(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 362 199 B1**

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification : **01.04.92 Bulletin 92/14**

(51) Int. Cl.^{5} : **E01C 19/10**

(21) Application number : **87906317.0**

(22) Date of filing : **12.09.87**

(86) International application number : **PCT/IT87/00081**

(87) International publication number : **WO 88/08052 20.10.88 Gazette 88/23**

(54) **ASPHALTIC CONCRETE PRODUCTION APPARATUS.**

(30) Priority : **16.04.87 IT 343787**
09.06.87 IT 8338487
03.07.87 IT 6040187
03.09.87 IT 6042887

(43) Date of publication of application : **11.04.90 Bulletin 90/15**

(45) Publication of the grant of the patent : **01.04.92 Bulletin 92/14**

(84) Designated Contracting States : **BE CH DE FR GB LI NL SE**

(56) References cited :
CH-A- 87 924
DE-A- 3 423 521
FR-E- 47 500

(56) References cited :
GB-A- 2 131 314
US-A- 2 421 345
US-A- 4 332 478
US-A- 4 427 376

(73) Proprietor : **MARINI S.P.A.**
Via Roma, 50
I-48011 Alfonsine (IT)

(72) Inventor : **CIPRIANI, Antonio**
Via Roma, 50
I-48011 Alfonsine (IT)
Inventor : **TORSELLO, Marino**
Via Andrea Agnello, 2
I-48100 Ravenna (IT)

(74) Representative : **D'Agostini, Giovanni, Dr.**
D'AGOSTINI ORGANIZZAZIONE n. 17 via G.Giusti
I-33100 Udine (IT)

EP 0 362 199 B1

Description

The subject of the present invention is an apparatus for drying and mixing inert material and/or recyclable asphaltic product (R.A.P.), with bituminous and non bituminous materials in an elongated rotatable drum means, in which inert material composition is introduced at a first end and recovered at the opposite second end, and having a burner nozzle or the combustion chamber or its closed extension, extending into the drum and directing the hot gases countercurrent to the advancing materials into the drum means.

The invention has a convenient although not exclusive application for the production of asphaltic concrete as a ready bituminous mix, in particular for road paving.

The countercurrent solution is known in the present state of art: US-4,522,498 (USA application n. 139,708 filed on Apr.,14,1980 in the name of Mendenhall). This solution proposes an apparatus for recycling asphaltic concrete comprising an elongated rotatable drum in which composition is introduced at a first end and recovered at the opposite second end, and having a burner extending into the drum so that the burner nozzle is located within the drum in intermediate position between the first and second ends and directs the hot gases toward the first end, and wherein the portion of the drum between the burner and the first end is provided with lifters of a type which prevent the formation of a veil of composition particles from falling through the hot gases of combustion as the drum is rotated, and a second portion between the burner nozzle and the second drum end and which is provided with lifters which cause a veil of composition particles to pass through hot gases of combustion as the drum rotates.

Another solution for recycling asphaltic product with inert virgin material is proposed by the same applicant with IT-5031B/84 (MARINI application of 10.9.84) regarding a "Drier with recycling of salvage asphaltic concrete material for bituminous mix apparatus". Said drier foresees the use of a rotatable drum which is preferably slightly tilted in respect to the horizontal plane, having finning-lifters for inside mixing, where inert virgin material (e.g. gravel not impregnated with bituminous substances) is charged upstream (at the first end of the drum) and where the mouth of a burner is arranged downstream immediately inside the drum, the flame of which is directed axially in countercurrent in respect to the said inert material advancing from upstream drum end, and where recyclable asphaltic product (R.A.P.) is charged in a position immediately upstream in respect to said burner head or nozzle so that a new dried mix of reutilisable inert product is discharged downstream.

Similar solution is suggested in DE,A,3423521 (ATS ASPHALTT).

Both in the first solution (US-4522498) and in the seconds one (IT-5031B/84), the product can be discharged dried (without further addition of bituminous asphalt substances and other filler impregnating binders) to be then utilized at the desired moment, after a successive impregnation with impregnating bituminous substances and fillers, by a second mixing drum apparatus allowing to addition the "binders" to the respective inert dried product so as to obtain the ready-mixed bituminous mix of asphaltic concrete ready to be utilized.

The main disadvantage of this solutions concerns the fact that requires two drum apparatuses:

- the first one for drying the inert material and eventually mix the virgin inert material with recyclable asphaltic product (R.A.P.);
- the second one for impregnating and mixing the respective dried product obtained by the first one, with liquid and or semiliquid bituminous and filler substances (binders).

Of course a single drum means concrete production apparatus can be realized, but this apparatus will be complex and too long. The problem being to realize a single universal apparatus, simple e very short, allowing to dry in a single drum apparatus, inert virgin material and eventually recyclable asphaltic product (R.A.P.) and impregnate and mix it with binding materials such as bituminous substances and fillers (binders) to realize a ready to use asphaltic concrete.

According to the above prior art, also US-A-2421345, discloses a single drum mixer, but for virgin material only, wherein the burner is placed downstream, outside (not inside) the cylinder. This plant discloses in fact an asphaltic concrete apparatus for the production of ready-mix asphaltic concrete, using a rotatable mixing drum having a flow of combustion gas in countercurrent by a downstream placed burner, delivering the combustion gases inside the respective rotatable mixing-drum.

This solution does not solve the excessive length of the apparatus needing separate premixing of R.A.P. with virgin material and further create problems of excessive evaporation of the bituminous binding material (pollution), associated of firing danger because the mixed material is obliged to across the combustion chamber (36). The combustion chamber shield (36) not being sufficient to avoid combustion of the gases evaporated from the bituminous binder delivered from the pipe (33).

In any case this solution does not solve the main scope of this invention to allow also working with Recyclable Asphaltic Material (R.A.M.) or Recyclable Asphaltic Product (R.A.P.) with a single machine and in the desired proportions.

