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(11) **EP 1 077 177 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.02.2001 Bulletin 2001/08

(51) Int. Cl.⁷: **B65B 53/06**

(21) Application number: **00202627.6**

(22) Date of filing: **21.07.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **21.07.1999 IT MI991602**

(71) Applicant: **INTERDIBIPACK S.p.A.
20017 Mazzo di Rho (Milan) (IT)**

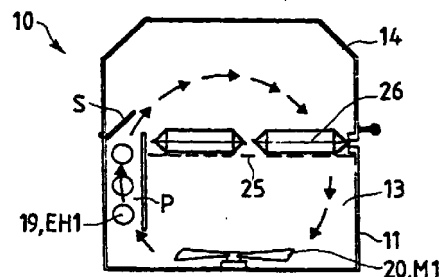
(72) Inventor: **DI BERNARDO Pietro
I- 20017 MAZZO DI RHO-MILAN (IT)**

(74) Representative:
**Martegani, Franco
Franco Martegani S.r.l.
Via Carlo Alberto, 41
20052 Monza (Milano) (IT)**

(54) **Process and machine for the packaging of products with a single-fold heat-shrinking film**

(57) A process for the packaging of products (26) with a single-fold heat-shrinking film (17) in a so-called "bell" type packaging machine, including the step of: first of all packing in a bag said numerous products (26) in succession, and then submitting said products (26) packed in a bag, at the same time and in a single step, to the heat-shrinking of the film (17) through the activation of circulation means forced by hot air.

Fig.13



Description

[0001] The present invention relates to a process for the packaging of various types of products, particularly, but not exclusively, relatively small-sized products, with a so-called single-fold heat-shrinking film.

[0002] The invention also relates to a machine for the realization of the above-mentioned process.

[0003] Those skilled in the art are well aware of the packaging machines that use a single-fold heat-shrinking film, that is to say a film that is folded lengthwise in order to distinguish two opposite sides which, once they have been moved away, create a space in which the product to be packaged is inserted.

[0004] Machines of this kind are for example disclosed and illustrated in the United States patent US-4.104.848 and in the European Patent EP-535747, to which reference should be made if further clarification is required.

[0005] Briefly, the packaging machine referred to in the above-mentioned patents is structurally formed by a packaging room which is closed at the top by a mobile bell, generally transparent, on top of a welding frame.

[0006] Inside said room the packaging process as well as the heat-shrinking process (when necessary) of the single-fold plastic film containing the product to be packaged are carried out at the same time, thanks to the forced circulation of hot air (obtained from one or more fans), which is heated and kept at a substantially constant temperature, which is relatively high (around 100°C-150°C), through the use of suitable heating means, placed within the packaging room.

[0007] More precisely, said heating means (opportunistically thermostated) are positioned within a "lung" where the heat is accumulated and released - through an automatic opening of the lung itself - when the bell is closed (lowered); this therefore leads to the activation of the welding blades and the start-up of the forced circulation of hot air fan.

[0008] As mentioned, this machine uses a so-called single-fold film, among the folds of which the product to be packaged is positioned using a work top positioned at the side of the packaging room.

[0009] The product, partially wrapped in the single-fold film, is dragged manually from said work top onto a net, or grill, work top placed inside the room (above the heating means and the fan) and the bell is lowered in order to activate the welding blades that close the open sides of the film.

[0010] At the same time, when the heat-shrinking process is expected, hot air is circulated, giving rise to the shrinking of the film itself around the product. In order to pick-up the package made, the operator lifts the bell in order to access to the support grill upon which the packaged product lies.

[0011] Automatic operation machines of this kind are also well-known, in which the product is fed to the packaging room by a continual netlike conveyor belt,

and in which the lowering and the raising of the bell are carried out mechanically, by one or more pneumatic cylinders.

[0012] In product packaging machines with heat-shrinking of the type mentioned above, the possibility of excluding heat-shrinking of the film on the product is available, therefore creating a package which is similar to a bag, but made from a plastic film.

[0013] This method of operation of the machine is achieved by excluding both the forced circulation of hot air from the operative cycle, that is to say deactivating the automatic activation of the fan/s when the bell is lowered (closure of the packaging room), i.e. at the moment that welding blades are activated, and the heating means.

[0014] In other words, in such a case, the machine simply operates like a common welding frame.

[0015] Considering the above, we must point out that, in the so-called well-known "bell" type packaging machines, in the method of operation with heat-shrinking of the plastic film onto the product, in each operative cycle, automatic opening of the heat lung is always provided for, and at the same time the activation of the fan that provoke the forced circulation of hot air within the packaging room and, consequently, the heat-shrinking of the plastic film on the product to be packaged.

[0016] Bell type machines, like the one described above, are used to package - even in just one company - numerous products of different kinds, of the most varied dimensions, maybe so large that they cover most of the support grill or so small that they cover just a tiny part, or in the middle.

[0017] In particular, in the packaging of small-sized products - or in any case products that on their own cover a small part of the support grill within the packaging room, just as for example small pictures -, those skilled in the art know very well that the product must be placed as close as possible to the corner of the grill, in order to avoid an excessive use and surplus of the material and to obtain a heat-shrunk package with satisfying finishing features.

[0018] This means that, in order to pack a large quantity of small-sized products which, using the bell type machine known, must be packaged one at a time, the following step correspond to each operative cycle (packaging): lowering of the bell, activation of the welding blades and of the fan/s that implement the forced circulation of hot air, lifting of the bell and extraction of the packaged product.

[0019] This way of operation means that, in each packaging cycle, when the operator opens the packaging room (lifting of the bell) he is impinged by an enormous quantity of hot air and fumes from the operation of welding and shrinking that escape from the open packaging room.

[0020] This fact represents a serious problem in that if the machine is used continually, or almost continually, during the day the working environment becomes

unhealthy.

[0021] In addition, the loss substantially of the entire volume of hot air contained in the packaging room, leads to a high energy consumption in each operative cycle (opening of the bell).

[0022] In order to resolve the above-mentioned problem, a proposal has already been made of applying suction means directly to the mobile bell.

[0023] However, such a proposal has turned out to be almost impracticable as remarkable power would have to be applied to try to achieve a suitable suction, without weighing down the weight of the mobile bell in an unacceptable manner.

[0024] Furthermore, such a solution does not resolve the problem of energy consumption and not even the problem related to environmental conditions.

[0025] Another problem which is not to be neglected, represented by the well-known bell type machines when numerous small-sized products are packaged, is the fact that the power applied (electrical energy) to each operative cycle is always the same, the maximum.

