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INSTALLATIONS FOR CONTINUOUSLY TREATING STRIP-LIKE MATERIALS IN VACUUM

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FIG. 1

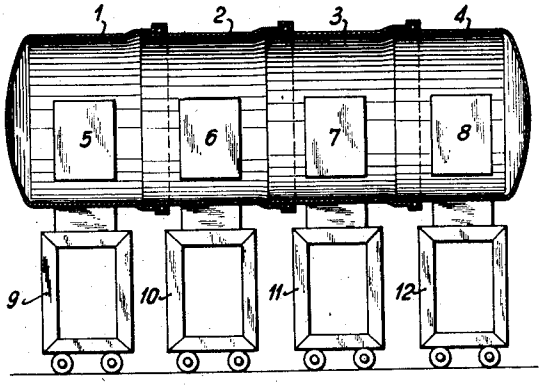


FIG. 2

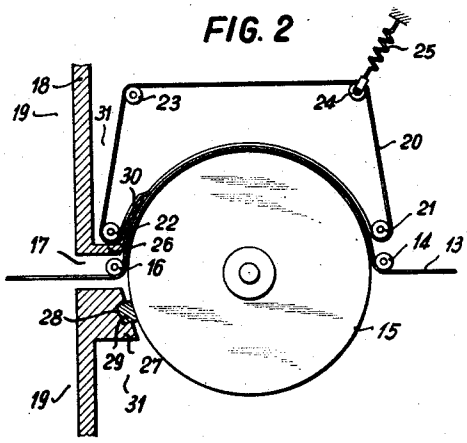


FIG. 3

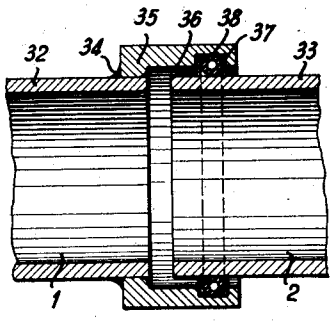


FIG. 4

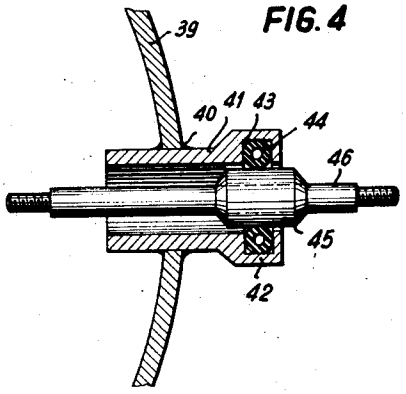
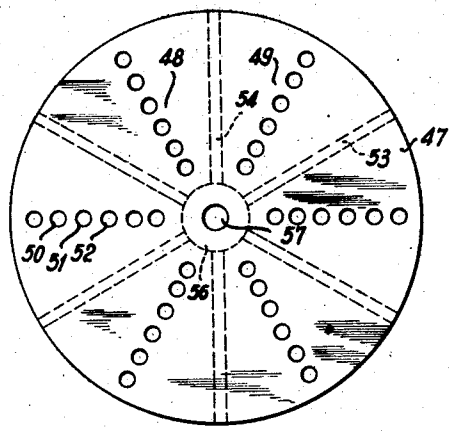


FIG. 5


48
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54
47
53
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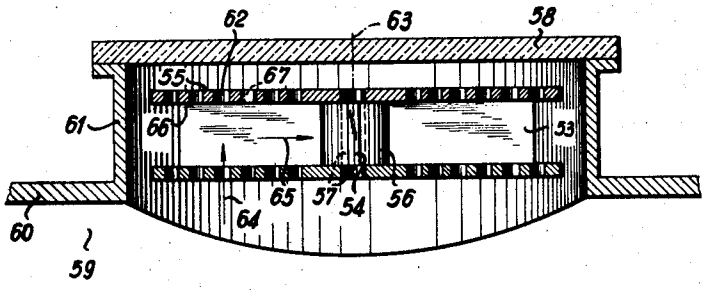
FIG. 6