US-A-4427376 ETNYRE, regards an apparatus for heating aggregate, recycled asphalt and the like, in which two machines are utilized: - a first drier drum

(15) with a first one hopper (45) for particulate material (virgin or R.A.P.-R.A.M. or premixed 11) at one of its extremities wherein the first binding material is added (66) and a second hoper at the other extremity (70) for adding further binding material (e.g.filler) over the combustion chamber;

– a second mixer drum (61) placed at the other extremity of said first drum (15), to receive the dried material for further mixing .

This solution obliging the first binding material to across the combustion chamber have the same problems of US-A-2421345.

In using R.A.M.-R.A.P. material, the plant needs a previous further step to premix in desired proportions (the respective R.A.M.-R.A.P. with virgin material), by a premixer plant in order to reconstitute the granulometry of the particulate material to be utilized.

It should be noted that in all the previous described disclosures, the flame is delivered where the binding material is delivered (Eg. US-A-2421345) or before (US-A-4427376).

In any case the above-mentioned disclosures do not solve the inconveniences (with a single drum plant) which derives from the fact that the:

1st - The presence of a shield around the flame inside the drum causes emission of blue gases (pollution) for the unavoidable evaporation of the bituminous binding materials in the mixing chamber around said flame falling down aver the red-hot shield, being possible accidental firing of binding material.

2nd- The virgin material and the recyclable Material (R.A.M.), must be added separately (in the first case virgin material only and in the second case premixed RAP-RAM with virgin material, not being possible to recycle R.A.P.-R.A.M. material only, because needing reconstituting of granulometry);

3rd - proportion between the virgin material and the material to be recycled (R.A.M. or R.A.P.) is not constant, as the apparatus must generally be able to realize a product in which the recyclable asphaltic product (R.A.M.-R.A.P.) can be absent or can be added in quantities which may also be identical to those of the inert virgin material. It follows that the first portion heating the inert virgin material is interested by a rate of virgin material which is as high as is the ratio between the virgin material/(R.A.P.). The consequence being a noticeable variation of the respective filling level. Said "filling level" is one of the fundamental parameters which influence the thermal exchange between the combustion gases and the advancing materials, and thereby the overall efficiency of the machine. As the filling level depends on the slope of the drum and on its speed of rotation, it is impossible in a single unit to act on one of these parameters so as to optimize the performances of the first section without simultaneously influencing the successive section where the virgin material is mixed with the R.A.P.

The problem to be solved becomes more complex if after mixing and drying inert virgin material with R.A.P. it is intended to impregnate and mix the dried material with the bituminous/filler binder substances which, on the other hand, needs to treat a nearly constant flow of material even if the ratio of inert virgin material/R.A.P. varies, the other conditions naturally remaining unvaried.

The scope of this invention is to eliminate said inconveniences and solve the respective problem which they raise. Main scope being to allow the plant, in a single rotating drum complex, to burn the evaporated hot gases to prevent blue gas emission (pollution) and to avoid firing of the added binding material. Further scope being to allow exact and continuous proportioning of the Virgin material with R.A.P.-R.A.M. and binders.

According to the characteristics given in the attached claims, this invention solves the problem by using an asphaltic concrete apparatus for the production of ready-mix asphaltic concrete, using rotatable mixing drum means having a flow of combustion gas in countercurrent by a downstream placed burner means means for advancing, drying, impregnating and mixing the material, with bituminous and filler substances (binders); of the type comprising the division of the rotatable mixing drum means into a first chamber (R-V) for supplying, advancing and drying the inert virgin material and eventually mixing it with the recyclable asphaltic product (R.A.P.) and into a second chamber (W) for further advancing, impregnating and mixing the dried material with bituminous and filler substances (binders),

characterized by the fact that:

– the respective nozzle of said burner means is placed inside said first chamber "R-V", firing into an intermediate chamber "V", located between a first portion "R" of said first chamber "R-V" and said second chamber "W", said second chamber "W" being a mixing chamber, said intermediate chamber "V" comprising:

– a diaphragm that allows the flame to pass axially and allows the material to go in to said second chamber "W", by falling-rolling advancement in cooperation with helicoidal feeders;

– the respective binder means are delivered into said second chamber "W" just behind said nozzle.

With this solution a very simple and short asphaltic concrete production apparatus can be realized.

The pollution for evaporated gases (blue gas) and firing of the material in the impregnating and mixing chamber (second one) is prevented because the respective diaphragm and the suction action of the coun-

tercurrent combustion gases developed and delivered in the first chamber, further allow to suck developed-evaporated inflammable gas from the second one allowing their complete oxidation.because the flame in the intermediate chamber "V" is not protected by a shield, firing all uncombusted gases.

In order to allow mixing in the first chamber (drying chamber) of the inert virgin material with recyclable asphaltic product (R.A.P.), the rotatable drum apparatus is divided in two coaxial portions "R"+"$", by an intermediate anular R.A.P. charging hopper, the second portion being divided in two sections "V"+"W" ("V" being the said intermediate chamber in said first chamber "R"), the second section "*W*" being said impregnating and mixing *second* chamber, wherein:

– the first portion "R" is provided with finning means for inside lifting advancing and mixing inert virgin material supplied at the first end of the rotatable drum apparatus, and

– the first section (intermediate chamber) "V" of the second portion "S" is provided with finning means for inside lifting, advancing and mixing inert virgin material supplied from the first portion "R" with recyclable asphaltic product (R.A.P.) supplied by said intermediate anular charging hopper.

With this solution a compact, not expensive and very efficient asphaltic concrete production apparatus is realized.