[0026] This means, not only high energy consumption even for the packaging of small-sized products, but also the confirmation of unacceptable overheating (around 100°C) of the work top (grill), or at the netlike conveyor belt in the automatic machines, and so the machine is not in compliance with current safety regulations.

[0027] Another problem of the machines that are presently used is represented by the relative slowness of the heat-shrinking step of small-sized products which, as they are placed in a corner of the support grill, they are not so easily reached by the flow of hot air issued by the fans. The general objective of the present invention is that of overcoming the above-mentioned drawbacks of the state of the art, creating a packaging process, and a machine suitable for its realization, which allows for the packaging with a single-fold heat-shrinking film and in particular of small-sized products, with a low energy consumption, therefore drastically reducing the escape of hot air and fumes when the packaging room is opened (lifting of the bell), finally achieving a package with perfectly closed and stable welding lines and with a remarkable reduction in time-cycle, therefore with an increase in productivity.

[0028] The above-mentioned objective is achieved, according to the present invention, by adopting a packaging process which is different from the ones presently used in bell-type machines.

[0029] The innovative concept upon which the process of the invention is based is that of packaging in a bag, in succession, numerous products and then submitting them, at the same time and in a single step, to film heat-shrinking.

[0030] More precisely, the above-mentioned objective is achieved through the use of a process and a machine with the features indicated in the attached

claims.

[0031] The structural and functional features of the present invention and its advantages with regards to the well-known techniques are even more clear and evident from a consideration of the following description, referred to the drawings attached, which illustrate an example of the machine aimed at activating the process according to the invention.

[0032] In the drawings:

- figure 1 illustrates a "bell" type packaging machine in a non-operative position (bell lifted up) ready to receive a product to be packaged placed between the raised edges of a single-fold heat-shrinking film;
- figure 2 illustrates the same machine in figure 1 in an operative position (bell lowered) in the realization step of the bags (welding blades activated, heating means activated and thermostated, absence of forced circulation of hot air);
- figures 3 and 4 are details which illustrate the grill of the machine upon which the first bag and numerous other bags have been positioned which have been packaged in succession after the first one, respectively;
- figures 5 and 6 illustrate the simultaneous heat-shrinking step of all of the previously packaged bags, controlled by the operator;
- figure 7 illustrates an example of the electrical layout of a "bell" type machine in which the welding and the heat-shrinking of the film on the product to be packaged comes about at the same time that the bell is closed (lowered);
- figures 8 and 9 illustrate two examples of electrical layouts suitable, respectively, for two different possible methods of activation of the process according to the invention; and
- figures 10 to 13 are schematic plans illustrating the operative step of the process according to the invention.

[0033] With reference to the drawings, a machine for the execution of the process according to the invention is generally indicated by 10, and is structurally made up of a fairing 11 including: a packaging top 12, a packaging room 13 (figures 5, 6), a transparent bell 14 for closure of said room 13, and a heating system and forced circulation of air into the space identified by said room 13 and bell 14.

[0034] Furthermore, the fairing 11 brings at least one cradle support 15 of a coil 16 of single-fold heat-shrinking film, idle rolls 17, 17A, of film return, and control panels 18, 18A.

[0035] The above-mentioned heating system and forced air circulation in the space identified by the room 13 and of the bell 14 include thermostated heating means, for example at least one resistor 19, EH1 and at least one fan 20, M1 (figures 5, 6). The resistor 19, EH1 may be contained within a lung P closed at the top by a

flap S which opens when the bell 14 is lowered to the position of figure 1 and to that of figure 2, in a way that is well-known to men skilled in the art, as for example described and illustrated in US-4.104.848.

[0036] At the top of the fairing 11 two welding and film cutting blades 21, EH2 and 22, EH2 are provided for, these blades are placed respectively in the diagonal and longitudinal directions (figures 1, 5 and 6) and their objective is to weld-seal together the two open sides of the single-fold film 17B and to separate the finished packaged from the film.

[0037] As those skilled in the art know, said blades 21, EH2 and 22, EH2 distinguish a so-called welding frame and they cooperate with counter-blades 23, 24 mounted onto the bell 14.

[0038] 25 indicates a net work top (grill) upon which the products 26 to be packaged are brought and positioned, arranged between the open folds 27, 28 of the film 17B (figure 8).

[0039] According to the packaging process of the invention, numerous products 26, especially small-sized products with regards to the surface of the top 25, are packaged in a bag, as illustrated in figures 3, 4 and 5 and the packaged bags are left on the work top 25 itself (figure 5) until it is filled (covered), or rather until packaging of the last product. After this, the forced air circulation is activated manually or automatically through the activation of the fan 20, M1, for a suitable period of time to apply the film to all of the packages in bags at the same time, as illustrated in figures 6, 13.

[0040] More precisely, the process of the invention is described with reference to the electrical control layouts of figures 7-9.

[0041] In the exemplificative case in which the invention is activated by a traditional "bell" type machine, the control circuit may, for example, be of the kind illustrated in figure 7, predisposed to activate at the same time the welding operations of the film and the heat-shrinking of the same on the product to be packaged when the bell 14 is closed (lowered).

[0042] More precisely, in such a case of normal operation well-known to men skilled in the art, the machine is in the condition indicated in figure 7.

[0043] The temperature of the heating resistor 19, EH1 is regulated by a thermostat BT1 and the heat does not spread throughout the packaging room 13 because 19, EH1 is, for example, closed in the temperature insulated lung p.

[0044] By closing the bell 14, the flap S of the lung P is opened mechanically as illustrated in figure 13, while a limit switch S1 is closed. With closure S1 (limit switch of closing-lowering of the bell 14) the welding of the film is activated for the period of time indicated on a timer KT1 (passing excitation) and at the same time the fan motor 20, M1 is powered. 20, M1 creates a forced air ventilation in the packaging room 13, and so said air flow - heated by conduction of the resistor 19, EH1 - constitutes the means for heating the heat-shrinking film

which wraps the product, therefore creating shrinking.

[0045] Naturally, even the action of the fan 20, M1 can be timed: however, such timing, for simplicity of illustration, has not been illustrated in the control circuit of figure 7.

[0046] By using, for embodying the invention, such a well-known bell-type machine, the traditional circuit of figure 7 can, for example, be modified as illustrated in figure 8 and the operative cycle of the invention is the following.

[0047] The machine is in the condition indicated in figure 8.

[0048] The temperature of the heat resistor 19, EH1 is regulated by the thermostat BT1 and the heat does not spread through the packaging room 13 as 19, EH1 is closed in the temperature insulated lung P.

[0049] When the bell 14 is closed from the position indicated in figures 1, 11 to the position as indicated in the figures 2, 5 no shrinking of the film is noticed as the fan 20, M1 is never powered.