62
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64
60
59

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FIG. 7

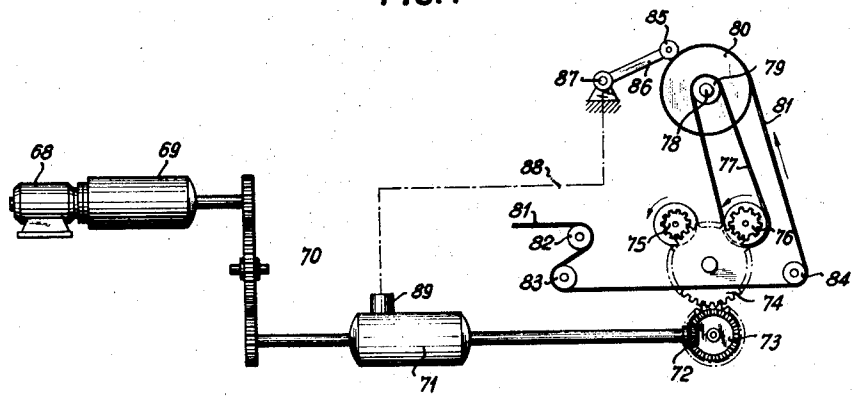
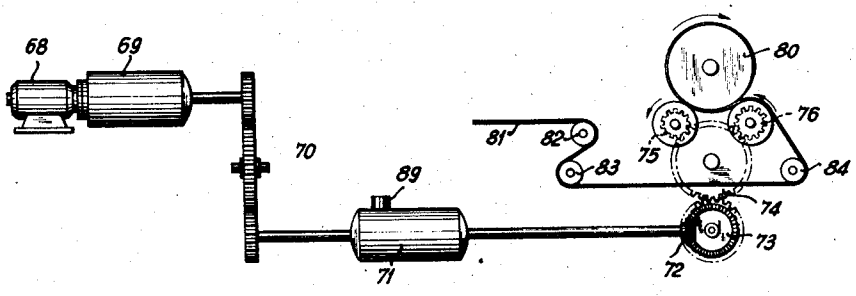


FIG. 8



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STRIP-LIKE MATERIALS IN VACUUM
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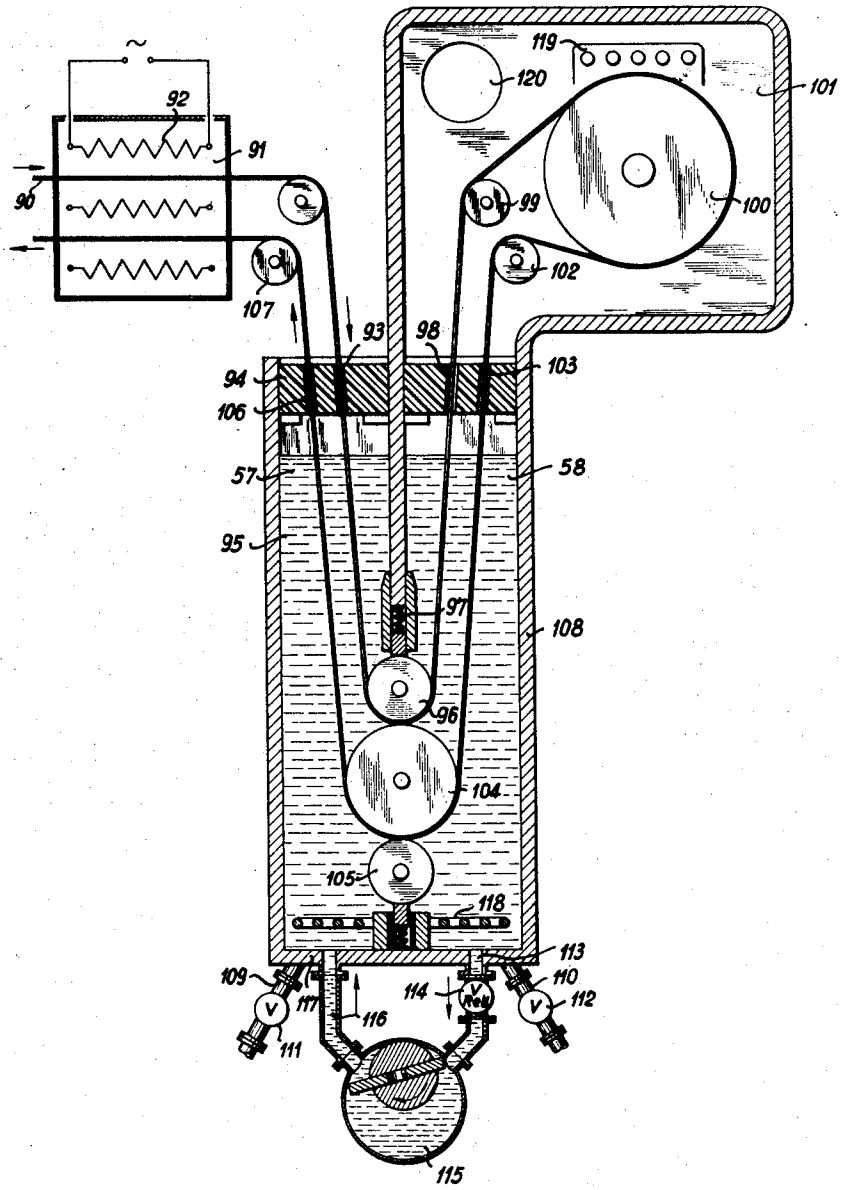
FIG. 9



United States Patent Office 2,853,047 Patented Sept. 23, 1958

2,853,047

INSTALLATIONS FOR CONTINUOUSLY TREATING STRIP-LIKE MATERIALS IN VACUUM

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Application June 23, 1955, Serial No. 517,622

Claims priority, application Germany June 26, 1954

19 Claims. (Cl. 118—49)

This invention relates to installations for continuously treating materials in vacuo.