The rotatable drum means is divided in two rotatable drum parts although realizing the axial continuity of the chamber for the progress and mixing of the materials, the first part comprising a first portion "R" which substantially interests the drying of the virgin material and the second part comprising a second portion "S" divided in two sections "V"+"W", being:

– the first section "V" substantially interesting the introduction of the R.A.P., heating and mixing it with the virgin material and

– the second section "W" for impregnating and mixing the dried materials from the first section "V", with binding substances e.g. bituminous and filler materials,

– each drum being equipped with rotating means allowing different speeds.

The advantages of this solution, consist in the possibility of being able to operate the apparatus in the optimal manner depending on the proportions of the materials used and on the resulting ready to use asphaltic concrete mix desired.

The burner is elongated axially inside and across the second section "W", the respective combustion happening or being extended in the first section intermediate chamber "V". This solution having the advantage of simplicity avoiding undesired firing.

The invention is hereafter explained in more detail with the help of the drawings showing the preferential realization solutions, the details of which are not to be held as limiting but only as examples.

– Figure 1 shows a schematic axial section view of the rotatable drum apparatus in a first incomplete embodiment with burner extended inside the drum having a diaphragm in the combustion opening, dividing the drum in two chambers, the combustion chamber being realized in an intermediate portion of the first chamber where inert virgin material is advanced around and dried, the second chamber providing the bituminous and filler binding liquid materials.

– Figure 2 shows, as per the present invention, a schematic axial section view of the rotatable drum apparatus as represented in Figure 1 with R.A.P. intermediate charging hopper.

– Figure 1C shows a schematic axial section view of the rotatable drum apparatus in the preferred solution of the invention by utilizing two independent rotatable drums and extending the burner axially inside the second drum.

– Figures 2C,3C,4A give the respective schematic transverse sections view of the rotatable drum means of Figure 1C, as per plans X-X in the first drum, Z-Z and Y-Y in the second drum.

With reference to the figures it can be seen that the apparatuses comprises less preferably a single rotatable drum (1) more preferably a pair of rotatable drums (1,1′) rotated by crown pinion means (109/110,17,17′) supported on roller means (106/104-107/105,18,18′) with an inlet mouth for inert virgin material hopper supply, placed upstream at the first end of the rotatable drum means (113,2) which pours the inert virgin material into a feeding area having helicoidal feeding blades (114,3) and then allow the same material to flue into a drying area having lifting finnings in the form of cups for a continuous fall of material (115,4) which constitute the first portion "R". More extended or more tightly closed finning-cups (115a, 6,7) being provided downstream in a further portion "S", in order to allow the advancing material to be lifted and advanced; said finning-cups being of the type which prevent the formation of a veil of inert particles from falling through the hot gases of combustion as the drum is rotated, to obtain an undisturbed combustion, leaving a free central axial space which has a more ample diameter in respect to the first portion "R", realizing a first section "V" where R.A.P. can be added (19).

The first portion "R" and said intermediate chamber "V" realizing said first chamber in the rotatable drum means where the inert material will be dried and eventually mixed with R.A.P.

The possibility of inserting the material to be recycled R.A.P. (12) can be realized at the end of the first portion "R" (115a,19) by an intermediate annular stationary introducing hopper (126) extending anularly in an external ring form (127,5), by means of helicoidal introducing channels realized by external finnings

fixed to the rotating drum, closed externally by a fixed openable cylindrical carter (129) in order to convey the respective R.A.P. inside the rotatable drum across a plurality of circumferential openings (130) realized in the first rotatable drum (1).

Advantageously, after the R.A.P. introducing hopper (126-127-129,12,5), a second coaxial independent rotatable drum (1′) with independent rotating means (17′), covering a second section "S" can be realized (Fig.1C). This section includes said intermediate chamber "V" and said second chamber "W".

After said first section, (intermediate chamber) "V", a second section (second chamber) "W" is provided in order to impregnate and mix the dried product coming from the previous section "V" with binding bituminous and filler substances by means of a suitable lower delivery nozzle means (123-124, 13) is arranged behind the burner's flame delivery mouth of the respective burner means (117-116-119,14, 14-15-16) so as to avoid danger of combustion.

The bound asphaltic concrete will be discharged downstream at the second end of the rotatable drum means, through a ring head (125,11) with the discharge outlet of the ready-mix composition, positioned downwards (8), whereas the combustion gases will be discharged upstream at the first end of the rotatable drum means by a flue (111-112, 9-10).

It will be noted that in the first portion "R" , after the inert virgin material feeding blades (114,3), the respective advancing finning means (115,4) is realized in form of semi-opened cups (Figure 2C) suitable for the realization of a continuous fall of material through the combustion gases whereas the finning means of the first section "V" (115a-6) is more tightly closed in order to determine, as explained, a free axial space for the combustion (Figure 3C).

Downstream of the advanced burner head (14) and in any case, behind the respective flame, the respective finning means will conveniently be radial (7) so as to obtain the final mixing of the various materials without collision with the respective burner duct means (116-119,14,16).

In order to prevent fire in the impregnating and mixing chamber (second chamber "W"), the two chambers "R+V" and "W", are divided by a diaphragm (118) with adjustable door openings (120) allowing the material to pass with adjustable rate from the first one to the second one by the falling-rolling advancing movement by cooperating upstream helicoidal feeders (121).

Advantageously both the said first portion "R" and the said first section "V" of the said first chamber, present finning means (115,115a,4-6) which are substantially bent with a progressive tendency to parallelism with the inside cylindrical surface of the chamber (4,6), those of the said downstream first section "V" being more closed than those of the first portion "R".

In order to avoid confusion and better understand the terms:
chamber, intermediate chamber, portions and sections, the following statement will be useful (to see Fig.1C):

- "R" = first portion (in the case of division of the drum in two coaxial independent rotating cylinders only) = "first drum"
- ("R"+"V") = first chamber;
- "V" = intermediate chamber; in the case of division of the drum in two coaxial independent rotating cylinders = first section;
- "W" = second chamber; in the case of division of the drum in two coaxial independent rotating cylinders = second section;
- "S"= ("V"+"W") = second portion; in the case of division of the drum in two coaxial independent rotating cylinders = "second drum"

The novel feature is the inclusion of the "V" intermediate chamber in the first chamber or first section in the second portion, placed between the "first portion" of the premixing and drying chamber "R" and the mixing chamber (second chamber or second section)"W".

