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(54) Automatic sack filling machine

Automatische Maschine zum Befüllen von Säcken

Machine automatique pour remplissage de sacs

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(56) References cited:
EP-A- 82 955
DE-A- 2 634 754
FR-A- 2 062 621
FR-A- 2 267 241
FR-A- 2 324 514
FR-A- 2 505 771
IT-A- 1 183 012
US-A- 3 948 019

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Description

Sack filling machines are known, which comprise:

- a station for cyclically feeding a sack, provided preferably with means for cyclically forming a sack by sealing and cutting operations from a continuous tube of heat-sealable film, usually with bellows side folds;
- a station with means for opening the mouth of the sack;
- a station with means for filling the sack with a product;
- a station with means for closing the sack by a transverse heat-sealing operation;
- a station with means for cooling the transverse seal which has closed the sack.

Said stations are arranged after each other along a rectilinear path of travel, are equally spaced apart, and are provided with grippers mounted on a structure which is moved so that, after the operations at the various stations, the mouths of the sacks are simultaneously disengaged from the respective stations by means of a downward displacement, after which the said sacks are moved horizontally and are transferred to the successive station. The mouths of the sacks are then raised and inserted, simultaneously, into the above station so as to be retained thereby. The grippers which have transferred the sacks are then opened, are raised to move away from said sacks, and then are moved horizontally to be returned to the original stations where they are lowered to repeat the cycle described above.

A machine of this type is described, for example, in the Italian Patent No. 1.213.889 in the name of the same applicant.

According to the present invention, the sack filling machine comprises a particular rocking structure mounting the grippers designed to transfer the sacks to the various operating stations. The grippers have been reduced thanks to the omission of the sack-opening station, which has been incorporated in the sack-forming station. Moreover, the cooling station has been incorporated in the final sealing station. The operating stations arranged after each other are thus reduced to three and the transfer of sacks between them can be effected by only two pairs of grippers.

In the machine according to the invention, the means for opening the sack have been incorporated in the intermediate filling station, so that said sack can be transferred to said station while still in a flattened and closed condition as when formed, thus reducing the problems.

The grippers that transfer the sacks from the filling station to the final sealing and cooling station, are fixedly mounted on the rocking supporting structure, since this structure itself moves said grippers towards and away from each other to grip the opened mouth of the filled sacks and to pre-close said mouth by a transverse stretching action, prior to its entrance into the sealing station. This solution has permitted the use of gripper displacing means very sturdy and powerful, capable of operating even with considerably heavy sacks without requiring any oversizing of the gripper-supporting structure. This solution has also permitted to reduce the transverse space requirement of the machine considerably.

Further characteristics of the machine according to the invention, and the advantages resulting therefrom will appear from the following description of a preferred embodiment thereof, shown merely by way of non-limiting example, in the attached drawings, in which:

Figure 1 is a perspective side view of the structure having a composite rocking movement, which supports the two pairs of grippers which transfer the sacks to the operating stations of the machine;

Figure 2 is an enlarged perspective view from below, of the lower side of the structure shown in Figure 1;

Figure 3 shows a kinematic diagram of one of the two articulated-parallelogram assemblies forming the rocking structure of the preceding Figures, as seen from one side;

Figure 4 is a front perspective view of the upper portion of the pair of levers of the rocking structure shown in the preceding Figures, with the grippers for transferring a sack from the opening/filling station to the final sealing station;

Figure 5 is a perspective view of the intermediate sack-opening/filling station in the rest condition;

Figures 6, 7 and 8 are perspective views of the lower portion of the station of Figure 5 during the successive working steps;

Figure 9 is a partly sectional view of one of the stationary grippers which operate at the intermediate sack opening/filling station;

Figures 10, 11, 12, 13, 14, 15 and 16 are diagrammatic top plan views of the intermediate sack opening/filling station, during successive working steps.

In the Figures 1, 2 and 3, to which reference is made first, S1 indicates the station at which a sack is formed cyclically by sealing and cutting operations by the action of opposite devices 1 and 2 which are mounted on parallel opposite carrier assemblies 3-4, movable on stationary guides 5 and connected to a self-centering actuating mechanism 6 of the crank/connecting rod type which, in turn, is connected by a crank 7 to a pair of fluid-operated double-acting jacks 8 by means of which said crank 7 can be moved selectively to the positions A-B-C.

Pairs of pressure bars 9 and 10 are mounted, with an intermediate springing system, on the assemblies 3-4, while cooling air dispensing bars 11-11' are arranged on the pressers 9 and directed towards the sealers 1.

In Figure 3, F indicates the tube of heat-sealable bellows-folded film coming from the powered feeding rollers 12 and inserted, under command, to a suitable extent between the sealing and cutting means 1-2 in the opened position thereof. On completion of the movement of the tube F the actuation is effected of the jacks 8 to move the crank 7 from the position A to the position C. The tube F is acted upon first by the pressure bars 9-10 and then by the sealers 1 and cutting means 2. During this step the sealing is effected of the bottom of a sack which will be completed during the successive working step and the severance is effected therefrom of a sack which has been formed during the preceding step. During this step, the cranks of the actuating mechanism 6 are slightly beyond their dead centers and maintain a controlled pre-established pressure against the tube to be sealed, thus granting the quality of the sealing effected by the devices 1.

In the successive step, the crank 7 is moved to the position B to move the sealing/cutting means 1-2 away from F, while the pressure bars 9 and 10 are kept closed against the tube and against the sack obtained therefrom. A jet of cool air is issued from the bars 11-11' and is directed against the seal effected by the means 1 in order to cool it and assure the required mechanical strength.

Before the crank 7 moves to the position A to return the sealing/cutting assembly to the rest position, as from Figure 3, the sack Z which has been formed at the station S1 is gripped laterally at its upper portions by a pair of pneumatically operated grippers P1 (Figures 1-2) which afterwards will transfer it in its closed condition to the intermediate opening/filling station S2. During this step, a stronger pair of grippers P2 will seize the side upper portions of the sack that has been filled previously at the station S2 and will transfer it to the final station S3 which effects the top closing seal of the sack and which incorporates the means to cool said seal.