With the hitherto known installations for continuously treating, for example, impregnating or vapour-treating strip-like material, for example, webs of paper, plastics or textiles, with aluminium in vacuo, it is inter alia a disadvantage that the means, devices, equipment or arrangements for treating the strip-like material, which are frequently complicated, are not readily accessible, this being particularly undesirable, for example, with long vacuum boilers. A further disadvantage is that it is usually not possible (or is only possible with great difficulty), for the individual treating means, devices equipment or arrangements to be adjusted relatively to one another, as is necessary, for example, if strip-like material has to be conducted continuously under vacuum through the separate stages of the treatment. A further disadvantage is that it is also very difficult for certain of these means, devices, arrangements and the like to be dismantled or replaced, and that those parts of the installation which form a unit, for example, a long boiler, can only be transported with special auxiliary devices and also with considerable loss of time.

The present invention permits all these disadvantages to be avoided in a simple manner; at the same time, a number of very important additional advantages are obtained. The installation provided by the present invention for continuously treating (for example impregnating or vapour-treating) strip-like material under vacuum is built up of components adapted to be assembled in sections, each of the components being associated with a predetermined treatment or stage of the treatment and the components being adapted to be coupled to one another with sealing.

The individual components of the installation each comprise, for example, an independent treatment group which may consist of vacuum pumps and pipe lines, valves, cooling assemblies, transformers, switches, fuses, impregnating rollers, etc. All these parts together form an independent unit and a self-contained operating group. It is only necessary, for example, for the electric mains and the cooling water supply to be connected for setting the installation in operation.

It is very advantageous if the individual components of the installations are mounted, for example, on wheels running on rails, whereby it is possible in certain cases for the components of the installation to be taken apart and replaced conveniently and simply. It is expedient for the separate components of the installation, for example, the separate sections of a vacuum boiler, to be mounted on their own travelling frames or carriages.

The couplings connecting the components to one another are to be so constructed that the components are also capable of being adjusted relatively to one another when they are coupled, this being useful or necessary, for example, when it is a question of modifications or adaptations in the guiding of the material being conveyed. The means for adjustment purposes may, for example, be provided spaced apart arcuately by 120° on the casings of the components.

Moreover, couplings are advantageously incorporated in the pipe lines between the vacuum pumps arranged in a fixed position after the installation, especially for the convenient separation and replacement of the components of the installation, perhaps when threading the strip to be vapour-treated through the narrow slots of the sealing means between the components. For example, the vacuum pipe is provided at this separation point with two plates, one of which is surface-ground, while the other comprises a dove-tailed groove with a rubber ring. This permits a certain relative displacement of the pipes or tubes at the junction, which is advantageously so arranged that when the components are brought together, the two plates are automatically urged one against the other.

The packings between the components, for example, between the sections of a vacuum boiler and relatively to the outside space, for example, the free atmosphere, are advantageously provided externally on the walls, for example, of the boiler sections.

Each component of the installation is preferably provided at least at one end with a rigidly fitted ring or the like which is, for example, welded around the said end and projects beyond the latter, the ring embracing the other component which is coupled to this point or being embraced by the other component, and a resilient packing ring bearing on two components to be sealed off relatively to one another is provided in at least one encircling groove of the ring and/or of the bearing part forming the counterpart of the ring.

The packing ring may be a tube, adapted to be expanded by means of air, gas, oil or the like in such manner that the ring bears tightly and firmly against those parts of the installation which are to be sealed off.

It is advantageous to ensure that the packing ring (for example, a tube) is non-detachably secured on or in its groove; the groove may have a substantially dove-tailed cross-section for this purpose. The tube may also be secured by split rings or by adhesives.

For electric lead-in conductors, for example, water-cooled pins, it is expedient if the pins are surrounded at the sealing position by hollow (and perhaps inflatable) packing rings, which are vulcanised, for example, on pins and in turn are surrounded, for example, by projections of that wall (for example, of a vacuum boiler) provided with openings for the lead-ins.

