2.

[0051] In a first embodiment, the machine 1 described above is a cigarette making machine, in particular a machine for making filter-tipped cigarettes.

[0052] In a different embodiment, the machine 1 described above is a machine for making cigarettes filters, in particular filters composed of two or more filtering segments.

[0053] In a further embodiment, the machine 1 described above is a packing machine for making cigarette packets or groups of cigarette packets.

Claims

1. A machine for making tobacco industry products comprising a base (2) having a vertical front wall (3), a plurality of operating elements (4) supported by the vertical front wall (3) and an air suction system (6) comprising at least one suction source (7), wherein the suction system (6) comprises a tubular structure (8) directly connecting the source (7) to at least one operating element (4), **characterized in that** the tubular structure (8) comprises at least one conduit (10, 14) directly connecting the source (7) to at least one operating element (4), and **in that** the tubular structure (8) is ring-shaped and comprises a main conduit (10) having two inlet openings (11) in communication with the source (7); the operating elements (4) being directly connected to the source (7) through the main conduit (10).
2. A machine for making tobacco industry products comprising a base (2) having a vertical front wall (3), a plurality of operating elements (4) supported by the vertical front wall (3) and an air suction system (6) comprising at least one suction source (7), wherein the suction system (6) comprises a tubular structure (8) directly connecting the source (7) to at least one operating element (4), **characterized in that** the tubular structure (8) comprises a main ring (12) and at least one secondary ring (13); the main ring (12) being formed by the main conduit (10) and the secondary ring (13) being formed by at least one secondary conduit (14) and by at least part of the main conduit (10); the secondary conduit (14) having an inlet opening (15) in communication with the suction source (7) and a connecting opening (16) in communication with the main conduit (10).
3. The machine according to claim 2, **characterized in that** the tubular structure (8) comprises at least one conduit (10, 14) directly connecting the source (7) to at least one operating element (4).
4. The machine according to claim 3, **characterized in that** tubular structure (8) is ring-shaped and comprises a main conduit (10) having two inlet openings (11) in communication with the source (7); the operating elements (4) being directly connected to the source (7) through the main conduit (10).
5. The machine according to claim 1, **characterized in that** the tubular structure (8) comprises a main ring (12) and at least one secondary ring (13); the main ring (12) being formed by the main conduit (10) and the secondary ring (13) being formed by at least one secondary conduit (14) and by at least part of the main conduit (10); the secondary conduit (14) having an inlet opening (15) in communication with the suction source (7) and a connecting opening (16) in communication with the main conduit (10).
6. The machine according to any one of claims 1 to 5, **characterized in that** the configuration of the tubular structure (8) depends on the position of the operating elements (4) on the vertical front wall (3) of the machine (1), the configuration of the tubular structure (8) determining a path (P) of the air drawn inside the main and secondary conduits (10, 14) of the tubular structure (8).
7. The machine according to claim 6, **characterized in that** the tubular structure (8) comprises a plurality of branches (19) connecting the operating elements (4).
8. The machine according to any one of claims 1 to 7, **characterized in that** the tubular structure (8) feeds each operating element (4) through at least two routes for flow of the air along the path (P), the routes for flow of the air being formed by secondary conduits (14) and by at least part of the main conduit (10).
9. The machine according to any one of the preceding claims, **characterized in that** the suction system (6) comprises air flow regulator means (21) positioned along the tubular structure (8).
10. The machine according to any one of the preceding claims, **characterized in that** the tubular structure (8) is made from a single component inserted inside the base (2) and interposed between the vertical front wall (3) and the vertical rear wall (9).
11. The machine according to any one of the preceding claims, **characterized in that** the conduits (10, 14) of the tubular structure (8) have a substantially rectangular cross-section.