Claims

1. Asphaltic concrete apparatus for the production of ready-mix asphaltic concrete, using rotatable mixing drum means having a flow of combustion gas in countercurrent by a downstream placed burner means, means for advancing, drying, impregnating and mixing the material with bituminous and filler substances (binders) (123-124-13); of the type comprising the division of the rotatable mixing drum means into a first chamber (R-V) for supplying, advancing and drying the inert virgin material and eventually mixing it with the recyclable asphaltic product (R.A.P.) and into a second chamber (W) for further advancing, impregnating and mixing the dried material with bituminous and filler substances (binders),
characterized by the fact that:

- the respective nozzle (116-16) of said burner means (117-14) is placed inside said first chamber "R-V", firing into an intermediate chamber "V", located between a first portion "R" of said first chamber "R-V"and said second chamber "W", said second chamber "W" being a mixing chamber, said intermediate chamber "V" comprising:
  - a diaphragm (118-120) that allows the flame to pass axially and allows the material to go nto said second chamber "W", by falling-rolling advancement in cooperation with helicoidal feeders (121).
- the respective binder means (13) are delivered into said second chamber "W" just behind said nozzle (116-16).

2. Asphaltic concrete apparatus as per claim 1., characterized by the fact that said diaphragm (118) has adjustable opening means (120) in order to allow the particulate dried material to pass, from the intermediate chamber (V) to the second chamber (W):

– by its falling-rolling, advancing movement and

– in adjustable rate.

3. Asphaltic concrete apparatus as per claim 1., characterized by the fact that said feeding finning lifter means in said intermediate chamber "V" comprises alternatively or jointly in combination, to advance the drying particulate material:

– helicoidal feeders (121) and

– elevator transverse cups (6);

4. Asphaltic concrete apparatus as per claim 1., characterized by the fact that the rotatable drum apparatus (1) is divided in two coaxial portions "R"+"S", by an intermediate anular R.A.P. charging hopper (126-127-128-129-130, 5,19), the second portion "S" being divided in two sections "V"+"W", the first section "V" being said intermediate chamber "V" of claim 1. and second section being said impregnating and mixing second chamber "W" of claim 1., wherein:

– the first portion "R" is provided with finning means (114- 115,3-4) for inside lifting advancing and mixing inert virgin material supplied at the first end (113,2) of the rotatable drum apparatus (1), and

– the first section "V" of the second portion "S" is provided with finning means (115a, 6) for inside lifting, advancing and mixing inert virgin material supplied from the first portion "R" with recyclable asphaltic product (R.A.P.12) supplied by said intermediate anular charging hopper (126-127-128-129-130, 5,19).

5. Asphaltic concrete apparatus as per claim 1., characterized by the fact that the rotatable drum means is divided in two coaxial rotatable drum parts (1,1′) although it realizes the continuity of the chamber for the progress and mixing of the materials, the first part (1) comprising a first portion "R" in which substantially drying of the virgin material takes place and the second part (1′) comprising a second portion "S" divided in two sections "V+W", being:

– the first section "V" where the R.A.P. is introduced (12), heating and mixing it with the inert virgin material (113,2) and

– the second section "W" for impregnating and mixing the dried materials from the first section "V", with binding substances e.g. bituminous and filler materials (123-124,13),

– each drum (1,1′) being equipped with rotating means (17,17′) allowing different speeds from one to the other

6. Asphaltic concrete apparatus as per claim 1., characterized by the fact that in said first chamber " R" comprises:

– a first set of feeding blades in helicoidal form (114,3) to advance virgin particulate material (2) at one end of the drum (1);

– a second set of lifting and advancing finning means, realized in form of semi-opened cups (115,4) suitable for the realization of a continuous particulate advancing material.

7. Asphaltic concrete apparatus as per claim 1., characterized by the fact that downstream of the advanced burner head (14), behind the respective flame, in said second chamber "W", respective advancing and mixing material finning means are radial (7).

8. Asphaltic concrete apparatus as per claim 1., characterized by the fact that the internal cylindrical wall of said first chamber ("R"+"V") comprises finnings lifting means (115- 115a,4-6) which are substantially bent with a progressive tendency to parallelism with the inside cylindrical surface of the rotating chamber.

9. Asphaltic concrete apparatus as per claim 1., characterized by the fact that the internal cylindrical wall of said first chamber comprises finning lifting means (115-115a,4-6) which are substantially bent with a progressive tendency to parallelism with the inside cylindrical surface of the rotating chamber, being said finning lifting means (115-115a,4-6) divided in two portions wherein the downstream portion (115a,6) is more close to the inner cylindrical surface than the upstream portion (115,4).

Patentansprüche

1. Asphaltbetonvorrichtung zur Herstellung von Fertig-Asphaltbeton, mit drehbarer Mischtrommel mit Gegenströmung des Verbrennungsgases durch einen stromabwärts postierten Brenner sowie Vorrichtungen zum Fortbewegen, Trocknen, Tränken und Mischen des Materials mit bituminösen und Füllstoffen (Bindemitteln) (123-124-13); mit Unterteilung der drehbaren Mischtrommel in eine erste Kammer (R-V) zur Anlieferung, Voranbewegung und Trocknung des trägen unvorbereiteten Materials und seiner abschliessenden Mischung mit dem wiederverwertbaren Asphaltprodukt (R.A.P.) sowie eine zweite Kammer (W) zum Weitertransport, Tränken und Mischen des Materials mit bituminösen und Füllstoffen (Bindemitteln),
gekennzeichnet dadurch, daß:

– die betreffende Düse (116-16) des besagten Brenners (117-14) sich innerhalb der genannten ersten Kammer (R-V) befindet und in eine Zwischenkammer "V" ausstößt, die zwischen einem ersten Teil "R" der besagten ersten Kammer (R-V) und der genannten zweiten Kammer "W" liegt, wobei die zweite Kammer "W" eine Mischkammer ist und die besagte Zwischenkammer "V"

– eine Membran (118-120) umfaßt, die die Flamme in axialer Richtung durchläßt und das Material in die genannte zweite Kammer "W"

passieren läßt, durch fallend-rollende Fortbewegung in Zusammenarbeit mit schraubenförmigen Zufuhreinrichtungen (121).