During the filling step at the station S2 and transferring step to the station S3, the sack is supported by an underlying conveyor 13 of a conventional type, which comprises an initial rocking portion 113 which at the beginning of each step is in its lower position, as shown with solid lines, and which is raised during the filling of a sack in order to better support said sack and ensure a uniform filling thereof. To this end, the initial portion 113 of the conveyor can, if desired, submit the sack, during the filling step, if desired, to a slight subsultory movement. The conveyor 13 is of suitable length for discharging the sack after the closing step at the final station S3 and is connected to an actuating unit (not shown).

It appears from Figures 1-2-3 that the grippers P1 and P2 are mounted on two horizontal, parallel cradles 14-14', arranged at the same level and directed longitudinally at the sides of the machine. The ends of said cradles are connected - by articulating them on horizontal shafts 15-15' perpendicular to said cradles - to the lower ends of respective pairs of parallel and equal connecting rods 16-16' which are directed upwards and are supported indirectly at their upper ends, so as to be swingable on axes 17-17' parallel to said lower shafts, by the frame T of the machine. The cradles 14-14' form the lower mobile side of two articulated parallelograms which are connected by means of links 18 to a pair of cranks 19 which are keyed on a synchronization shaft 20 which is actuated, for example, by a self-braking geared motor 21. The oscillatory movement of the connecting rods causes the longitudinal reciprocating movement of the cradles 14-14' to transfer the sacks from a station to the successive one and to return to the initial position.

Said axes 17-17' are the axes of respective parallel shafts 22 of the type shown in Figure 4, on which said connecting rods are mounted with the interposition of bushes and bearings. These shafts, in turn, are supported rotatably at the ends thereof by the frame T of the machine, with the interposition of cranks having the same characteristics and so timed whereby said shafts can rotate on respective axes 23-23' which are parallel to and equally spaced from the axes 17-17'.

The axes 23-23' are synchronized between each other by a positive drive 24 of any suitable type, e.g. a chain-and-sprocket drive or a toothed pulley and belt drive. One of the axes 23-23' is connected, in turn, by a rigid drive 25, to a self-braking geared motor, not shown. The intermittent rotation of the eccentrics 17-23 and 17'-23' causes the grippers mounted on the cradles 14-14' to move up and down as required for inserting and withdrawing the sacks, respectively, into and from said stations S1-S2-S3.

In the machine being described, it has been foreseen, for example, that the grippers P1-P2 reach the stations S1-S2 in the opened and raised condition. Here, the grippers will close to seize the sacks at their sides, and then they move down to withdraw the sacks from said stations and then they transfer said sacks from S1 to S2 and from S2 to S3. On completion of this transfer, the grippers move upwards to introduce the sacks into the stations they have reached and after introducing them they open and oscillate to repeat the cycle just described. This succession of steps is ensured by suitable programming means, not shown, for actuating with suitable timing the geared motor 21 and the geared motor connected to the drive 25.

In Figure 3, H indicates the extent of the upwards and downwards displacement of the grippers, caused by the eccentrics 17-23 and 17'-23', and L indicates the extent of the backward and forward displacement of the assembly of grippers by the action of the cranks 19.

It appears from Figures 1 and 2 that the cradles 14-14' comprise an intermediate member 114-114' which is connected by means of cylindrical/vertical articulated joints 26-26' to the end portions 214-314 carrying the grippers P1-P2 and the pivots 15-15' to the connecting rods 16-16'. The cradles 14-14' are articulated since the grippers P2 are fixed to the ends 314 of the cradles and

are moved towards and away from each other, as required to transfer a sack from the station S2 to the station S3, as a result of a proportional parallel displacement of the connecting rods 16 towards and away from each other, these connecting rods 16 being of sturdier construction than the connecting rods 16' because they must bear stronger stresses.

It will be noted in Figure 4 that the bushes 27, cooperatively associated with the connecting rods 16 for rotation on the shaft 22, can also move axially on said shaft 22, for example by means of ball-recirculation bearings. Mounted centrally on the shaft 22 and prevented from displacing axially, there is a body member 28 having affixed thereto the intermediate portion of a rod 29 which is parallel to the shaft 22 whose end portions slidably support bushes 30 which are secured to the bushes 27. In this manner the connecting rods 16 are made solidary with each other in oscillating on the shaft 22.

The body member 28 is provided with a depending projection 128 having secured thereto two opposite pneumatic jacks 31-31', of equal characteristics, connected to the connecting rods 16 by means of tierods 131-131'. By varying the length of said tierods, the maximum mutual approaching condition of the gripper P2 is adjusted to the dimensions of the sack to be gripped. Conversely, the maximum spaced apart condition of the grippers P2 is adjusted by means of nuts 132-132' screwed on members 32-32' secured to the body member 28, parallel to the shaft and traversing the abutments 33-33' secured to the bushes 27.

The grippers P2 reach the station S2 in the maximum mutually approached condition and in the opened condition. At this station they will be closed to grip the side portions of the sack, after which they will be lowered to withdraw the mouth of the sack from said station. While tranferring the sack from the station S2 to the station S3, the grippers P2 are moved away from each other by such an extent to stretch the mouth of the sack transversely, whereby said mouth will reach the station S3 in an almost closed condition, to be inserted suitably between the sealers at that station.

With reference to Figure 5, the intermediate station S2 will be now described. At this station there operates the stationary lower mouth 34 of the product-feeding station, which is closed in a conventional manner by a pair of valve-like doors 35-35' which are hinged to said mouth and which can be moved apart for opening the hopper under the action of pneumatic jacks (not shown).

Operating below the mouth 34 of the hopper are opposite suction heads 36-36' mounted on slides 37-37' which slide on guides 38-38' which are secured to the sides of said mouth 34 and so directed as to permit the movements of the heads 36-36' to and from each other. These movements are effected in a self-centering manner by means of two vertical levers 39-39' which are connected to the slides 37-37' at their slotted lower ends and are interfulcrumed at 40-40' to respective supports secured to the hopper. By means of a tierod 41, said levers 39-39' are interconnected at 42-42' so as to obtain a self-centering movement, and one of said levers is connected to an oscillation control member comprising, for example, an angle lever 43 fulcrumed at 40 and connected at the opposite end at 44 to an actuating jack 45 and the slotted arm of which cooperates with a pin 46 at the end of the lever 39. It is now apparent that the upward and downward movements of the lever 43 will cause, respectively, the movements of the suction heads 36-36' away and towards each other.