Patentansprüche

1. Maschine zur Herstellung von Tabakindustrieprodukten, umfassend eine Basis (2), aufweisend eine vertikale frontseitige Wand (3), eine Vielzahl an Betriebselementen (4), die von der vertikalen frontseitigen Wand (3) gestützt werden, und ein Luftansaugungssystem (6), umfassend mindestens eine Saugquelle (7), wobei das Ansaugungssystem (6) eine Rohrkonstruktion (8) umfasst, die die Quelle (7) direkt mit mindestens einem Betriebselement (4) verbindet, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) mindestens eine Leitung (10, 14) umfasst, die die Quelle (7) direkt mit mindestens einem Betriebselement (4) verbindet, und dadurch, dass die Rohrkonstruktion (8) ringförmig ist und eine Hauptleitung (10) umfasst, die zwei Einlassöffnungen (11) aufweist, die mit der Quelle (7) in Kommunikation sind, wobei die Betriebselemente (4) über die Hauptleitung (10) direkt mit der Quelle (7) verbunden sind.
 2. Maschine zur Herstellung von Tabakindustrieprodukten, umfassend eine Basis (2), aufweisend eine vertikale frontseitige Wand (3), eine Vielzahl an Betriebselementen (4), die von der vertikalen frontseitigen Wand (3) gestützt werden, und ein Luftansaugungssystem (6), umfassend mindestens eine Saugquelle (7), wobei das Ansaugungssystem (6) eine Rohrkonstruktion (8) umfasst, die die Quelle (7) direkt mit mindestens einem Betriebselement (4) verbindet, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) einen Hauptring (12) und mindestens einen Hilfsring (13) umfasst, wobei der Hauptring (12) durch die Hauptleitung (10) gebildet ist und der Hilfsring (13) durch mindestens eine Hilfsleitung (14) und mindestens einen Teil der Hauptleitung (10) gebildet ist, wobei die Hilfsleitung (14) eine Einlassöffnung (15) in Kommunikation mit der Saugquelle (7) und eine Verbindungsöffnung (16) in Kommunikation mit der Hauptleitung (10) aufweist.
 3. Maschine nach Anspruch 2, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) mindestens eine Leitung (10, 14) umfasst, die die Quelle (7) direkt mit mindestens einem Betriebselement (4) verbindet.
 4. Maschine nach Anspruch 3, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) ringförmig ist und eine Hauptleitung (10) umfasst, die zwei Einlassöffnungen (11) in Kommunikation mit der Quelle (7) aufweist, wobei die Betriebselemente (4) über die Hauptleitung (10) direkt mit der Quelle (7) verbunden sind.
 5. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) einen Hauptring (12) und mindestens einen Hilfsring (13) umfasst,
- wobei der Hauptring (12) durch die Hauptleitung (10) gebildet ist und der Hilfsring (13) durch mindestens eine Hilfsleitung (14) und mindestens einen Teil der Hauptleitung (10) gebildet ist, wobei die Hilfsleitung (14) eine Einlassöffnung (15) in Kommunikation mit der Saugquelle (7) und eine Verbindungsöffnung (16) in Kommunikation mit der Hauptleitung (10) aufweist.
6. Maschine nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Konfiguration der Rohrkonstruktion (8) von der Position der Betriebselemente (4) an der vertikalen frontseitigen Wand (3) der Maschine (1) abhängt, wobei die Konfiguration der Rohrkonstruktion (8) einen Verlauf (P) der in die Haupt- und Hilfsleitung (10, 14) der Rohrkonstruktion (8) angesaugten Luft bestimmt.
 7. Maschine nach Anspruch 6, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) eine Vielzahl an Abzweigen (19) umfasst, die die Betriebselemente (4) verbinden.
 8. Maschine nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) ein jedes Betriebselement (4) über mindestens zwei Strecken für die Luftströmung entlang des Verlaufs (P) speist, wobei die Strecken für die Luftströmung durch Hilfsleitungen (14) und mindestens einen Teil der Hauptleitung (10) gebildet sind.
 9. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Ansaugungssystem (6) Luftströmungsreglermittel (21) umfasst, die entlang der Rohrkonstruktion (8) positioniert sind.
 10. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Rohrkonstruktion (8) aus einer einzigen Komponente besteht, die in die Basis (2) eingefügt und zwischen der vertikalen frontseitigen Wand (3) und der vertikalen rückseitigen Wand (9) eingesetzt ist.
 11. Maschine nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Leitungen (10, 14) der Rohrkonstruktion (8) einem im Wesentlichen rechteckigen Querschnitt aufweisen.