– die betreffenden Bindemittel (13) in die genannte zweite Kammer "W" eingeführt werden, unmittelbar hinter der besagten Düse (116-16).

2. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die genannte Membran (118) eine regulierbare Öffnung (120) aufweist, um das korpuskulare getrocknete Material aus der Zwischenkammer "V" in die zweite Kammer "W" passieren zu lassen:

– durch seine fallend-rollende, voranführende Bewegung und

– mit regulierbarer Geschwindigkeit.

3. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die besagten Blattrippen-Hebe-Zufuhreinrichtungen in der genannten Zwischenkammer "V" zur Fortbewegung des korpuskularen getrockneten Materials alternativ oder kombiniert umfassen:

– schraubenförmige Zufuhreinrichtungen (121) und

– quergerichtete Hebepfannen (6).

4. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die drehbare Trommelvorrichtung (1) in zwei koaxiale Abschnitte "R" + "S" aufgeteilt ist, und zwar mittels eines dazwischenliegenden ringförmigen Fülltrichters (126-127-128-129-130, 5, 19), wobei der zweite Abschnitt "S" in zwei Unterabschnitte "V" und "W" unterteilt ist, dessen erster, "V", besagte Zwischenkammer aus Anspruch 1 ist und dessen zweiter, "W", die genannte zweite Kammer "W" zum Tränken und Mischen aus Anspruch 1 ist. Dabei

– ist der erste Abschnitt "R" mit Blattrippen (114-115, 3-4) ausgestattet, um das träge unvorbereitete Material, das am vorderen Ende (113,2) der drehbaren Trommelvorrichtung (1) ausgegeben wird, im Innern zu heben, fortzubewegen und zu mischen, und

– der erste Unterabschnitt "V" des zweiten Abschnitts "S" ist mit Blattrippen (115a, 6) ausgestattet, um das träge unvorbereitete Material, das vom ersten Abschnitt "R" anlangt, im Innern zu heben, fortzubewegen und mit wiederverwertbarem Asphaltprodukt (R.A.P. 12) zu mischen, das von dem besagten dazwischenliegenden ringförmigen Fülltrichter (126-127-128-129-130, 5, 19) angeliefert wird.

5. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die drehbare Trommelvorrichtung in zwei koaxiale drehbare Trommelteile (1, 1′) aufgeteilt ist, obwohl sie die Kontinuität der Kammer für die Weiterführung und Mischung der Materialien gewährleistet, wobei das erste Teil (1) einen ersten Abschnitt "R" umfaßt, in dem im wesentlichen das Trocknen des unvorbereiteten Materials vonstatten geht, und das zweite Teil (1′) einen zweiten Abschnitt "S" umfaßt, der in zwei Unterabschnitte "V" und "W" unterteilt ist, wobei:

– in dem ersten Unterabschnitt "V" das R.A.P. (12) eingeführt, erhitzt und mit dem trägen unvorbereiteten Material (113, 2) gemischt wird, und

– in dem zweiten Unterabschnitt "W" das von dem ersten Unterabschnitt "V" anlangende getrocknete Material getränkt und mit bindenden Stoffen, z. B. bituminösen und Füllstoffen (Bindemitteln) (123- 124-13), gemischt wird, und

– jede Trommel (1, 1′) mit einer Rotiervorrichtung (17, 17′) ausgestattet ist, die verschiedene Geschwindigkeiten zuläßt.

6. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die genannte erste Kammer "R" folgendes umfaßt:

– einen ersten Satz von Zuführblättern in Schraubenform (114, 3) zur Weiterführung des korpuskularen unvorbereiteten Materials (2) an dem einen Ende der Trommel (1);

– einen zweiten Satz von Hebe- und Förder-Blattrippen in Form halboffener Pfannen (115,4), geeignet zum kontinuierlichen Voranbewegen von korpuskularem Material.

7. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß stromabwärts von dem vorgesetzten Brennerkopf (14), hinter der betreffenden Flamme, in der genannten zweiten Kammer "W", die betreffenden Blattrippen zur Fortbewegung und zum Mischen des Materials radial sind (7).

8. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die zylindrische Innenwand der besagten ersten Kammer ("R"+"V") Blattrippen-Hebevorrichtungen (115-115a, 4-6) umfaßt, die im wesentlichen gebogen sind, mit fortschreitender Tendenz zur Parallelität mit der zylindrischen Innenoberfläche der rotierenden Kammer.

9. Asphaltbetonvorrichtung wie nach Anspruch 1., gekennzeichnet dadurch, daß die zylindrische Innenwand der besagten ersten Kammer Blattrippen-Hebevorrichtungen (115-115a, 4-6) umfaßt, die im wesentlichen gebogen sind, mit fortschreitender Tendenz zur Parallelität mit der zylindrischen Innenoberfläche der rotierenden Kammer, wobei besagte Blattrippen-Hebevorrichtungen (115-115a, 4-6) in zwei Abschnitte unterteilt sind, von denen der stromabwärts gelegene Abschnitt (115a, 6) näher an der zylindrischen Innenoberfläche liegt als der stromaufwärts gelegene Abschnitt (115, 4).