[0050] Therefore, the operator may continually produce bags until the entire surface of the grill 25 is filled (as illustrated in figures 5, 12) and, for example, during the creation of the last bag, the operator himself may push a button for manual shrinking SB1 which starts-up the fan 20, M1, activating the above-mentioned forced air fan and therefore at the same time the shrinking of the film of all of the bags previously made.

[0051] The time required to shrink the film on the bags may be managed in the two following ways.

[0052] Manually, keeping the button SB1 pushed down until reaching the level of heat-shrinking required, which will be visually controlled by the operator.

[0053] Or automatically, using a time switch which generates, through the pressure of the button SB1 a single start-up impulse for the timer D2 and leaving it to manage the predefined heat-shrinking time of the film on the product.

[0054] A method of timing management of the film shrinking time is represented in the circuit of figure 8, where the button SB1 controls the reel of a relay K1 which is used:

- a. to power the fan 20, M1 through the use of a proper contact K1.1; and
- b as a signal to start the timer D2 through the use of a proper contact K.1.2

[0055] We must point out that D2 is a timer with a "delay passing to instant excitation to the control" function, ie. D2 closes its own contact D2.2 on the rise front of the impulse on the starter pin for the time defined by the operator: A1 and A2 are the power pins of D2.

[0056] The process of the invention can be, for example, executed even in the manner illustrated in the control circuit of figure 9.

[0057] The machine is in the condition of figure 9.

[0058] In this case it is possible to automate the

activation of the button SB1, described with reference to the operation method of figure 8, without operator assistance.

[0059] Such a possibility may be obtained using a piece counter or an impulse counter D1.

[0060] Said impulse counter D1 is designed, after its activation, through a piece counter selector SA2, according to the number of packages that make up the entire group to be heat-shrunk.

[0061] The impulse counter D1 receives the impulse generated by the limit switch S1 as an impulse to be counted on pins CP (closing-lowering of the bell limit switch 14) and therefore at any impulse it operates the welding of a package in a bag (one bag = one impulse).

[0062] When the count of the impulse counter D1 coincides with the quantity of packages defined, making up the group to be shrunk, then the same impulse counter D1 generates an impulse on the OUT pin in order to be reset for a new count.

[0063] This OUT impulse generated is a start signal for the D2 timer, therefore for simultaneous heat-shrinking of the entire set of bags.

[0064] The objective mentioned in the preamble of the description, of packaging with a single-fold with heat-shrinking film of small-sized products, with a low energy consumption is therefore achieved, greatly reducing the escape of hot air and fumes when the bell is lifted, and obtaining a package with perfect welding lines, in a single shrinking operation on all of the products, this requiring a shorter time-cycle time in comparison with the times required to carry out welding and film heat-shrinking operations on each product one at a time.

[0065] Of course, it is preferable, but not vital, that the bell-type machine for the realization of the process according to the invention operates even to carry out at the same time welding operations and film heat-shrinking operations on a single product to be packaged, as described with reference to the control circuit of figure 7.

[0066] Numerous variants can be provided for in the construction of the "bell-type" machine for the execution of the process of the invention. For example, the heating means (resistor 19, EH1) may not necessarily be closed in a lung P, and they may be positioned wherever is considered most suitable.

[0067] It is, in fact, only necessary to guarantee the presence of an environment of hot air in the packaging room 13 so that when the forced circulation is activated, the hot air itself insures suitable shrinking of the film onto the product.

[0068] The power of the products inside the packaging room, rather than being carried out manually, can also be carried out mechanically using techniques and systems that are well-known in the field.

[0069] The scope of the invention is therefore defined only by the following claims.

Claims

1. A process for the packaging of products (26) with a single-fold heat-shrinking film (17B) in a so-called "bell" type packaging machine, that is to say including: a packaging room (13) which is closed at the top by a mobile bell (14) over a welding frame (21, 22), in said room (13) air heating means (19, EH1) is provided for together with means (20, M1) for the forced air circulation of said hot air, the process being characterised by the steps of: first of all packing in a bag numerous of said products (26) in succession, and then submitting said products (26) packaged in a bag, at the same time and in a single step, to heat-shrinking of the film (17B) using the execution of said means (20, M1).
2. A "bell" type packaging machine for the execution of the process according to claim 1, characterised in that it provides for actuator means (SB1) which lead to the selective intervention of said means (20, M1) for the forced circulation of hot air in said packaging room (13).
3. A machine, according to claim 2, characterised in that said actuator means (SB1) are made up of a manual activation button.
4. A machine, according to claim 2, characterised in that said actuator means (SB1) are of an automatic intervention type.
5. A machine, according to claim 2, characterised in that it includes a control circuit in which: the temperature of said heating means (19, EH1) is regulated by a thermostat (BT1) and the heat does not spread through the packaging room (13) because (19, EH1) are closed within a thermo-insulated lung (P), in which, when the bell (14) is closed the film does not shrink around the product because said means (20, M1) are never powered, and for example during the realization of the last bag, said means (SB1), which start up the means (20, M1) may be manually activated, activating the forced air ventilation and therefore at the same time the shrinking of the film in all of the bags that have been previously made.
6. A machine, according to claim 3, characterised in that the shrinking time of the film on the bags is managed automatically through the use of a timer, generating through the pressure applied to said button (SB1) only one start-up impulse for the timer (D2), and leaving the latter the management of the predefined time of film shrinking around the product, therefore said button (SB1) controls the coil of a relay (K1) which is used:

- a. to power the means (20, M1) of forced air circulation, through a proper contact (K.1.); and
- b. as a signal to start the timer D2 through the use of a proper contact (K.1.2), (D2) being a timer with a "delay passing to instant excitation to the control" function, ie. D2 closes its own contact D2.2 on the rise front of the impulse on the starter pin for the time defined by the operator, (A1) and (A2) being the power pins of D2.

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7. A machine, according to claim 5, characterised in that it includes a piece counter or impulse counter (D1), said impulse counter (D1), being set, after activation of the same through a piece counter selector (SA2), according to the number of packages that make up the entire group to be heat-shrunk, the impulse counter (D1) receives as an impulse to be counted the impulse generated by the limit switch (S1) (limit switch of closure-lowering of the bell 14), on pin (CP) and therefore at each impulse the welding of a bag package is carried out (a bag = an impulse), when the count on the impulse counter (D1) coincides with the defined quantity of packages which makes up the group to be shrunk, then the same impulse counter (D1) generates an impulse on the pin (OUT) in order to be resetted for another count, such impulse (OUT) generated is the start signal for the timer (D2), therefore for heat-shrinking at the same time of the entire group of bags.