Revendications

1. Machine de fabrication de produits de l'industrie du tabac comprenant une base (2) ayant une paroi antérieure verticale (3), une pluralité d'éléments fonctionnels (4) supportés par la paroi antérieure verticale (3) et un système d'aspiration d'air (6) comprenant au moins un point d'aspiration (7), dans laquelle

- le système d'aspiration (6) comprend une structure tubulaire (8) reliant directement le point (7) à au moins un élément fonctionnel (4), **caractérisée en ce que** la structure tubulaire (8) comprend au moins un conduit (10, 14) reliant directement le point (7) à au moins un élément fonctionnel (4), et **en ce que** la structure tubulaire (8) est en forme d'anneau et comprend un conduit principal (10) ayant deux ouvertures d'entrée (11) en communication avec le point (7) ; les éléments fonctionnels (4) étant directement reliés au point (7) par l'intermédiaire du conduit principal (10).
2. Machine de fabrication de produits de l'industrie du tabac comprenant une base (2) ayant une paroi antérieure verticale (3), une pluralité d'éléments fonctionnels (4) supportés par la paroi antérieure verticale (3) et un système d'aspiration d'air (6) comprenant au moins un point d'aspiration (7), dans laquelle le système d'aspiration (6) comprend une structure tubulaire (8) reliant directement le point (7) à au moins un élément fonctionnel (4), **caractérisée en ce que** la structure tubulaire (8) comprend un anneau principal (12) et au moins un anneau secondaire (13) ; l'anneau principal (12) étant formé par le conduit principal (10) et l'anneau secondaire (13) étant formé par au moins un conduit secondaire (14) et par au moins une partie du conduit principal (10) ; le conduit secondaire (14) ayant une ouverture d'entrée (15) en communication avec le point d'aspiration (7) et une ouverture de raccordement (16) en communication avec le conduit principal (10).
 3. Machine selon la revendication 2, **caractérisée en ce que** la structure tubulaire (8) comprend au moins un conduit (10, 14) reliant directement le point (7) à au moins un élément fonctionnel (4).
 4. Machine selon la revendication 3, **caractérisée en ce que** la structure tubulaire (8) est en forme d'anneau et comprend un conduit principal (10) ayant deux ouvertures d'entrée (11) en communication avec le point (7) ; les éléments fonctionnels (4) étant directement reliés au point (7) par l'intermédiaire du conduit principal (10).
 5. Machine selon la revendication 1, **caractérisée en ce que** la structure tubulaire (8) comprend un anneau principal (12) et au moins un anneau secondaire (13) ; l'anneau principal (12) étant formé par le conduit principal (10) et l'anneau secondaire (13) étant formé par au moins un conduit secondaire (14) et par au moins une partie du conduit principal (10) ; le conduit secondaire (14) ayant une ouverture d'entrée (15) en communication avec le point d'aspiration (7) et une ouverture de raccordement (16) en communication avec le conduit principal (10).
 6. Machine selon l'une quelconque des revendications de 1 à 5, **caractérisée en ce que** la configuration de la structure tubulaire (8) dépend de la position des éléments fonctionnels (4) sur la paroi antérieure verticale (3) de la machine (1), la configuration de la structure tubulaire (8) déterminant un parcours (P) de l'air introduit à l'intérieur des conduits principal et secondaire (10, 14) de la structure tubulaire (8).
 7. Machine selon la revendication 6, **caractérisée en ce que** la structure tubulaire (8) comprend une pluralité de branches (19) reliant les éléments fonctionnels (4).
 8. Machine selon l'une quelconque des revendications de 1 à 7, **caractérisée en ce que** la structure tubulaire (8) alimente chaque élément fonctionnel (4) à travers au moins deux voies pour faire circuler l'air le long du parcours (P), les voies destinées à faire circuler l'air étant formées par les conduits secondaires (14) et par au moins une partie du conduit principal (10).
 9. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le système d'aspiration (6) comprend des moyens de réglage de l'écoulement d'air (21) positionnés le long de la structure tubulaire (8).
 10. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la structure tubulaire (8) est fabriquée à partir d'un composant unique inséré à l'intérieur de la base (2) et interposé entre la paroi antérieure verticale (3) et la paroi postérieure verticale (9).
 11. Machine selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les conduits (10, 14) de la structure tubulaire (8) possèdent une section transversale substantiellement rectangulaire.