The heads 36-36' are connected to a suction source through flexible hoses 47-47', while they are connected through additional conduits 48-48' to a safety circuit which controls the vacuum within said heads 36-36' as described below.

With reference also to Figure 10, it will be noted that mounted at the sides of the head of said hopper there are mounted respective grippers 49-49' which are directed downwards and such as to operate on the mouth of a sack that is inserted at the station S1. Arranged between said grippers and the hopper are stationary forks 50-50', also directed downwards and operating as explained below.

Upon the beginning of each working cycle, the grippers 49-49' are opened and the suction heads are spaced away and disactivated, as from Figure 5. It will be noted in Figure 10 that at due time the grippers P1 will position at the station S2 a sack Z coming from the station S1 and supported at the upper side portions thereof by said grippers P1 in their lower position. At the station S2, said grippers P1 are raised to bring the sack to a short distance from the mouth of the hopper, inserting it partially in the forks 50-50'.

As appearing from the successione of Figures 11 and 12, the suction heads 36-36' are activated and moved towards each other to grip the sack at opposite side portions of its mouth (see also Figure 6), after which the grippers P1 will be opened and wait for the completion of work of the grippers P2 to repeat with them the working cycle.

During the step in which the suction heads 36-36' seize a sack, if one or both heads should not seize the corresponding portion of sack correctly, the irregularity is detected by sensors which are connected to the conduits 48-48' and which will act accordingly, for example, by controlling the heads to repeat the sack-seizing operation and by stopping the machine if the irregularity should persist.

In Figures 13 and 7 it will be seen that in subsequent steps the suction heads 36-36' are moved apart to open the mouth of the sack, while the portion of said mouth that is not covered by the overlying outline of the hopper is kept closed due to the co-operation with the forks 50-50'. This closed portion of the mouth of the sack will be acted upon at due time by the stationary grippers 49-49' of the station S2, while the mouth of the

hopper will be opened, with the valve-like doors 35-35' pressing the interposed portions of the mouth of the sack against the suction heads 36-36' (see also Figure 8). The sack is thus firmly seized and suitably arranged for being filled at the station S2.

While the sack is being filled, the grippers P1 are returned to the station S1 and the grippers P2 are positioned at the station S2 in their opened and approached condition (Figure 14). At due time, the grippers P2 will close and grip the sack at side upper portions that are not engaged by the stationary grippers 49-49' which will be opened when the hopper 34 is closed (see Figure 15).

In the successive step, the grippers P2 are lowered to withdraw the sack from the filling station S2 while the suction heads 36-36' have been neutralized. As shown in Figure 16, while the grippers P1 insert a new sack Z to be filled into the station S2, the grippers P2 transfer the filled sack Z from the station S2 to the sealing station S3, and at due time they will be moved away from each other by the action of the means described with reference to Figure 4, to stretch the mouth of the sack and nearly close it, so as to ensure a correct insertion thereof into the sealing unit at the station S3.

It will be noted in Figure 9 that the grippers 49-49' at the station S2, preferably, are provided at their jaws with a shearing tip 51 and a cavity 52 in line with said tip, to partially shear at 53 the pinched flaps of the mouth of a sack, without removing any material therefrom, to obtain a fastening point for said flaps, which will be thus more suitably prepared for insertion into the final station S3.

With reference to Figures 8 and 14, it will be noted, finally, that in order to control any escape of air and powder from a sack while being filled at S2, the outer side portions of the door 35 at the hopper mouth may be provided with suction tubes 54-54' connected to a suction source, which will be introduced into the open regions of the mouth of a sack to subject the latter to a suitable depressurization.

In Figure 3 it can be seen that the station S3 comprises a pair of opposite sealers 55-55' which are mounted together with a pair of underlying opposite spring-loaded pressure bars 56-56', on a conventional structure having a self-centering action, shown diagrammatically at 57. On completion of the sealing, the sealers 55-55' are retracted and the sack will be further supported temporarily by the pressure bars 56-56', which are hollow, perforated and connected to a source (not shown) feeding cool air to the opposite faces of the sealed region so as to cool it. On completion of the cooling step, also the pressure bars 56-56' are opened so that the filled and sealed sack, no longer supported by the grippers P2, which have released it to effect a new working cycle, is discharged by the conveyor 13.

It is to be understood that the description relates to a preferred embodiment of the invention and that many changes and modifications, especially of constructional nature, may be made thereto within the scope of the claims. Said changes and modifications may relate, for example, to the fact that the two pairs of connecting rods 16-16' may be made independent in their oscillating and upward/downward movements, whereby the insertion of an empty sack into the station S2 and the filling of said sack may avail of a longer time than the sack-transfer step from the station S2 to the final sealing station S3, with the obvious advantages resulting from this condition.

Claims

1. A sack filling machine comprising a plurality of working stations (S1, S2, S3) sequentially arranged with a suitable distance after one another along a straight path and being designed to form a sack of thermoplastic material, to open, fill and seal said sack by heat sealing and cooling the seal, said machine also including a plurality of pairs of grippers (P1, P2) designed to transfer each single sack (Z) gripping it at its mouth portion from a station to the successive station, and a conveyor (13) that supports the sack during the filling step, during the closing and in the going out of the machine,
characterized in that it includes two pairs of grippers (P1, P2) for transferring the sacks among three successive working stations (S1,S2,S3), each gripper of each pair of grippers being mounted on a cradle member (14, 14') arranged at the respective side of the machine and articulated by its ends (15, 15') to pairs of parallel connecting rods (16, 16') directed upwardly and pivotably supported at their upper ends by the frame of the machine, the said cradle members (14, 14') being operatively connected by means of a respective tierod (18) to driving means (19,20) which impart to said cradles a longitudinal alternating movement equal to the distance between two subsequent working stations (S1, S2, S3), so that each sack (Z) is transferred by the first pair of gripper from the first working station (S1) to the second intermediate working station (S2), at which the sack is opened and filled, and then by the second pair of grippers from the said second intermediate working station (S2) to the third and final working station (S3) where sealing means close the sack by heat-sealing and subsequent cooling of the seal; means are provided for lifting and lowering the grippers (P1, P2) in correct time ralationship with the swinging movement of the cradles, for inserting and withdrawing the mouth of the sack respectively into and from the working station concerned.