The means, devices, arrangements and the like for treating, for example, strip-like material are advantageously arranged separately or in groups on supports independent of the housing of the corresponding component, which supports may comprise frames consisting of sectional members or the like, which are passed through the wall of the housing of the corresponding components of the installation while being sealed off against vacuum or a positive pressure. By means of this particular support of the treating means, the corresponding component is completely relieved from inside.

A common pump is expediently associated with several series-connected components separated from one another by partitions: throttle valves, overflow valves or the like are, advantageously provided in the partitions between the said components. This arrangement renders it unnecessary for each separate unit of the installation to be provided with its own vacuum pump unit, and in addition the throttle valves or the like render possible a transverse flow between the chambers and thus better use of the entire pumping system; for example, the pumping times become shorter.

Those parts of the installation, for example, vacuum chambers, which are at the delivery end considered in the direction of the process are expediently supplied by a vacuum pump, preferably a steam-jet pump, which is economic in the low pressure range, while the common main vacuum pump is connected to the chamber at the inlet end. A throttle valve or an overflow valve is advantageously disposed between these two chambers, for example, in the partition. For example, the chamber with the less effective vacuum is connected to the initial vacuum side of the steam-jet pump by way of a separate pipe line adapted to be closed by means of a throttle valve. As soon as the necessary vacuum in the component at the output end is reached with the steam-jet pump, the valve is closed and the initial vacuum side of this pump, parallel to the other component at the inlet end, is connected to the common main vacuum pump.

As sealing means for the lead-in for the material between the components, for example, two vacuum chambers, it is expedient to use two parallel plates, the spacing of which is small in relation to the free path length of the gas molecules, it perhaps being necessary to utilise the laws of molecular flow. The flow resistance of this device may readily be so great that the highest vacua are maintained even with very great pressure differences between the two chambers, without the web or the like conducted therethrough being impeded or impaired in any way.

Instead of these sealing plates, it is also possible to use two endless travelling belts or bands forming a slot-like passage, or only one such belt or band and a rotating roller engaged by the latter over a relatively large part of its circumference; the belts and the roller accompany the material at a certain speed while it travels through this slot-like sealing passage, which is in effect also moving. The material is thus subjected to very gentle treatment, because relative movements between the material and the belt or roller do not occur. The sealing effect is very good, because the belts and roller completely enclose the strip-like material over a relatively long distance.

The belts and roller may at the same time serve as driving means. Moreover, it is also possible to provide supplementary sealing means, for example, bars covered with fabric, which are arranged transversely of the direction of travel and rub on the belts and rollers. Such bars may in addition serve as separating devices, for example, for dust, and also as a brake if they are adjustable.

As already stated, the travelling belts, rollers or the like particularly have the advantage that in practice there is no deleterious effect on the travelling material while maintaining a good sealing action, because no relative movement occurs between this material and the travelling belt or belts and roller. For example, these sealing means are in particular also very suitable if a material formed with apertures, for example, gauze-like material, is to be moved therethrough. The individual threads or the like of the gauze, which have a tendency to cause creeping paths along them and thus an undesirable transfer of air for one chamber to the other, are satisfactorily enclosed by the two travelling belts or by one belt and a roller accompanied by this belt over a large part of its circumference, because the belts are usually capable of being made sufficiently long or the diameter of the roller sufficiently large. In this manner, the arrangement ensures a very good sealing action with a very gentle treatment when sensitive material, such as perforated foils having a thickness of for example, only 0.1 mm. are to be passed through, or when it is a question of very large pressure differences between the chambers.

The endless belts which, if necessary, are provided with coverings are expediently resilient and, for example, are adjustable as regards their tension; they may, for example, run over rollers which are spring-loaded. Moreover, the sealing roller associated with one endless sealing band to form a slot-like passage is also adapted to be adjustably

mounted and, for example, provided with coverings, for example, of plastics, which grip the material in a particularly suitable manner and holding the material with a sliding action or without movement as it passes through the apparatus.

In order to ensure that the inside surface of the glass pane, or the like of a control window arranged in the outside wall of the vapour-treating space is protected against metal vapour being deposited on this surface and consequently impairing or even preventing vision through the window, it is a further feature of the invention that the said window consisting, for example, of glass should have arranged in front of it two discs disposed in spaced relation relatively to one another and driven at the same speed, the discs having openings, those of one of the discs being so arranged in relation to those of the other disc as to form aligned viewing passages, whereby the spacings of the discs, the holes therein and also the speed of the discs in relation to the speed of the particles of, for example, metallic vapour are so chosen that a particle which has travelled through a hole of the disc nearer to the vapour-treating chamber, owing to the further rotation of the other disc which has meanwhile taken place impinges on those solid parts of the said disc between the said holes, so that the disc acts as a screen. The two discs consisting, for example, of sheet metal are advantageously combined to form a unit.