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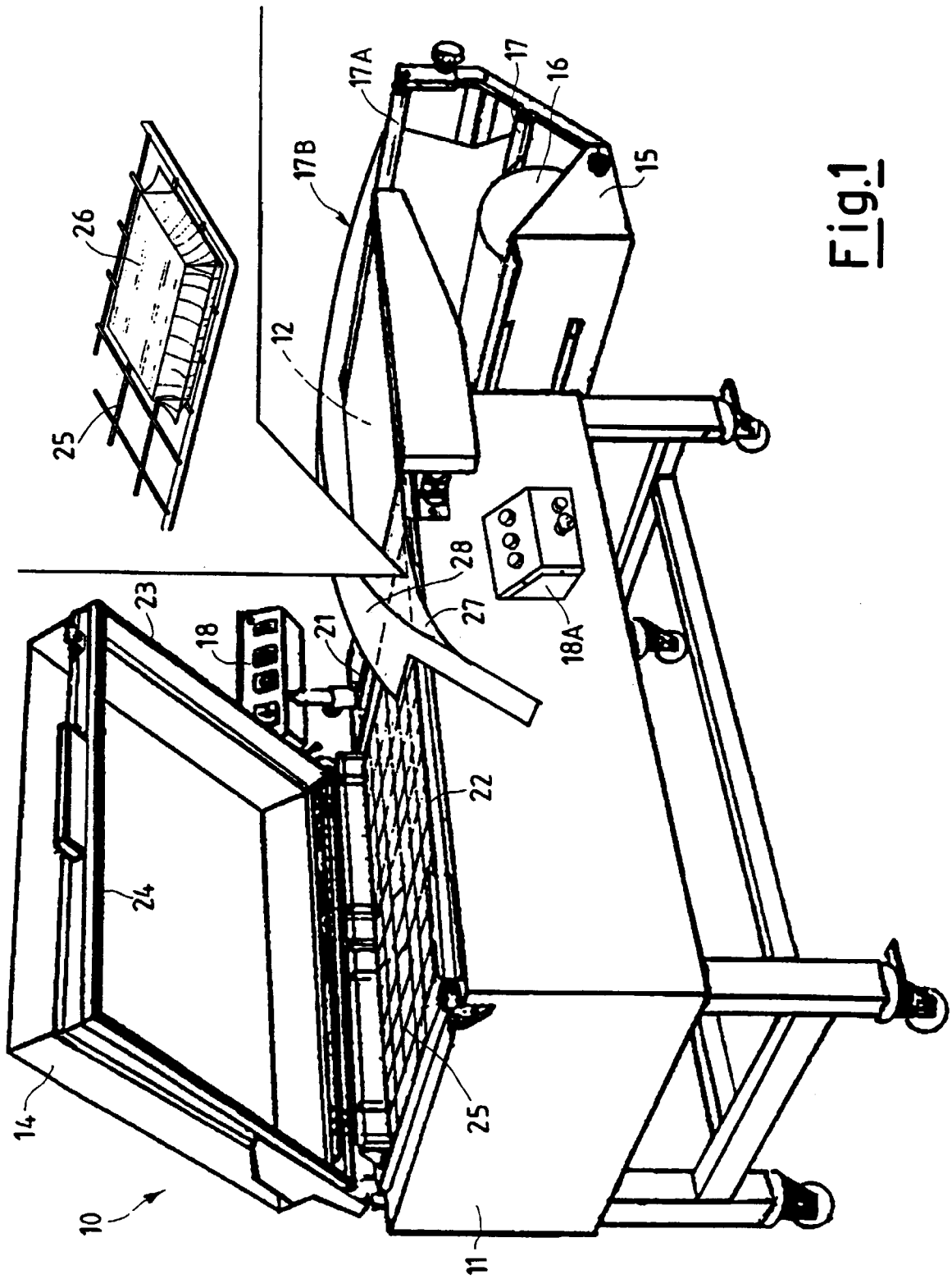