2. A machine according to the claim 1, characterized in that the connecting rods (16, 16') which support the cradles (14,14') and the grippers (P1,P2) for handling the sacks, have their upper ends which

are swingably mounted onto lifting and lowering means (17,22,23-17,22,23') which are operated in time relationship with the motion of the same connecting rods, so that the said grippers (P1,P2) are moved up and down as it is necessary.

3. A machine according to claim 3, characterized in that the upper ends of the connecting rods (16, 16') are carried by excentric shafts (22,23,17-23',17') synchronized with each other by a rigid drive (24) and linked, by a further rigid drive, to a driving unit actuated in correct time relationship with the driving unit (21) which drives the tierods (18) imparting to the cradles (14, 14') the longitudinal alternating movement (L).

4. A machine according to any one of the previous claims, characterized in that the grippers mounted on the osillating cradles (14-14') are actuated in a self-centering pneumatic manner and are arranged horizontally to act on opposite side top portions of a sack.

5. A machine according to any one of the previous claims, characterized in that the cradles (14, 14') comprise an intermediate portion (114) which is pivoted at its ends on vertical axes (26-26') and the connecting rods (16) that are near to the grippers seizing a filled sack are mounted on the respective oscillating and raising/lowering eccentric shaft (22) with interposed axially sliding means (27) and are controlled by displacing means (31-31') wich under command move them towards and away from each other to give said grippers (P2) the required movement to seize an opened sack at the filling station (S2) and then to stretch the mouth of said sack during the transfer towards the final sealing station (S3), in order to close said mouth which is thus disposed correctly between the operating components of the said final station.

6. A machine according to claim 6, characterized in that intermediately of the eccentric shaft (22) supporting the connecting rods (16) for the grippers (P2) for handling a filled sack there is mounted in a rotable but axially-locked manner a member (28) which carries the intermediate portion of a rod (29) which is parallel to said shaft and which slides within bushes (30) which are secured to the end bushes (27) of said connecting rods, in order to synchronize the latter in their oscillatory movement, said member (28) having secured thereto fluid-operated jasks (31-31') for moving said connecting rods towards and away from each other and having secured thereto means (32-32'-132-132'-33-33') for controlling the stroke of said jacks.

7. A machine according to any one of the preceding claims characterized in that said grippers (P1-P2) are mounted on respective pairs of oscillating connecting rods (16-16'), suitable constructed as an articulated parallelogram to maintain said grippers in a horizontal position, means being provided whereby said pairs of connecting rods are actuated independently of each other so that the sack has a longer dwell period at the opening-filling station (S2).

8. A machine according to any of the previous claims characterized in that the first working station (S1) comprises means (12) for feeding a tube (F) of thermoplastic material between a pair of opposite heat sealers (1) mounted on carrier assemblies (3-4) which move with a self-centering movement to cause said sealers to move toward and away from each other and having arranged thereon, below said sealers, means (2) for cutting the sack-forming tube (F) transversely, said assemblies having mounted thereon, at their top and bottom, pairs of pressure bars (9-10) acting on the tube which is iserted cyclically into the station at intervals of pre-established length, at least one pair of said pressure bars having secured longitudinally thereon air-dispensing bars (11-11') to cool the seal effected by the sealers, the actuation of said self-centering mechanisms being effected, for example, by means of connecting rods and cranks (6) keyed on a shaft which is moved by means of a crank (7) driven by fluid-operated jacks (8).

9. A machine according to any of the previous claims characterized in that the final station (S3) comprises a pair of opposite sealers (55-55') mounted on a self-centering carrier assembly (57) having also mounted theron, below said sealers, pressure bars (56-56') provided with means which, under command, dispense cool air, further means being provided whereby the opening movement of said mechanism will occur in two steps, with a suitable dwell period in the position when the sealers (55-55') are spaced from each other and the filled sack is retained by the lower pressure bars (56-56') which blow cooling air.

10. A machine according to any of the previous claims, characterized in that the second intermediate sack filling station (S2) comprises:

- a hopper (34, 35) for feeding the product into the opened sack (Z);
- suction tubes (54, 54') associated to the outlet of said hopper, to suck air and powder from the sack being filled;
- suction heads (36, 36') acting to open the mouth of the sack;
- fork members (50, 50') for delimiting the portion

of the mouth of the sack to be opened by the said suction heads (36, 36') and for leaving in closed condition the end portions of the said mouth of the sack;

- a pair of downwardly directed grippers (49, 49') arranged sidewise of the said hopper (34,35) and of the said fork members (50, 50') to grip the end portions of the mouth of the sack in order to support it during the filling step.

Patentansprüche

1. Eine Beutelfüllmaschine, bestehend aus mehreren Arbeitsstationen (S1,S2,S3), die in angemessenem Abstand hintereinander entlang einer schmalen Straße angeordnet sind und dazu dienen, einen Beutel aus thermoplastischem Material zu bilden, diesen zu öffnen, zu füllen, und durch Wärmeschweißen und Abkühlen der Schweißnaht zu versiegeln, wobei die genannte Maschine außerdem umfaßt: mehrere Greiferpaare (P1,P2), die jeden einzelnen Beutel (Z) Von einer Station zur nächsten befördern, während die Öffnungsabschnitte der Beutel ergreifen, sowie ein Förderband (13), auf dem der Beutel beim Abfüllen, Schließen und Auslaufen aus der Maschine steht; dadurch gekennzeichnet, daß zur Maschine zwei Greiferpaare (P1,P2) für den Transfer der Beutel zwischen den drei aufeinanderfolgenden Arbeitsstationen (S1,S2,S3) gehören, und jeder Greifer von jeden Greiferpaare auf einem Schwingelement (14,14') montiert ist, von denen je eines auf den beiden Maschinenseiten angebracht ist, die Schwingelemente sind an ihren Enden (15,15') gelenkig mit Paaren paralleler Verbindungsstangen (16,16') verbunden, die nach oben gerichtet sind und an ihrem oberen Ende drehbar auf dem Maschinenrahmen gelagert sind, die genannten Schwingelemente (14,14') sind über eine entsprechende Zugstange (18) funktionell mit Antriebsvorrichtungen (19,20) verbunden, die den Schwingelementen eine alternierende Längsbewegung erteilen, die gleich dem Abstand zwischen zwei aufeinanderfolgenden Arbeitsstationen (S1,S2,S3) ist, so daß jeder Beutel (Z) durch das erste Greiferpaar von der ersten Arbeitsstation (S1) zu der zweiten, mittleren Arbeitsstation (S2) befördert und dort von Siegelvorrichtungen durch Wärmeschweißen und anschließender Abkühlung der Schweißnähe verschlossen wird; un daß Vorrichtungen vorgesehen sind, die zum Heben und Senken der Greifer (P1,P2) im korrekten zeitlichen Verhältnis zur Schwingbewegung der Schwingelemente (14,14') dienen, um die Beutelöffnung jeweils in die betreffende Arbeitsstation einzuführen beziehungsweise aus ihr herauszunehmen.