With the generally very rapid rotation of the discs, the holes forming the viewing passages provide a practically unimpaired vision of the vapour-treating chamber in accordance with the optical principle which is known per se. The holes are at the same time so formed, arranged and directed that the observer can accurately inspect the entire vapour treating chamber, preferably from different points.

The vapour-treating chamber is advantageously arranged completely enclosed in one of the independent components of the installation, perhaps as a single treatment space filling this component, and is preferably supplied by its own vacuum pump; in this case, the strip-like material to be vapour-treated advantageously itself forms the upper limit of the treatment space.

The versatility of the strip-like materials per se which may be treated with this installation and the change-over from one material to another, which it is frequently necessary to carry out at relatively short intervals, may in particular present difficulties when the finally treated webs or strips are reeled or wound, which difficulties may produce their effect on the entire run of the strip or web and thus also on the vapour-treatment and also the quality of the vaporised, for example, metallic layer.

According to the invention, these difficulties and disadvantages are avoided in a very simple manner by the winding or reeling means being changed over merely by replacing the reeling bar receiving the strip or web in the supporting roller system by the winding rod or bar in the winding rod system, and vice versa.

The winding by means of supporting rollers is particularly suitable for materials which satisfactorily withstand the great pressure which obtains between the coil of strip material which is always increasing in weight and the rollers supporting it by bearing on the circumference. The rolling method using a winding rod, on the other hand, is particularly suitable in order to reel more sensitive and perhaps very soft or brittle material.

The possibility of changing over merely by replacement of the corresponding bars or rods, that is to say, more especially without any mechanical modifications, is additionally made possible in a very simple manner by the fact that a supporting roller serving to drive the coil of strip material with the supporting roller system is at the same time used for driving the winding bar or rod in the winding rod system.

It is advantageous to provide an infinitely variable gear in the drive means serving for the two systems, by

means of which gear the speed of strip material may be regulated within a relatively large range. When the material is wound by means of supporting rollers, the peripheral speed of the latter is equal to the speed of the strip or web material.

It is expedient for another infinitely variable gear to be included in this power transmission of the drive means, which additional gear correspondingly reduces the speed of the winding rod in dependence on the increasing diameter of the coil of strip material with the winding rod system, so that the speed of the web or strip travelling through the installation is maintained at the predetermined value.

Further features of the invention will be apparent from the enclosed representations of constructional examples and also from the following description.

In the drawings:

Figure 1 shows a vacuum boiler assembled in sections, each section being arranged on its own travelling frame or trolley,

Figure 2 is a view to an enlarged scale showing a sealing means for guiding, for example, strip-like material between two parts of the installation, for example boiler sections, with a revolving belt and a roller around which the latter passes,

Figure 3 is a view to a larger scale showing a sealing arrangement between two parts of the installation, for example, boiler sections,

Figure 4 is a view, also to a larger scale, showing a modified construction of a packing, more especially for electric lead-ins,

Figure 5 is an elevation of an apertured disc of a device for keeping the inside surface of a control window free from deposits of metal vapour,

Figure 6 is a plan view of the device according to Figure 5, which consists essentially of two synchronously rotating discs, arranged in front of that inside surface of the control window to be kept free from deposits of metal vapour,

Figure 7 is a diagrammatic view showing a drive means in which the material is coiled on winding rods,

Figure 8 is also a diagrammatic view showing a drive means in which material is wound on supporting rollers, and

Figure 9 is a diagrammatic longitudinal section through a strip guideway with packing means and using communicating pipes.

The sections of the installation, for example, boiler sections, **1**, **2**, **3** and **4** have arranged therein various treating means, apparatus, devices or the like **5**, **6**, **7** and **8**, respectively, for example, guide rollers with their frames, vapour-treating devices, heating means, cooling means, pumps, pipes, valves, regulating, measuring and switching means and the like. Each section of the installation is mounted on a travelling frame or carriage **9**, **10**, **11** and **12**, respectively; the sections are adapted to be moved axially so that the strip-like material may be conveniently passed through from the chamber to chamber through narrow sealing slots. Moreover, the treating means may easily be checked, repaired, replaced, etc.

With a sealing or jointing device according to Figure 2, the material **13** being conveyed, for example, a paper web, a gauze web or strip of textile material, first of all travels over guide rollers **14**, then over a sealing roller **15**, which is for example, driven and which moves at the same speed as the material, then over a second guide roller **16** and thereafter through a slot **17** in a partition **18** into a chamber **19** which is at a different pressure.