Revendications

1. Appareil de béton asphaltique pour la production d'un mélange prêt à l'emploi de béton asphaltique, utilisant un tambour mélangeur rotatif ayant un flux de gaz combustible en contre-courant et un brû-

leur placé en aval et servant à distribuer, assécher, imbiber et mélanger le matériau avec des matières bitumineuses épaississantes (agglomérants) (123-124- 13); du type comportant la séparation du tambour mélangeur rotatif en une première chambre (R-V) pour la distribution, l'acheminement et le séchage du matériau vierge inerte, et pour finalement le mélanger au produit asphaltique recyclable (R.A.P.), et en une seconde chambre servant à une phase ultérieure de distribution, acheminement et mélange du matériau seche à des matières bitumineuses épaississantes (agglomérants),
caractérisé par le fait que:

– le bec (116-16) du brûleur (117-14) est placé à l'intérieur d'une première chambre "R-V" qui ouvre sur une chambre intermédiaire "V", située entre une première portion "R" de la dite première chambre "R-V" et de la seconde chambre "W", la dite seconde chambre "W" étant une chambre de mélange, et la dite chambre intermédiaire "V" comprenant:
  – un diaphragme (118-120) permettant à la flamme de passer axialement et au matériau d'être transféré dans la seconde chambre "W", par un mouvement chute-roulement en coopération avec des canaux d'alimentation hélicoïdaux (121).
– le dit matériau agglomérant (13) est délivré par la seconde chambre "W" située derrière le bec (116-16).

2. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que le dit diaphragme (118) possède un mécanisme d'ouverture réglable (120) de façon à permettre au matériau seche et réduit en particules de passer de la chambre intermédiaire (V) à la seconde chambre (W):
– par mouvement chute-roulement et
– à une vitesse réglable.

3. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que le système de canaux d'alimentation de la dite chambre intermédiaire "V" comporte, en mode joint ou alternatif, pour acheminer le matériau séché et réduit en particules:
– des canaux d'alimentation (121) hélicoidaux et
– des godets élévateurs transversaux (6);

4. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que le système de tambour rotatif (1) est divisé en deux portions coaxiales "R"+"S" par un sauteur intermédiaire de chargement annulaire R.A.P. (126-127-128-129-130,5,19), la seconde portion "S" étant divisée en deux sections "V"+"W", la première section "V" étant la dite chambre intermédiaire "V" de la revendication 1. et la seconde section étant dite seconde chambre "W" d'imprégnation et de mélange de la revendication 1., où:
– la première portion "R" est alimentée par des systèmes en arête (114-115, 3-4) places à la première extrémité (113, 2) du système de tambour rotatif (1), et servant à charger, faire avancer et mélanger le matériau vierge inerte et
– la première section "V" de la seconde portion "S" est munie de systèmes en arête (115a, 6) pour charger, acheminer et mélanger le matériau vierge inerte fourni par la première portion "R" au produit asphalteux recyclable (R.A.P. 12) fourni par le sauteur de chargement intermédiaire annulaire (126-127-128-129-130, 5,19).

5. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que le système de tambour rotatif est divise en deux parties coaxiales rotatives (1, 1′) bien qu'il forme la continuité de la chambre pour l'acheminement et le mélange des matériaux, la première partie (1) comprenant une première portion "R" où a lieu l'essentiel du séchage du matériau vierge et la seconde partie (1′) comprenant une seconde portion "S" divisée en deux sections "V"+"W", comme suit:
– la première section "V" où est introduite la R.A.P. (12), afin de le chauffer et de le mélanger au matériau vierge inerte (113, 2) et
– une seconde section "W" pour l'imprégnation et le mélange des matériaux préalablement séchés dans la première section "V" avec des substances agglomérantes e.g. bitumineuses et des matériaux épaississants (123-124, 13) ,
– chaque tambour (1, 1′) étant équipé de systèmes de rotation (17, 17′) permettant différentes vitesses.

6. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que la dite chambre "R" comprend:
– un premier jeu de lames d'alimentation hélicoïdales (114, 3) disposées à une extrémité du tambour (1)et servant à acheminer le matériau vierge réduit en particules (2) ;
– un second jeu de systèmes de chargement et d'acheminement sous forme de godets semi-ouverts (115, 4) permettant un acheminement continu du matériel réduit en particules.

7. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que, en aval du bec du brûleur (14), derrière la flamme, dans la dite seconde chambre "W", les sytèmes respectifs d'acheminement et de mélange des matériaux épaississants sont radiaux (7).

8. Appareil de béton asphaltique selon dans la revendication 1. caractérisé par le fait que la paroi interne cylindrique de la dite première chambre ("R"+"V") comprend des systèmes de chargement en arête (115-115a, 4-6) s'incurvant sensiblement et tendant à devenir progressivement parallèles à la surface cylindrique interne de la chambre rotative.

9. Appareil de béton asphaltique selon la revendication 1. caractérisé par le fait que la paroi interne cylindrique de la dite première chambre comprend des systèmes de chargement en arête (115-115a, 4-

6) s'incurvant sensiblement et tendant à devenir progressivement parallèles à la surface cylindrique interne de la chambre rotative, les dits systèmes de chargement en arête (115-115a, 4-6) étant divisés en deux portions, la portion en aval (115a, 6) étant plus proche de la surface cylindrique intérieure que la portion en amont (115, 4).