2. Maschine gemäß Anspruch 1, dadurch gekennzeichnet, daß die Verbindungsstangen (16,16'), an denen die Schwingelemente (14,14') und Greifer (P1,P2) zur Beutelhandhabung angebracht sind, mit ihren oberen Enden drehbar auf einer Hebe- und Senkvorrichtung (17,22,23-17',22',23') montiert sind, die im zeitlichen Verhältnis zur Bewegung der Verbindungsstangen selbst betätigt wird, so daß die genannten Greifer (P1,P2) je nach Bedarf nach oben und unten bewegt werden.

3. Maschine gemäß Anspruch 2 , dadurch gekennzeichnet, daß die oberen Enden der Verbindungsstangen (16,16') auf exzentrischen Wellen gelagert sind (22,23,17-22',23',17'), die über einen starren Antrieb (24) untereinander synchronisiert sind und durch einen weiteren starren Antrieb mit einer Antriebseinheit verbunden sind, die im zeitlich korrekten Verhältnis zu der Antriebseinheit (21) betätigt wird, welche die Zugstangen (18) antreibt, die die Schwingelemente (14,14') in die alternierende Längsbewegung (L) versetzen.

4. Maschine gemäß einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß die auf den schwingenden Teilen (14,14') montierten Greifer selbstzentrierend pneumatisch betätigt werden und waagerecht angeordnet sind, um an den gegenüberliegenden oberen Beutelenden anzugreifen.

5. Maschine nach einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß zu den Schwingelementen (14,14') ein Mittelteil (114) gehört, der an seinen Enden drehend auf Senkrechtachsen (26,26') gelagert ist und daß die Verbindungsstangen (16), die sich nahe an den einen gefüllten Beutel haltenden Greifern befinden, mit dazwischenliegenden axialen Gleitvorrichtungen (27) auf entsprechende schwingende und sich hebende/senkende exzentrische Wellen (22) montiert sind, und daß sie durch Versetzungeinrichtungen (31,31') gesteuert werden, die sie nach Befehl aufeinander zu beziehungsweise voneinander weg bewegen, dadurch wird den Greifern (P2) die erforderliche Bewegung erteilt, um einen geöffneten Beutel an der Abfüllstation (S2) zu ergreifen und anschließend die Beutelöffnung während des Weitertransports zur letzten Station (S3) so zu dehnen, daß die Öffnung geschlossen und somit korrekt zwischen den Arbeitsteilen der genannten letzten Station plaziert wird.

6. Maschine gemäß Anspruch 5, dadurch gekennzeichnet, daß in der Mitte der exzentrischen Welle (22), an der die Verbindungsstangen (16) für die Greifer (P2) zur Handhabung des gefüllten Beutels befestigt sind, drehbar aber in Achsrichtung unbeweglich ein Element (28) montiert ist, das den Mit-

telteil einer Stange (29) trägt, die parallel zur genannten Welle ist und in Buchsen (30) gleitet, die an den Endbuchsen (27) der genannten Verbindungsstangen festgemacht sind, so daß diese in ihrer Schwingbewegung synchronisiert werden, an dem genannten Element (28) sind hydraulische Winden (31,31') befestigt, die dazu dienen, die Verbindungsstangen aufeinander zu und voneinander weg zu bewegen, daran befestigt sind Vorrichtungen (32,32',132,132',33,33') zur Kontrolle des Windenhubs.

7. Maschine gemäß einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß die Greifer (P1-P2) auf entsprechenden Paaren schwingender Verbindungsstangen (16-16') montiert sind, die zweckgemäß als gegliedertes Parallelogramm konstruiert sind, um die genannten Greifer in waagerechter Position zu halten, wobei Einrichtungen vorgesehen sind, mit welchen die genannten Verbindungsstangenpaare unabhängig voneinander betätigt werden, so daß der Beutel in der Öffnungs- und Füllstation (S2) eine längere Haltezeit hat.

8. Maschine gemäß einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß die erste Arbeitsstation (S1) eine Vorrichtung (12) aufweist, die für die Zufuhr eines Schlauchs (F) aus thermoplastischem Material zwischen einem Paar gegenüberliegender Wärmesiegelvorrichtungen (1) dient, welche auf Trägergruppen (3-4) montiert sind, die sich selbstzentrierend bewegen und dadurch Siegelvorrichtungen aufeinander zu und voneinander weg bewegen lassen, unterhalb der genannten Siegelvorrichtungen sind außerdem Vorrichtungen zum Abschneiden des beutelbildenden Schlauches (F) in Querrichtung angebracht, sowie am oberen und unteren Ende der Trägergruppe Druckstäbepaare (9-10), die gegen den Schlauch drücken, der zyklisch, nach vorgewählten Längenintervallen, in die Station eingeführt wird, auf mindestens einem der Druckstäbepaare sind in Längsrichtung Luftgebläsestäbe (11,11') angebracht, die zur Abkühlung der von der Siegelvorrichtung gefertigen Schweißnaht dienen, die Betätigung dieser selbstzentrierenden Mechanismen kann zum Beispiel über Verbindungsstangen und Kurbelwellen (6) erfolgen, die auf eine Spindel gekeilt sind, die durch eine von hydraulischen Winden (8) angetriebene Kurbelwelle bewegt wird.