Fig. 1

Fig.2

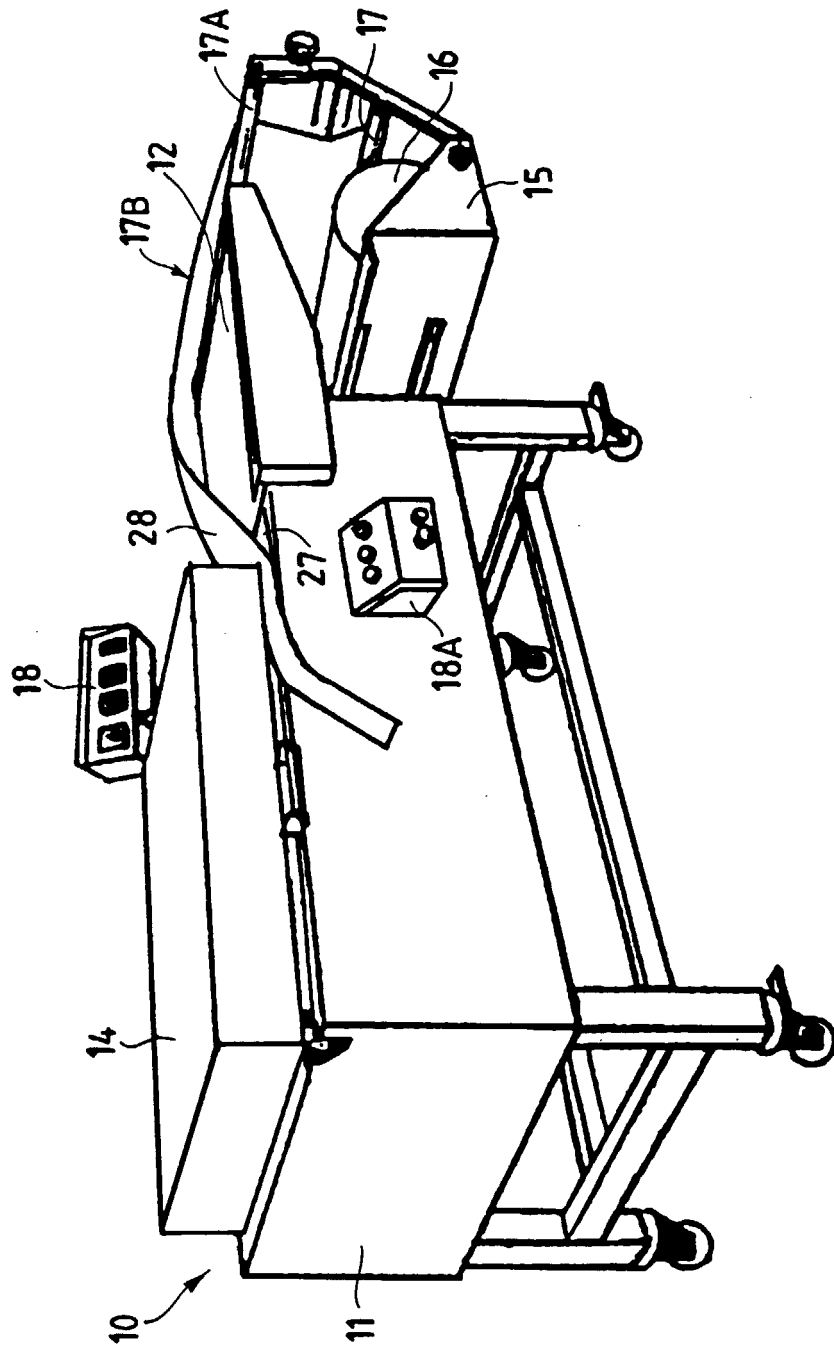
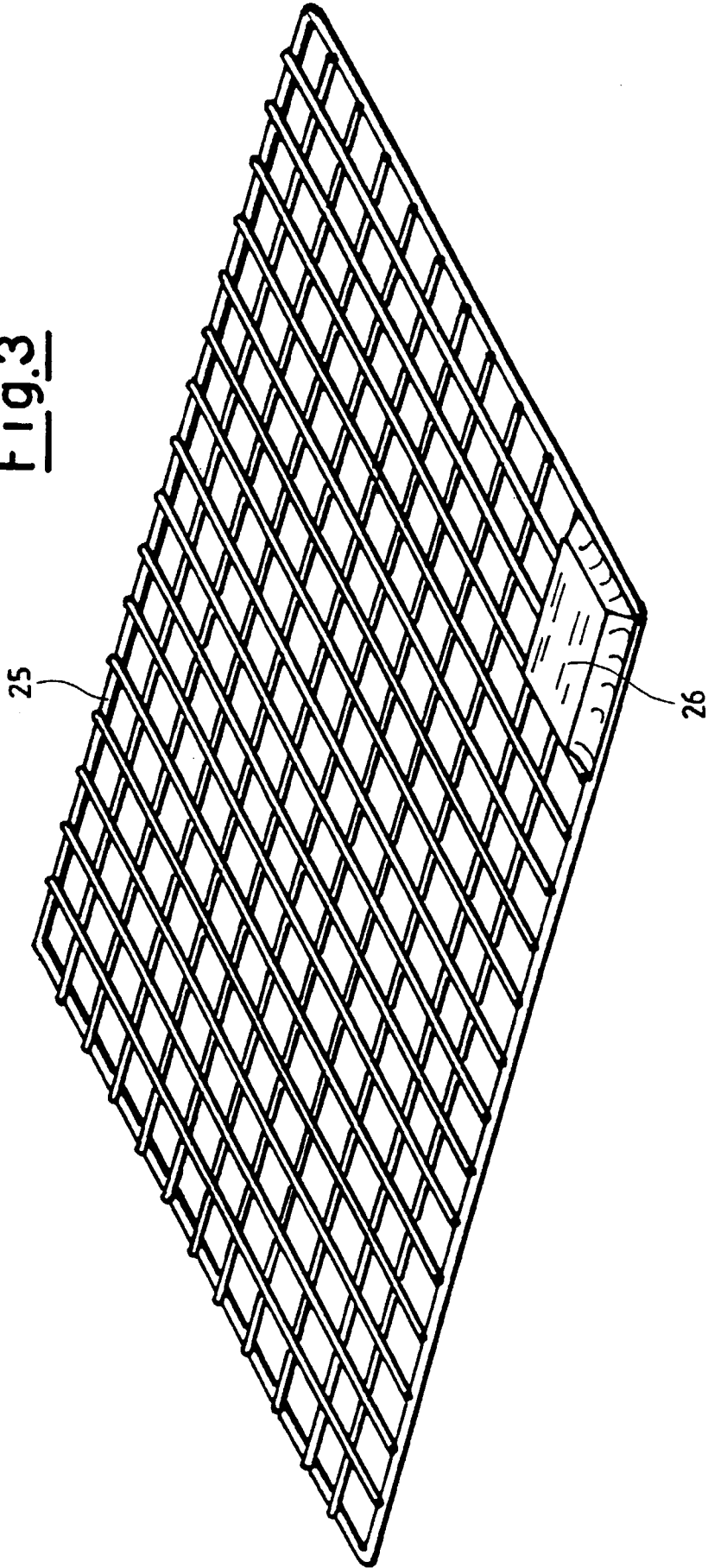