The roller **15** is embraced over about half of its periphery by a section of an endless sealing belt **20** travelling at the same speed as the roller so that a slit-like sealing duct is formed between the roller **15** and the belt **20**. The belt travels over the guide rollers **21**, **22**, **23** and **24**; the roller **24** is loaded by a spring **25**, which is preferably adjustable.

The sealing belt **20** is preferably resilient and urges the material **13** against the sealing roller **15**, so that there is no relative movement between the material **13** and the sealing means; any such movement might have an unfavourable influence on the material.

Projections **26** and **27** are provided at the slot **17** and are directed towards the roller **15**. The projection **27**, which if necessary is adjustable, carries a sealing element **29** in a groove **28**, this element being, for example, in the form of a bar and rubbing on the roller **15**.

The projection **26** has an additional extension **30** extending substantially peripherally of the roller **15** and of that part of the belt **20** disposed at this point, this extension also exerting some sealing action; the extension **30** is at such a short distance from the roller **15** that a slit-like passage is formed so that the material being conveyed is closely embraced, but not so closely that it rubs on the extension **30**.

The sealing belt **20** is advantageously tensioned by the tension spring **25** to such a high degree that it not only urges the material **13** firmly against the roller **15** but also causes the sealing means completely to absorb any excess pressure between the chamber **19** and a space **31** which may also be a chamber.

The complete sealing arrangement may also be completely arranged in one of the chambers, for example, in the chamber at higher pressure.

As shown in Figure 3, casings **32** and **33** of the sections **1** and **2** respectively are adjustably coupled to one another by a ring **35** welded to the casings **32** and **34**. The ring **35** projects from an end of the casing **32** towards the casing **33** and surrounds the latter casing with a small clearance **36**; it has an internal peripheral groove **37** in which is arranged a hollow packing ring **38**, which ring may be so expanded, for example, by compressed air or oil under pressure, that it completely and reliably seals off the two sections while at the same time maintaining some degree of flexibility between them.

The sealing means shown in Figure 4 is particularly suitable for sealing off electric lead-in pins. A wall **39**, for example, the wall of the boiler section has a connection **41** which is fixed by a weld seam **40** and has at one end a collar **42** with an internal peripheral groove **43** surrounding a hollow, inflatable packing ring **44** which in turn closely surrounds a collar **45** of a copper pin **46** of an electric conductor; the pin **46** can for example, be hollow and adapted to be cooled by water.

Figures 5 and 6 shows a construction in which a disc **47** has radially extending rows **48** and **49** of apertures **50**, **51**, **52**. Radial partitions **53** and **54** are arranged between the rows and form individual compartments and which are at the same time fitted on another disc **55** and secure the discs rigidly to one another to form a structural unit. The discs and the partitions are driven by means of a common hub **56** and a shaft **57** so that the discs **47** and **55** run synchronously. The drive means may be of any desired type, for example, an electric motor.

The disc **55** faces the pane **58** of a control window and is made of a transparent material, for example, glass and the other disc **47** faces a vapour-treating chamber **59**. The chamber **59** is enclosed by a housing, of which a part is illustrated at **60**. The housing is provided with a tube section **61** and the window pane **58** is fixed at the free end of the section **61** in a sealed manner.

An opening, for example, **51**, in the disc **47** corresponds to an opening **62** in the disc **55**; both openings are in alignment with one another and are parallel to the axis of rotation **63**.

A metal particle passing through the opening **51** of the disc **47** in the direction of the arrow **64** does not pass through the aligned opening in the other disc **55** owing to the continued synchronous rotation of the latter, for example, in the direction of the arrow **65**, which takes place as the particle is travelling forward, but this particle instead impinges, for example, at **66**, on the solid wall

of the disc **55**; at this time, the opening **62** has reached the position **67** shown in dotted lines. The apertures, the mutual spacing and the speed of rotation of the discs are accordingly adapted to the speed of travel of the particles of metal vapour.

In the construction illustrated in Figure 7, an electric motor **68** or the like drives a bevel gear **72** through an infinitely variable gear **69** and a spur wheel gearing **70** as well as an additional infinitely variable gear **71**, the bevel gear **72** rotating the spur gear **74** through another bevel gear **73**. Supporting rollers **75** and **76** are driven by the spur gear **74** through additional spur gears arranged coaxially with the latter. Arranged on the shaft of the supporting roller **76** is a belt pulley or the like driving, a belt pulley on the shaft **78** by means of a belt **77**. Chain-wheels and chains or like transmission systems may be used instead of belt pulleys and belts.

Arranged on the shaft **78** is a winding bar **79** by means of which the coil **80** of strip material is set in rotation. After the strip or web **81** of, for example, paper has passed through a sealing means (not shown) between the preceding chamber of the installation and that chamber of the installation receiving the winding device, the web travels over guide rollers **82**, **83** and **84** and on to a roll **80**.