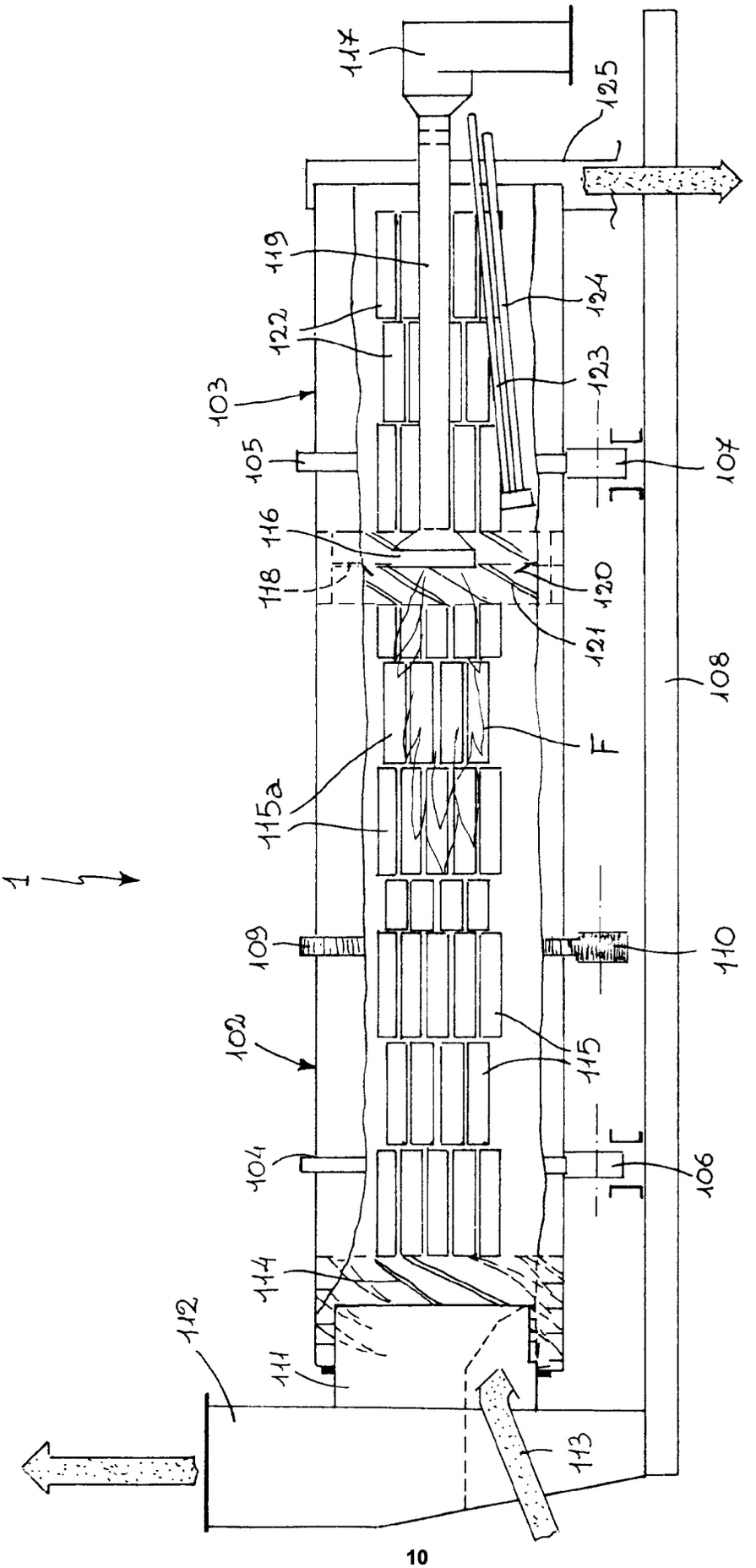
1
117
125
119
124
122
123
103
105
107
116
118
120
121
108
F
115a
109
110
102
115
104
106
114
112
111
113

FIG.1

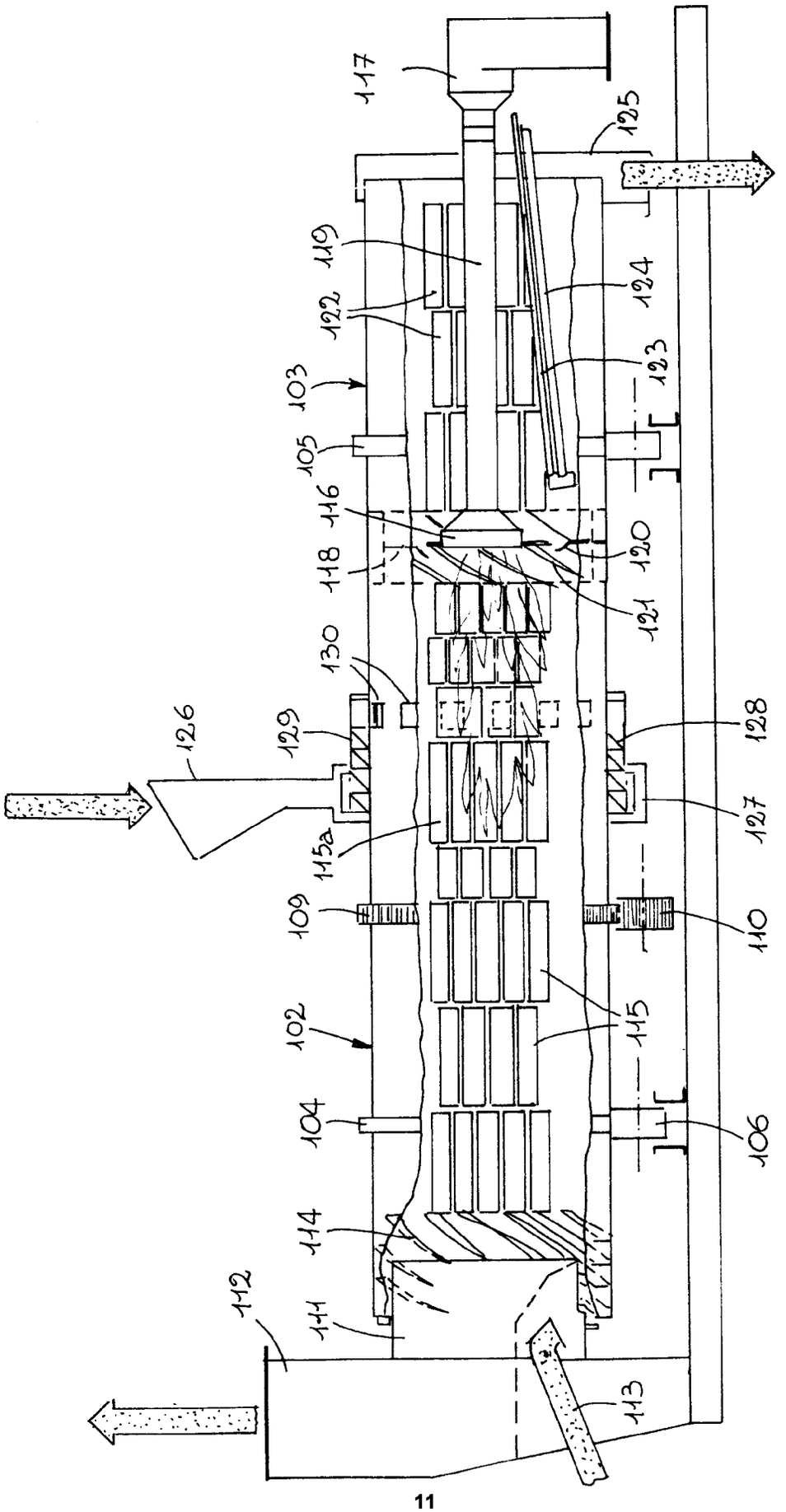
117
125
119
122
124
103
123
105
116
118
120
121
130
126
129
128
127
115a
109
110
102
115
104
106
114
112
111
113