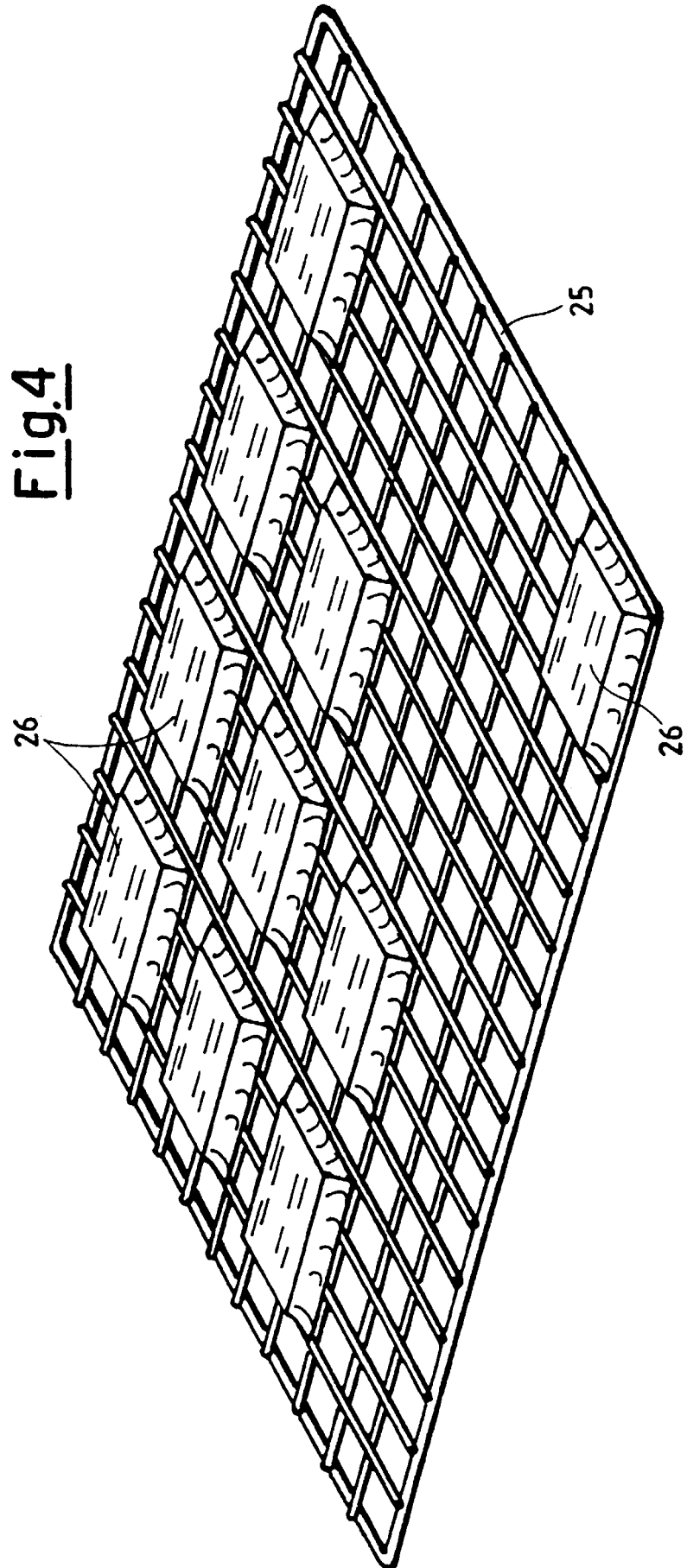
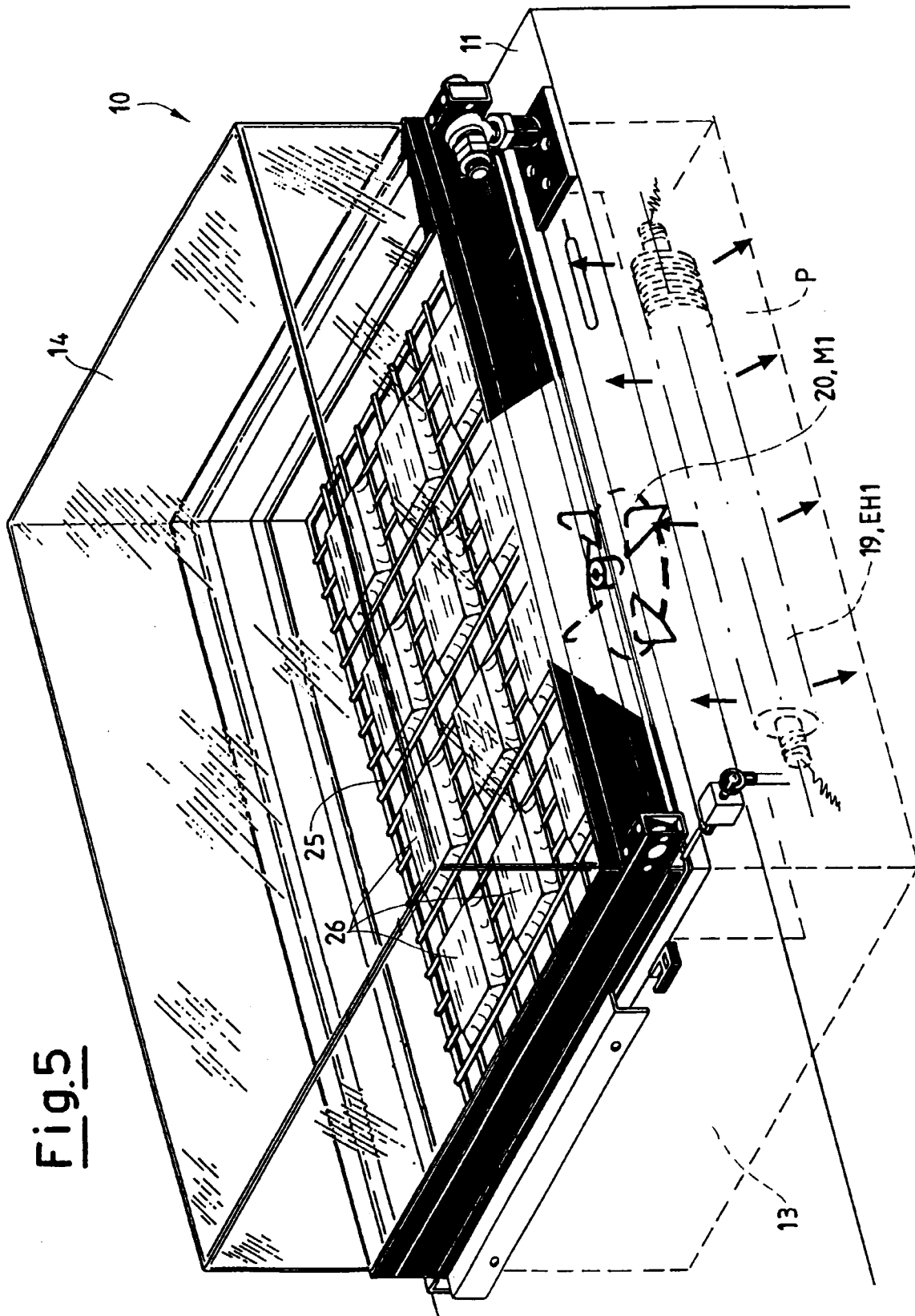