A feeler roller **85** or the like loaded by its own weight runs on the roll **80**, and is carried by an arm **86** which is pivotally mounted at **87** and which (in a manner illustrated in purely diagrammatic form) operates through a control line **88** on an adjustment means **89** of the infinitely variable gear **71**.

Thereafter, by use of the supporting roller **76**, the paper web **81** is wound on the winding bar **79** and in order to maintain the prescribed speed of the web, the infinitely variable gear **71** is so influenced by means of the pivoted feeler roller **85** (acting through the adjustment means **89**) which is influenced by the diameter of the roll **80** that the winding speed for the web **81**, which speed positively increases with increasing diameter of the roll **80**, is maintained by the infinitely variable gear **71** at the prescribed value, for example, is kept constant, that is to say, the gear **71** correspondingly reduces the speed imparted to it by the driving motor **68** through the two gears **69** and **70**, so that the supporting roller **76** driving the winding bar **79** is given a driving speed which is lower in proportion as the diameter of the roll increases.

With the construction illustrated in Figure 8 (which figure illustrates a winding of the material on to supporting rollers according to the invention) all the elements of Figure 7 are provided with the same reference numerals. The difference as compared with the other winding system is that the supporting rollers **75** and **76** drive the roll of strip **80** constantly winding on to the rollers at the periphery of the roll of strip material. In this case, after the strip or web **81** has been guided over the guide rollers **82**, **83** and **84**, it travels over the supporting roller **76** on to the reel **80**, which is rotated at the same speed as that at which the supporting rollers **75** and **76** are driven, the speed of the latter being adapted to be regulated to a predetermined value by means of the gear **69** in the same way as the winding bar arrangement of Figure 7.

The conversion of the arrangement in which the material is wound on winding bars to the arrangement using supporting rollers is effected merely by replacing the winding bar by the reeling rod used with the supporting rollers, or vice versa.

With the strip guiding and sealing arrangement shown in Figure 9, the strip travels through a heating chamber **91** which is heated by electric heater wires **92**, infra-red radiators or the like, then through a slot **93** of a sealing disc **94**, whence it travels through a liquid **95**, for example, an impregnating liquid, and around a roller **96** which is sealed in relation to the container holding the liquid by means of a spring-loaded slide **97**; the strip then leaves the liquid again, passes through the slot **98**, around a guide roller **99** to a roller **100** in a vacuum chamber **101**, and continues from roller **100** over a guide roller **102**, through a slot **103** of a sealing disc **94**, into the impregnating liquid **95** again, around a roller **104** (which is of resilient material and is under the action of a roller **105** sealed off in relation to the container by a spring-loaded slide member) through the liquid in an upward direction to a slot **106** in the sealing disc and from thence over a guide roller **107** and out through the chamber **91**.

The liquid **95** is in a container **108** divided into the two branches **57** and **58**. Connected to the bottom **117** of the container and acting as communicating tubes are two pipe connections **109** and **110** having valves **111** and **112**, respectively. Also connected to the bottom **117** is a pipe **113** which leads by way of a valve **114** to a recirculating pump **115** which conveys the liquid through a pipe **116** back into the container **108**. A heating coil **118** is provided just above the bottom **117** of the container.

Arranged above the roller **100** in the vacuum chamber **101** is an infra-red radiator **119**. A vacuum pump is connected at **120**.

What we claim is:

1. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uniform construction to thereby allow an interconnection of the individual sections in any desired sequence, means to adjust the sections relative to one another to form one entire installation, said packing means being disposed around the outside wall of the vessel section.

2. Installation according to claim 1, wherein each section of the boiler, is provided on at least one end with a ring which is rigidly connected around the section and projects beyond the end, the said ring embracing the next section to be coupled at this point or is enclosed by the section, and wherein a resilient packing ring bearing on two parts to be sealed off relatively to one another is provided in at least one encircling groove of the ring and/or of the supporting part forming the counterpart to the said ring.

3. Installation according to claim 2, wherein the packing ring is a tube which is adapted to be inflated by means of a fluid introduced into the said tube, the tube being held in its groove, preferably by means of an adhesive and/or by means of parts of a groove engaging over the said tube.

4. Installation according to claim 3, wherein electric lead-in conductors are embraced at the sealing points of the lead-in position by a hollow packing ring which if necessary is adapted to be inflated and which is surrounded by an annular groove.

5. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uni-

form construction to thereby allow an interconnection of the individual sections in any desired sequence, a common pump associated with a plurality of subsequent vessel sections which are separated from each other by separating walls, for the production of a vacuum, and further a separate pump associated, with each vessel partition for maintaining of different vacua, the separating walls being provided with sealable valves, one part of the installation being supplied by a vacuum pump, preferably a steam-jet pump which is economic in a low pressure range and after the throttle valve, overflow valve or the like provided between the parts of the installation has been closed by the initial vacuum obtained with this pump, the initial vacuum side of the said pump parallel to a different part of the installation being adapted to be connected to the full vacuum pump which is common to the parts of the installation; wherein at those sealing points between two chambers of different pressure designed for guiding through the material to be conveyed, sealing surfaces are provided which travel at the same speed with the said material and over a relatively long distance, at least one of said sealing surfaces being formed by an endless belt.

6. Installation according to claim 5, wherein one sealing surface is formed by an endless belt and the other by a roller travelling with the material and at the same speed as the said belt or band, which roller is tightly gripped and accompanied over a large part of its periphery by the endless belt so that a travelling slit-like passage is formed.

7. Installation according to claim 6, wherein the belts and the sealing roller are at the same time driving means for the material enclosed thereby.

8. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uniform construction to thereby allow an interconnection of the individual sections in any desired sequence, wherein two discs are provided on the inside of a control window of a vapour-treating chamber, which discs are disposed in spaced relation to one another and are driven at the same speed, and are formed with openings arranged in such manner that those of one disc are associated with those of the other disc so as to form aligned viewing passages, the spacings of the discs, the holes therein and also the speed of the discs in relation to the speed of the particles of metallic vapour and the like being so chosen that a particle which has passed through a hole in the disc nearer to the vapour-treating chamber, owing to the further rotation of the other disc which has meanwhile taken place, impinges on the solid-walled parts disposed between the holes of the latter disc which acts as a screen.

9. Installation according to claim 8, wherein the discs are preferably combined to form a structural unit and those holes therein which together form the viewing passages are so arranged that the observer may preferably view the entire chamber from different positions.

10. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uniform construction to thereby allow an interconnection of the individual sections in any desired sequence, wherein the means for reeling the treated material is adapted to be changed merely by replacing the reeling rod accommodating the strip or web when a supporting roller system is used by the winding rod used with the winding rod system, and vice versa.

11. Installation according to claim 10, wherein a supporting roller serving to drive the coil of strip material in the supporting roller system is used at the same time for driving the winding rod in the winding rod system.

12. Installation according to claim 10, having a gear in the power transmission of the common drive means, the said gear being infinitely variable.

13. Installation according to claim 12, wherein an infinitely variable gear, is provided in the power transmission of the common drive means, which gear is adjusted in dependence on the increasing diameter of the coil of strip material in the winding rod system to the predetermined speed of the said strip material.

14. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uniform construction to thereby allow an interconnection of the individual sections in any desired sequence, wherein the guideway for the strip-like material comprises communicating tubes which are filled with liquid and through which the strip material travels, and wherein a liquid pump is provided by means of which, if necessary in conjunction with an automatic throttle valve, the level of the liquid, preferably a liquid acting at the same time on the material, is maintained at the required height in the two branches.

15. Installation according to claim 14, wherein resilient sealing rollers are provided between those branches of the system which communicate with one another, the material to be treated being guided between the said rollers.

16. Installation for continuously treating strip-like material in vacuo, comprising individual installation elements adapted to be assembled in sections, each section having a movable support, a vessel section mounted on said support, as well as internal means inside of each said section associated with a predetermined treatment operation, adjacent vessel sections having therebetween packing means sealing relatively to the outside space, said internal means inside of adjacent sections being separated from each other by at least one separating wall with sealing orifices for said strip-like material, the coupling between the individual installation sections being of uniform construction to thereby allow an interconnection of the individual sections in any desired sequence, wherein treatment units for lacquering, for impregnating, for drying and for calendering purposes can be arranged in any desired order relative to the first part of the installation of even greater negative pressure.

17. Installation for continuously treating strip-like material in vacuo with two or more treatment spaces enclosed in a vessel section, said spaces each containing an installation corresponding to a predetermined individual treatment operation or to a treatment stage, and which are separated from one another by at least one

separating wall with sealing orifices for said strip-like material, the units composed of a vessel section and internal installation being adapted for coupling and exchange with each other to a state of working readiness, sealing means relatively to the outside space being provided, each internal installation being adapted to be inserted into its respective vessel section, and both being mounted on a common movable means.

18. Installation according to claim 17, wherein the individual installation sections are adapted to be moved on rails independently of each other, and the strip-like material is adapted to be inserted and rolled over also when said individual installation sections are moved apart.

19. Installation according to claim 17, wherein means are provided permitting to adjust installation sections comprising vessel section and internal installation as a whole, against each other, as well as the internal installation

mounted on a special mounting against the corresponding vessel section.

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