FIG.2

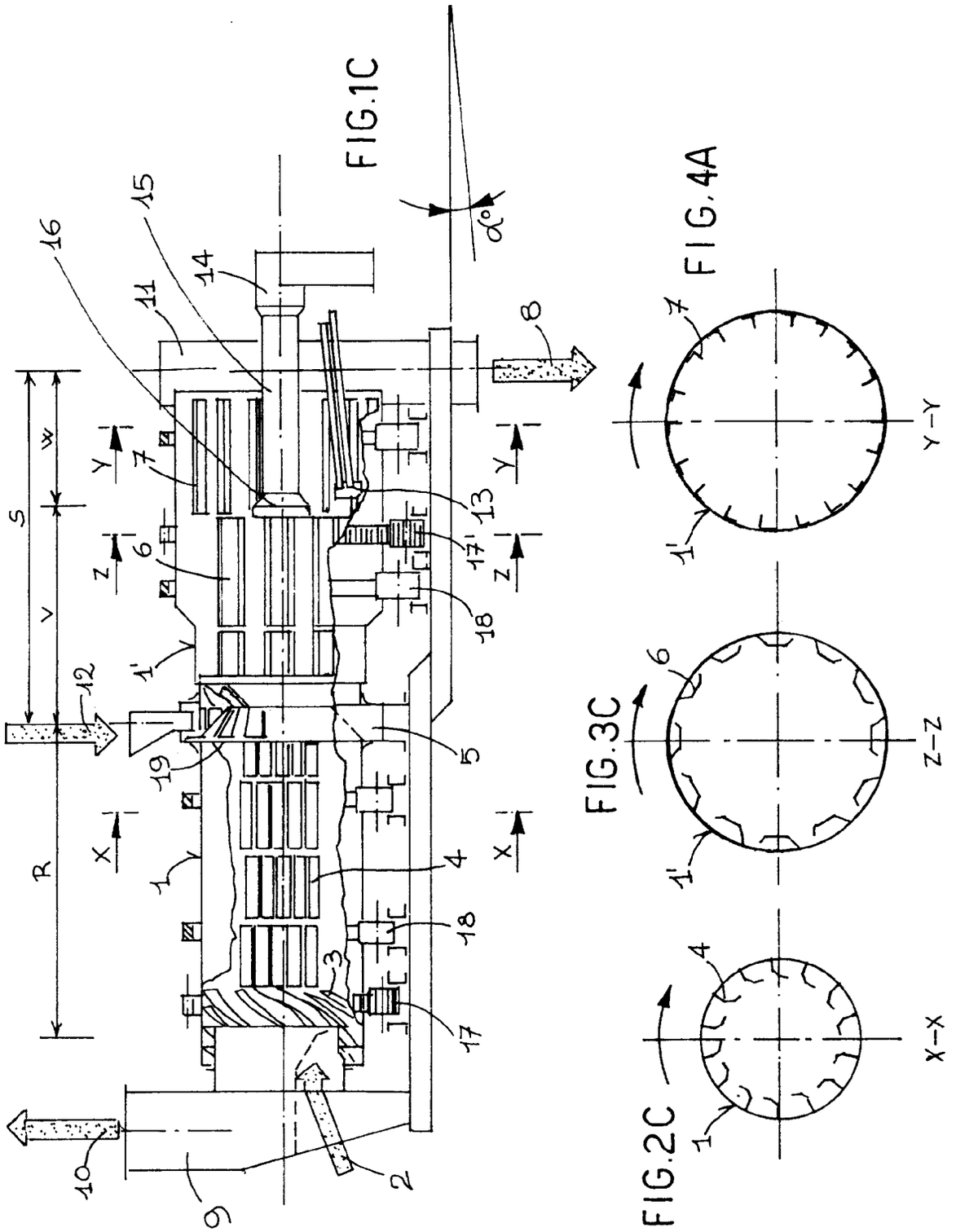
FIG.1C
FIG.4A
FIG.3C
FIG.2C
Y-Y
Z-Z
X-X
α°
S
W
V
R
1
1'
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
17'
18
19