Fig.3







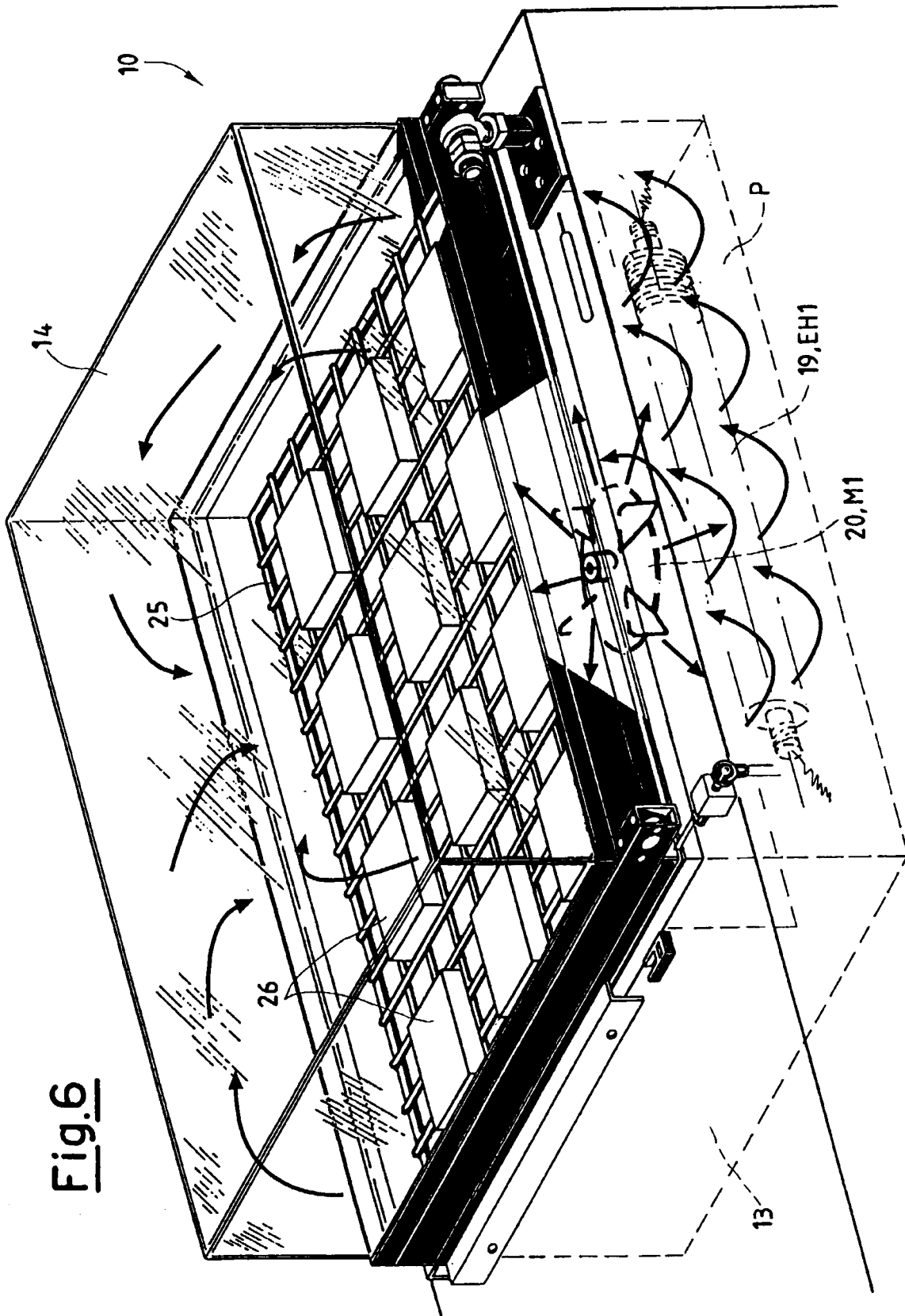


Fig. 6

Fig.7

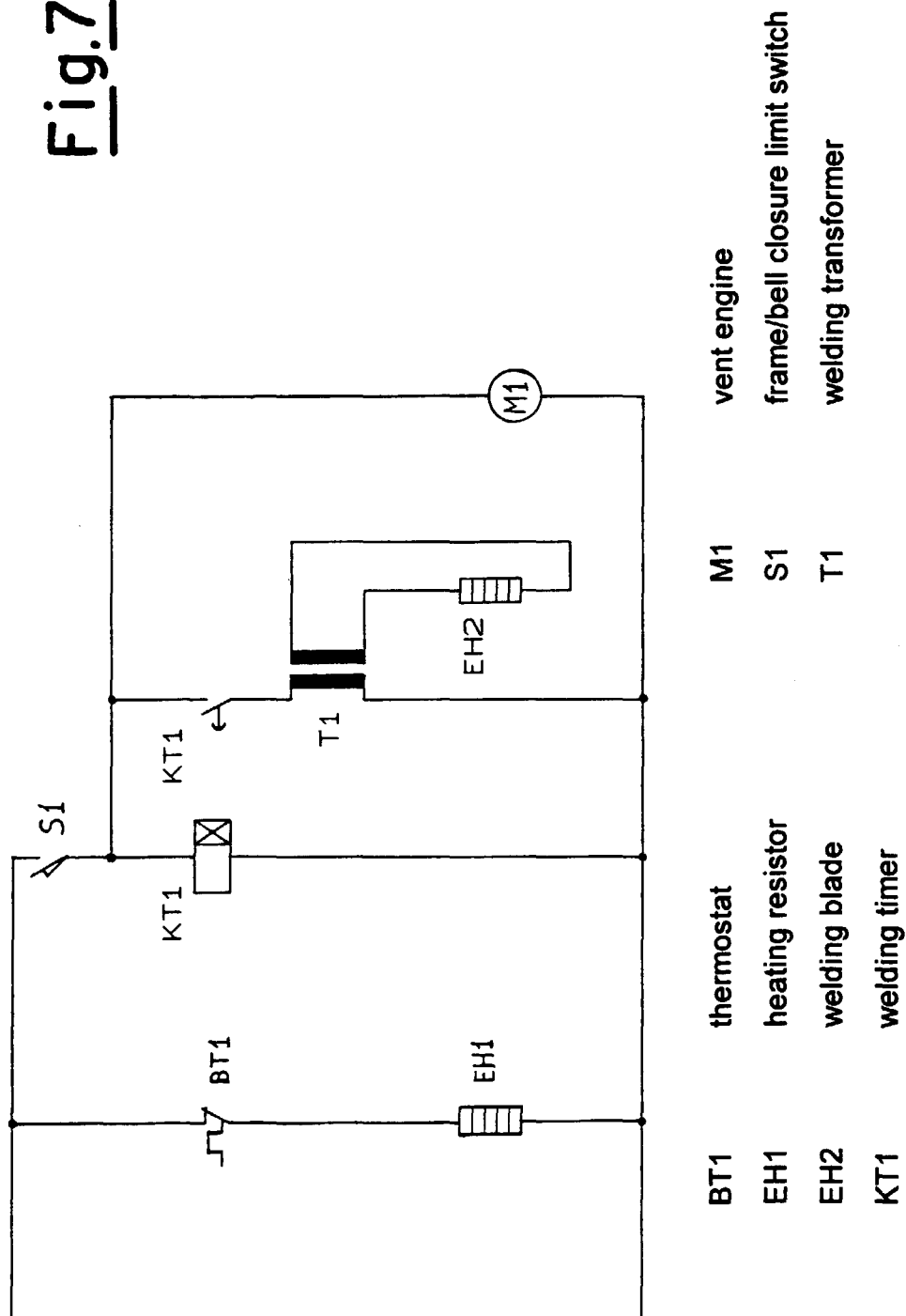
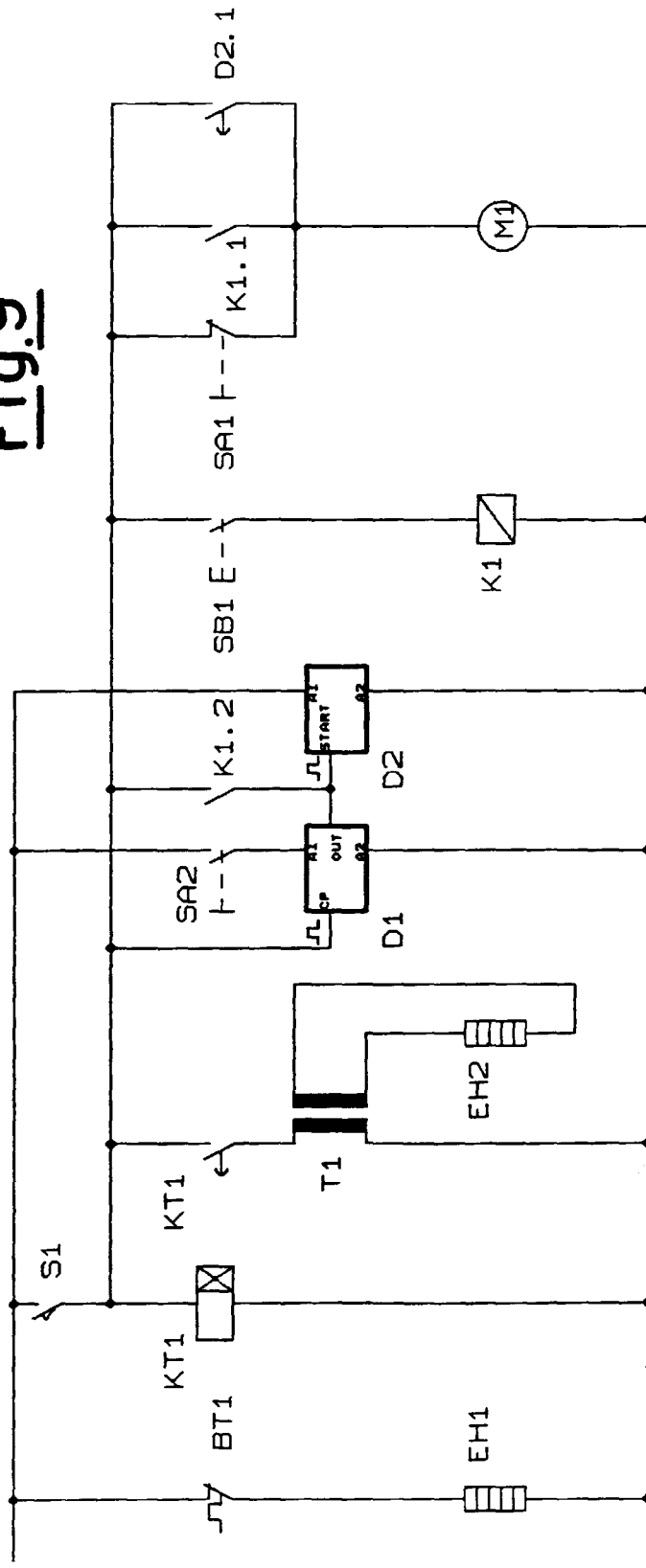