9. Maschine gemäß einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß die letzte Station (S3) ein Paar gegenüberliegender Siegelvorrichtungen (55,55') umfaßt, die auf einer selbstzentrierenden Trägergruppe (57) montiert sind, wobei unterhalb der genannten Siegelvorrichtungen Druckstäbe (55,56') angebracht sind, diese sind mit Vorrichtungen ausgestattet, die bei Betätigung Kaltluft abgeben, eine weitere Vorrichtung ist vorgesehen, wobei der Öffnungsvorgang des genannten Mechanismus in zwei Schritten erfolgt, mit einer angemessenen Haltezeit, wenn die Siegelvorrichtungen (55,55') voneinander entfernt sind und der gefüllte Beutel durch die unteren Druckstäbe (56,56') festgehalten wird, aus denen Kaltluft geblasen wird.

10. Maschine gemäß einem der obenstehenden Ansprüche, dadurch gekennzeichnet, daß die zweite und mittlere Abfüllstation (S2) umfaßt:

- einen Trichter (34,35) zum Einfüllen des Produktes in den geöffneten Beutel (Z)
- Saugrohre (54,54') die mit der Auslaßöffnung des genannten Trichters verbunden sind und dazu dienen, Luft und Staub aus dem Beutel abzusaugen, der gerade gefüllt wird;
- Saugköpfe (36,36') zur Öffnung der Beutelöffnung;
- gabelförmige Teile (50,50'), die dazu dienen, den von den Saugköpfen (36,36') zu öffnenden Abschnitt der Beutelöffnung abzugrenzen und die Endabschnitte der genannten Beutelöffnung geschlossen zu halten;
- ein Paar nach unten gerichteter Greifer (49,49'), die seitlich des Trichters (34,35) und der genannten gabelförmigen Teile (50,50') angeordnet sind und dazu dienen, die Endabschnitte der Beutelöffnung zu ergreifen und während des Abfüllvorganges festzuhalten.

Revendications

1. Ensacheuse comprenant plusieurs postes de travail (S1, S2, S3) qui sont disposés d'une manière successive à une distance convenable l'un derrière l'autre le long d'une trajectoire rectiligne et sont agencés de façon à former un sac de matière thermoplastique, à ouvrir, remplir et sceller ce sac par thermoscellement et refroidissement du joint, la machine comprenant aussi plusieurs paires d'organes de préhension (P1,P2), conçus de façon à saisir le parties de l'overtoure du chaque sac et à transférer le sac (Z) d'un poste au poste suivant, et un convoyeur (13) qui porte le sac pendant l'opération de remplissage, pendant la fermeture et pendant la sortie hors de la machine,

caractérisée en ce qu'elle comprend deux paires d'organes de préhension (P1, P2) servant à transférer les sacs entre trois postes successifs de travail (S1,S2,S3), chaque organe de préhension

du chaque paire d'organes de préhension étant montée sur un pièce formant berceau (14, 14') disposée sur un côté respectif de la machine et articulée par ses extrémités (15, 15') sur des paires de barres de liaison (16, 16') parallèles qui sont dirigées vers le haut et portées d'une manière pivotante, à leurs extrémités supérieures, par le bâti de la machine, les pièces formant berceau (14, 14') étant reliées, en coopération fonctionnelle et au moyen d'un tirant (18) respectif, à des moyens d'entraînement (19, 20) qui impartissent aux berceaux un mouvement longitudinal de va-et-vient d'une amplitude égale à la distance séparant deux postes de travail (S1, S2, S3) successifs, d'une façon telle que chaque sac (Z) est transféré, par la première paire d'organes de préhension, du premier poste de travail (S1) au deuxième poste de travail (S2), intermédiaire, auquel le sac est ouvert et rempli, puis, par la seconde paire d'organes de préhension, du deuxième poste de travail (S2) intermédiaire, au troisième poste de travail (S3), final, auquel les moyens de scellement ferment le sac par thermoscellement et refroidissement du joiont réalisé à la suite; et des moyens sont prévus pour soulever et abaisser les organes de préhension (P1,P2) d'une manière correctement synchronisée avec le mouvement oscillant des berceaux (14,14'), en vue respectivement d'introduire l'overtoure du sac dans le poste de travail concerné et de l'en extraire.

2. Ensacheuse selon la revendication 1, caractérisée en ce que les barres de liaison (16, 16') qui portent les berceaux (14, 14') et les organes de préhension (P1, P2) servant à manipuler les sacs ont leurs extrémités supérieures montées d'une manière oscillante sur des moyens de soulèvement et d'abaissement (17, 22, 23 et 17, 22, 23') qui sont actionnés d'une manière synchronisée avec le mouvement des barres de liaison, d'une façon telle que les organes de préhension (P1, P2) sont déplacés vers le haut et vers le bas de la manière qui est nécessaire.

3. Ensacheuse selon la revendication 2 caractérisée en ce que les extrémités supérieures des barres de liaison (16, 16') sont portées par des arbres excentriques (22, 23, 17 et 23', 17') synchronisés entre eux au moyen d'une transmission rigide (24) et reliés, par une autre transmission rigide, à une unité d'entraînement actionnée d'une manière correctement synchronisée avec l'unité d'entraînement (21) qui entraîne les tirants (18) qui impartissent aux berceaux (14, 14') le mouvement longitudinal de va-et-vient (L).

4. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que les organes de préhension montés sur les berceaux oscillants (14, 14') sont actionnés d'une manière pneumatique à autocentrage et sont disposés horizontalement de façon à agir sur des parties supérieures latérales opposées d'un sac.

5. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que les berceaux (14, 14') comprennent une partie intermédiaire (114) qui est montée pivotante à ses extrémités sur des axes verticaux (26 et 26') et en ce que les barres de liaison (16) qui sont proches des organes de préhension saisissant un sac rempli sont montées sur l'arbre excentrique (22) respectif, à mouvement oscillant et de soulèvement/abaissement, avec des moyens de coulissement axial (27) interposés, et sont commandés par des moyens de déplacement (31 et 31') qui, à la commande, les rapprochent et les éloignent l'un de l'autre de façon à impartir à ces organes de préhension (P2) le mouvement requis pour saisir un sac ouvert au poste de remplissage (S2), puis pour étirer l'ouverture de ce sac au cours du transfert vers le poste final de scellement (S3), afin de fermer cette ouverture qui est ainsi disposée d'une manière correcte entre les éléments fonctionels du poste final.