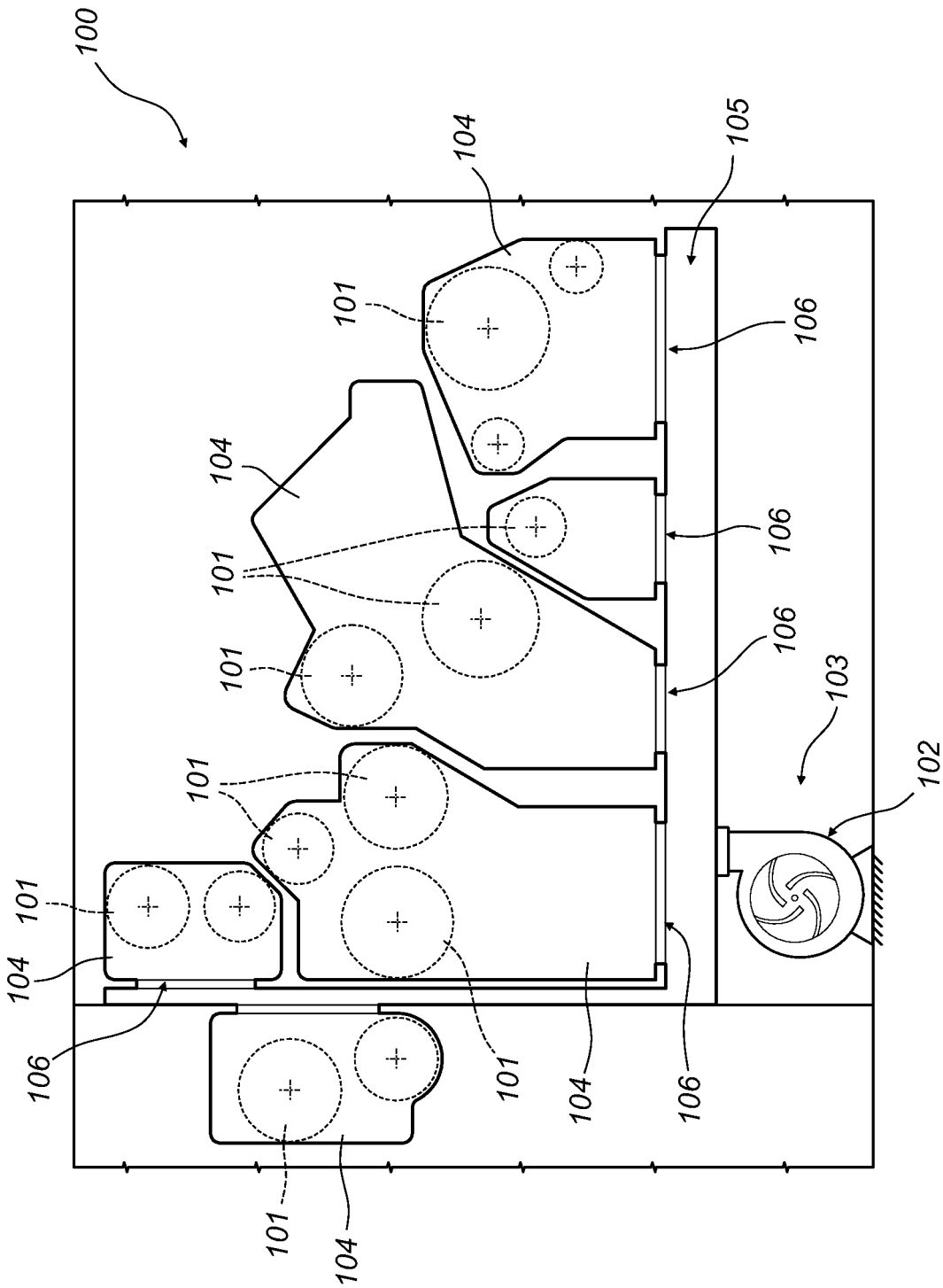