Fig. 9.



BT1	thermostat	M1	vent engine
D1	impulse counter	SA1	vent exclusion selector
D2	timer	SA2	piece counter selector
EH1	heating resistor	SB1	manual shrinking button
EH2	welding blade	S1	frame/bell closure limit switch
K1	relay	T1	welding transformer
KT1	welding timer		

Fig.10

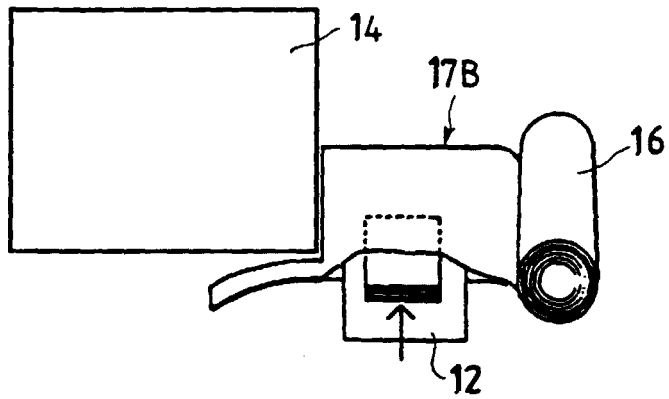


Fig.11

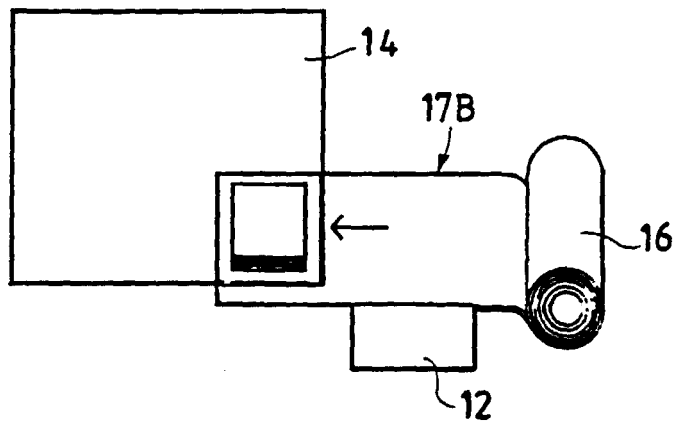


Fig.12

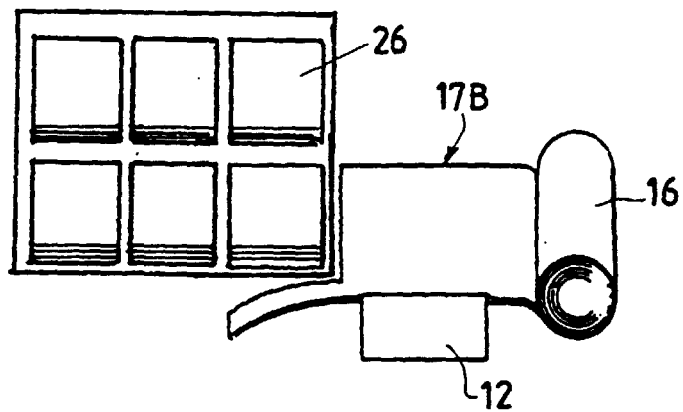


Fig.13