6. Ensacheuse selon la revendication 5, caractérisée en ce qu'en une position intermédiaire de l'arbre excentrique (22) qui porte les barres de liaison (16) associées aux organes de préhension (P2) servant à manipuler un sac rempli, il est monté, d'une manière rotative, mais avec une immobilisation axiale, une pièce (28) qui porte la partie intermédiaire d'une tige (29) qui est parallèle à l'arbre et qui coulisse dans des paliers (30) qui sont fixés sur les paliers d'extrémité (27) des barres de liaison, afin de synchroniser ces dernières en ce qui concerne leur mouvement oscillant, tandis qu'il est fixé sur ladite pièce (28) des vérins à fluide (31 et 31'), servant à rapprocher et éloigner les barres de liaison l'une de l'autre, ainsi que des moyens (32, 32', 132, 132', 33, 33') servant à régler la course de ces vérins.

7. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que les organes de préhension (P1 et P2) sont montés sur des paires respectives de barres de liaison (16 et 16') oscillantes qui sont réalisées d'une manière appropriée sous la forme d'un parallélogramme articulé de façon à maintenir les organes de préhension dans une position horizontale, des moyens étant prévus à l'aide desquels les paires de barres de liaison sont actionnées d'une manière indépendante l'une de l'autre, d'une façon telle que le sac dispose d'un temps de séjour plus long au poste

d'ouverture-remplissage (S2).

8. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que le premier poste de travail (S1) comprend des moyens (12) servant à acheminer un tube (F) de matière thermoplastique entre deux moyens de thermoscellement (1) qui se font face et sont montés sur des ensembles de support (3, 4) qui se déplacent suivant un mouvement à autocentrage de façon à faire se rapprocher et s'éloigner l'un de l'autre les moyens de scellement et sur lesquels sont disposés, au-dessous des moyens de scellement, des moyens (2) servant à couper transversalement le tube (F) de formation de sacs, ainsi que, à leur partie supérieure et à leur partie inférieure, des paires de barreaux de pression (9, 10) qui agissent sur le tube qui est introduit d'une manière cyclique dans le poste à des intervalles d'une longueur préétablie, tandis que, sur au moins une paire des barreaux de pression, il est fixé longitudinalement des barres de distribution d'air (11, 11') servant à refroidir le joint réalisé par.les moyens descellement, l'actionnement du mécanisme d'autocentrage étant par exemple effectué au moyen de bielles et de manivelles (6) calées sur un arbre qui est déplacé au moyen d'une manivelle (7) entraînée par des vérins à fluide (8).

9. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que le poste final (S3) comprend deux moyens de scellement (55, 55') qui se font face et sont montés sur un ensemble de support à autocentrage (57) sur lequel sont aussi montés, au-dessous des moyens de scellement, des barreaux de pression (56, 56') qui sont pourvus de moyens qui, à la commande, distribuent de l'air de refroidissement, d'autres moyens étant prévus à l'aide desquels le mouvement d'ouverture dudit mécanisme s'effectue en deux étapes, avec un temps de séjour convenable dans la position dans laquelle les moyens de scellement (55, 55') sont écartés l'un de l'autre et le sac rempli est retenu par les barreaux de pression inférieurs (56, 56') qui soufflent de l'air de refroidissement.

10. Ensacheuse selon l'une quelconque des revendications précédentes, caractérisée en ce que le deuxième poste (S2) ou poste intermédiaire de remplissage de sac comprend :

- une trémie (34, 35) servant à distribuer le produit dans le sac (Z) ouvert ;
- des têtes d'aspiration (54, 54') associées à la sortie de la trémie, afin d'aspirer l'air et la matière pulvérulente hors du sac en cours de remplissage ;
- des têtes d'aspiration (36, 36') servant à ouvrir l'ouverture du sac ;
- des pièces en forme de fourche (50, 50') servant à délimiter la partie de l'ouverture du sac devant être ouverte par lesdites têtes d'aspiration (36, 36') et à laisser à l'état fermé les parties d'extrémité de l'ouverture du sac ;
- deux organes de préhension (49, 49') qui sont dirigés vers le bas et sont disposés sur les côtés vis-à-vis de la trémie (34, 35) et des pièces en forme de fourche (50, 50') de façon à saisir les parties d'extrémité de l'ouverture du sac en vue de le soutenir pendant l'opération de remplissage.