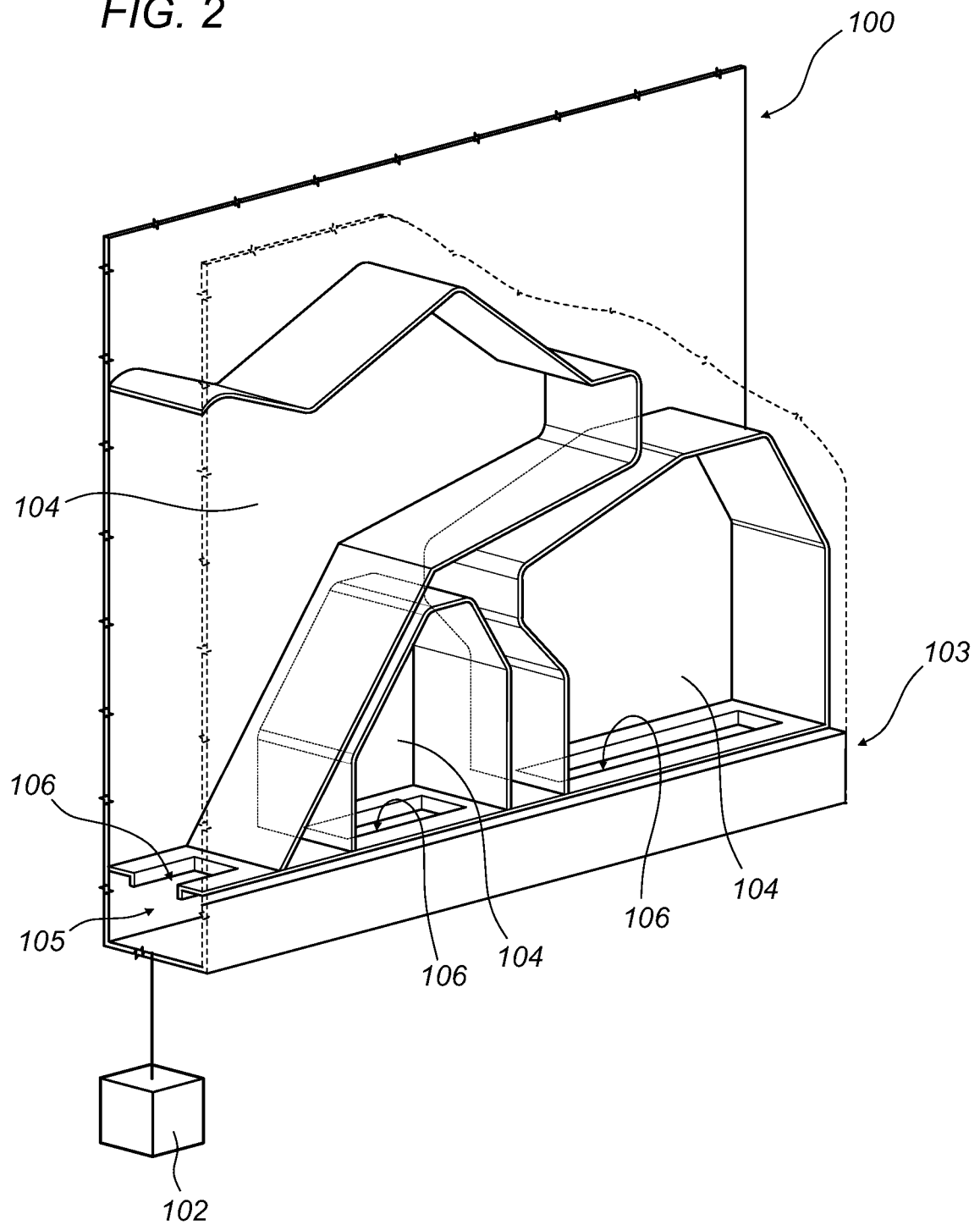


FIG. 1

FIG. 2



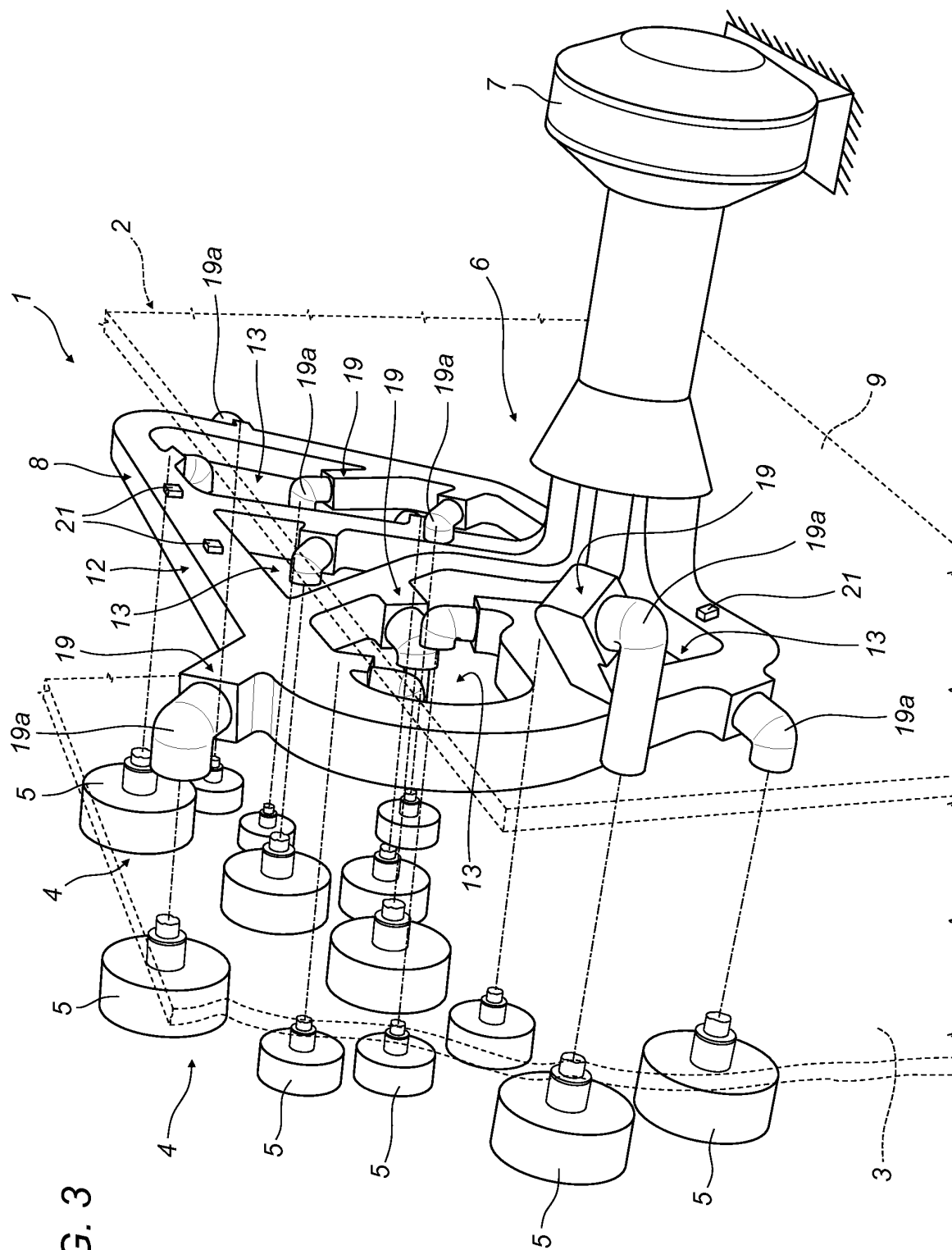
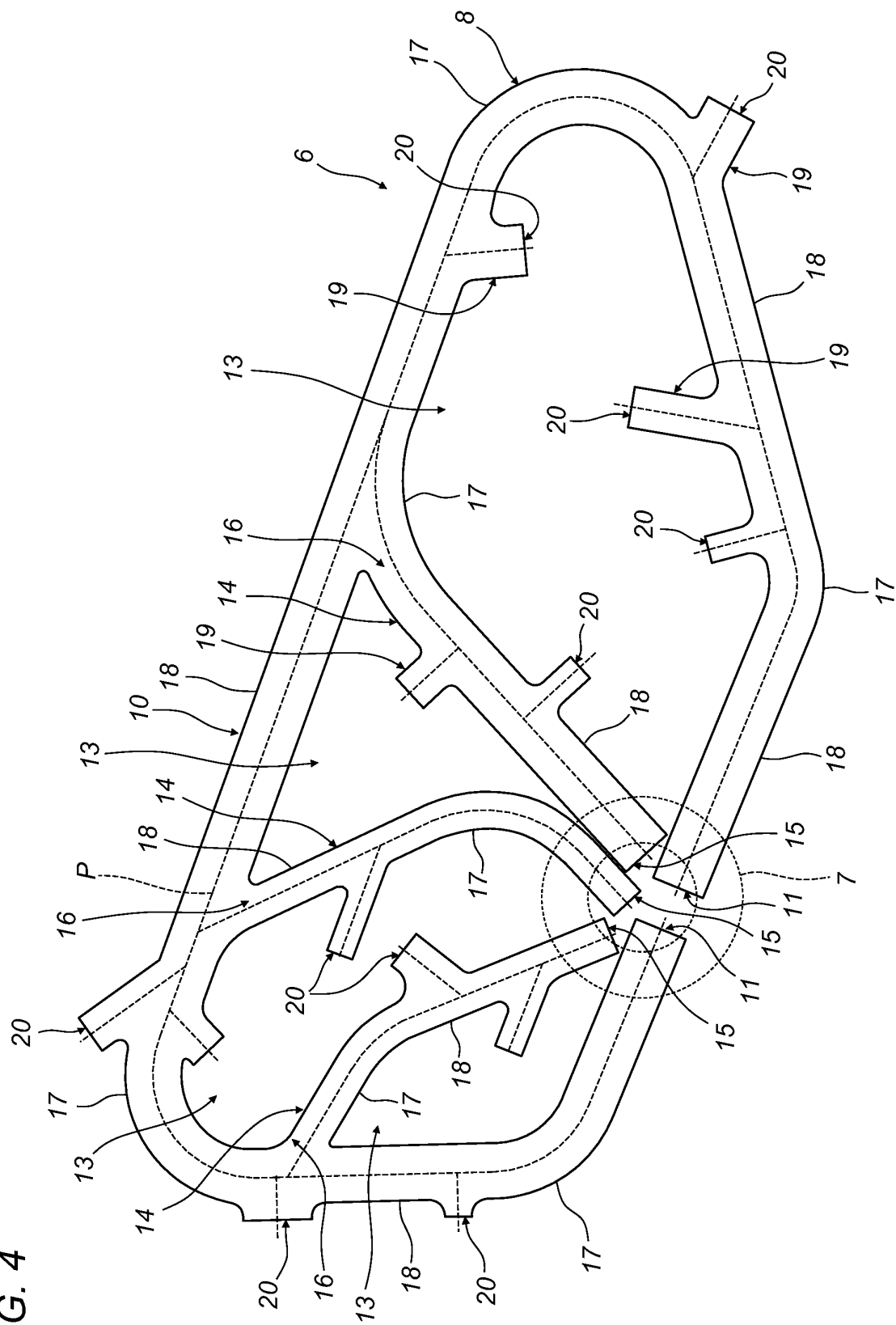


FIG. 3

FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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