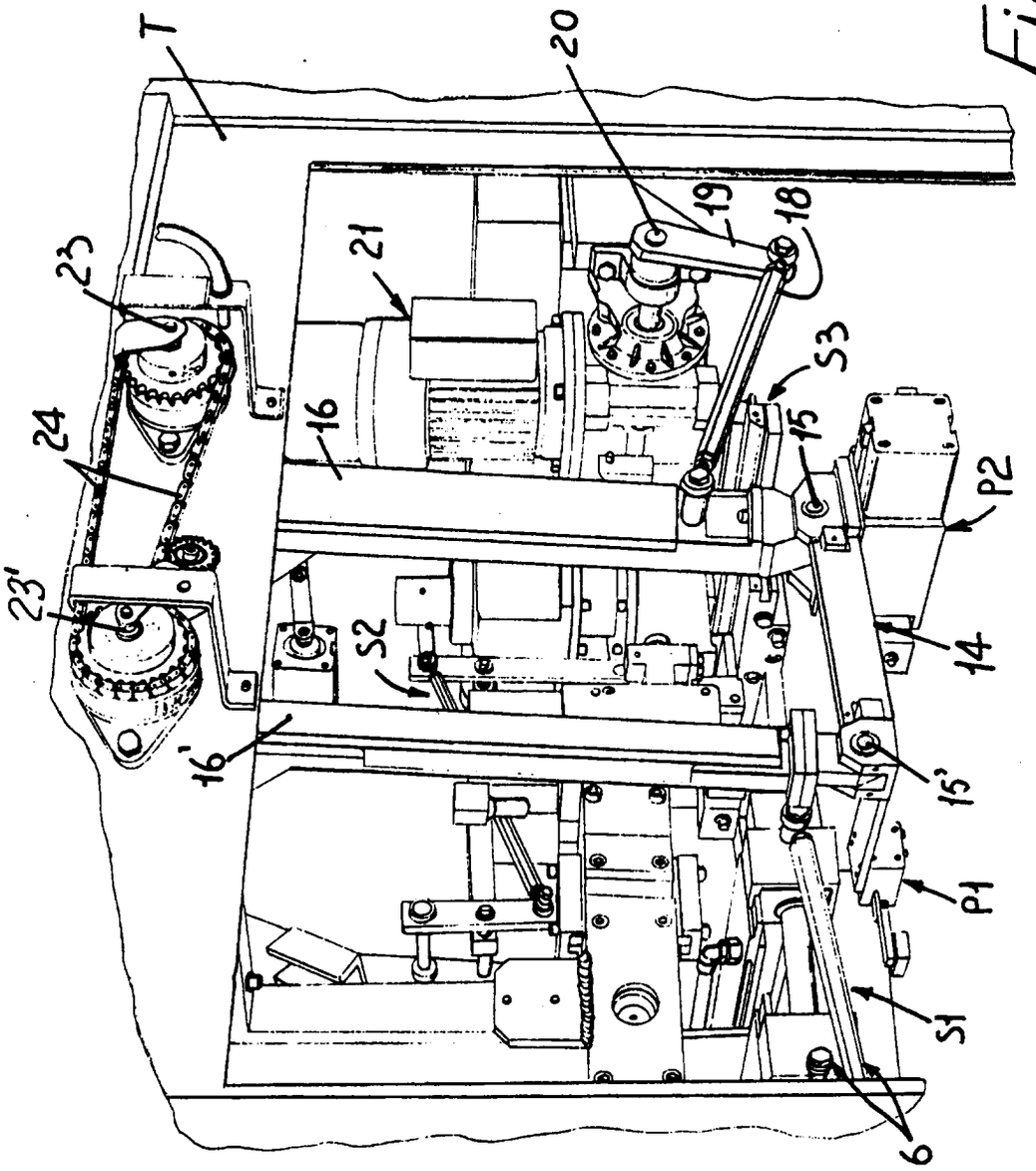


Fig. 1

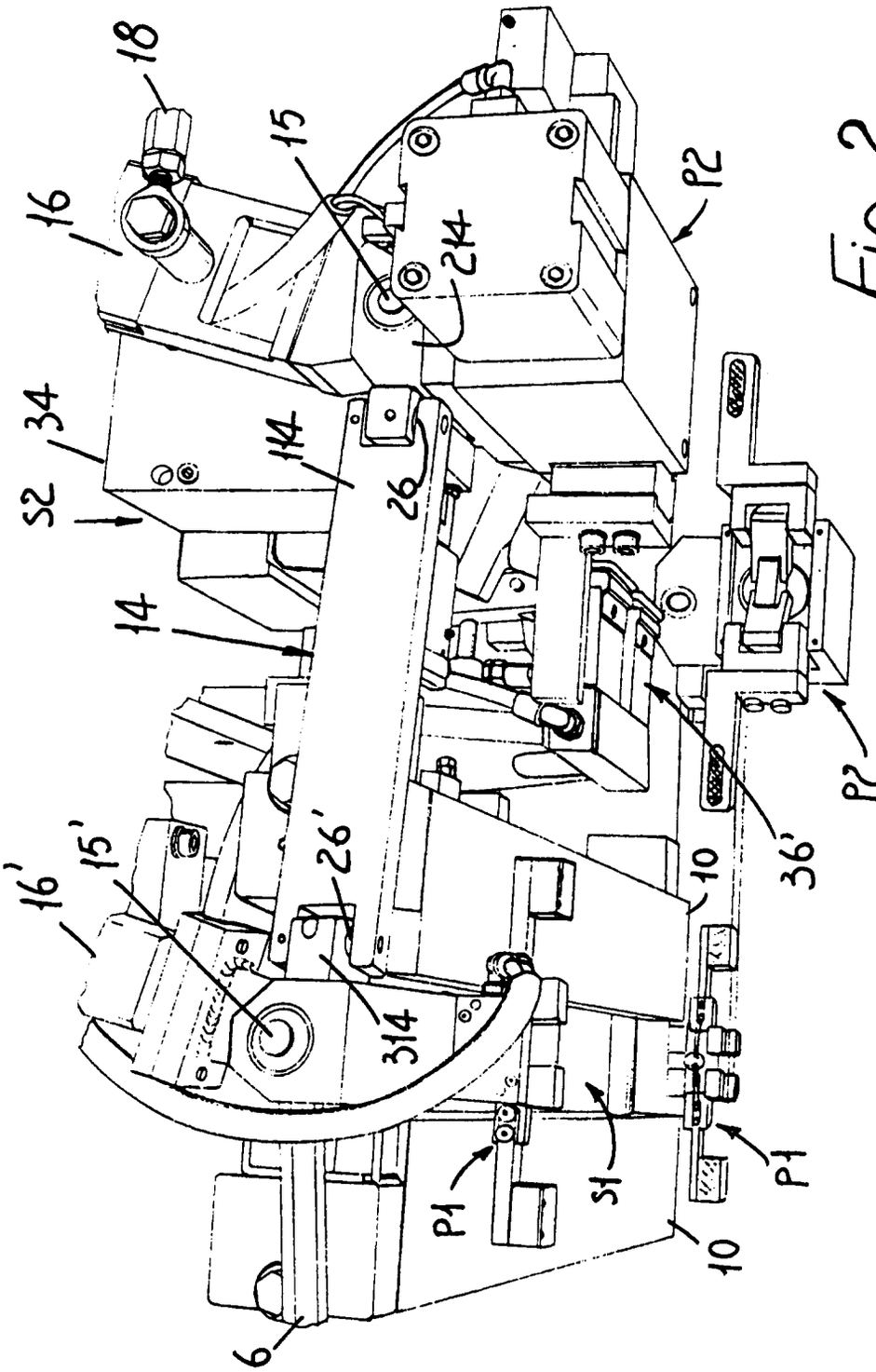


Fig. 2

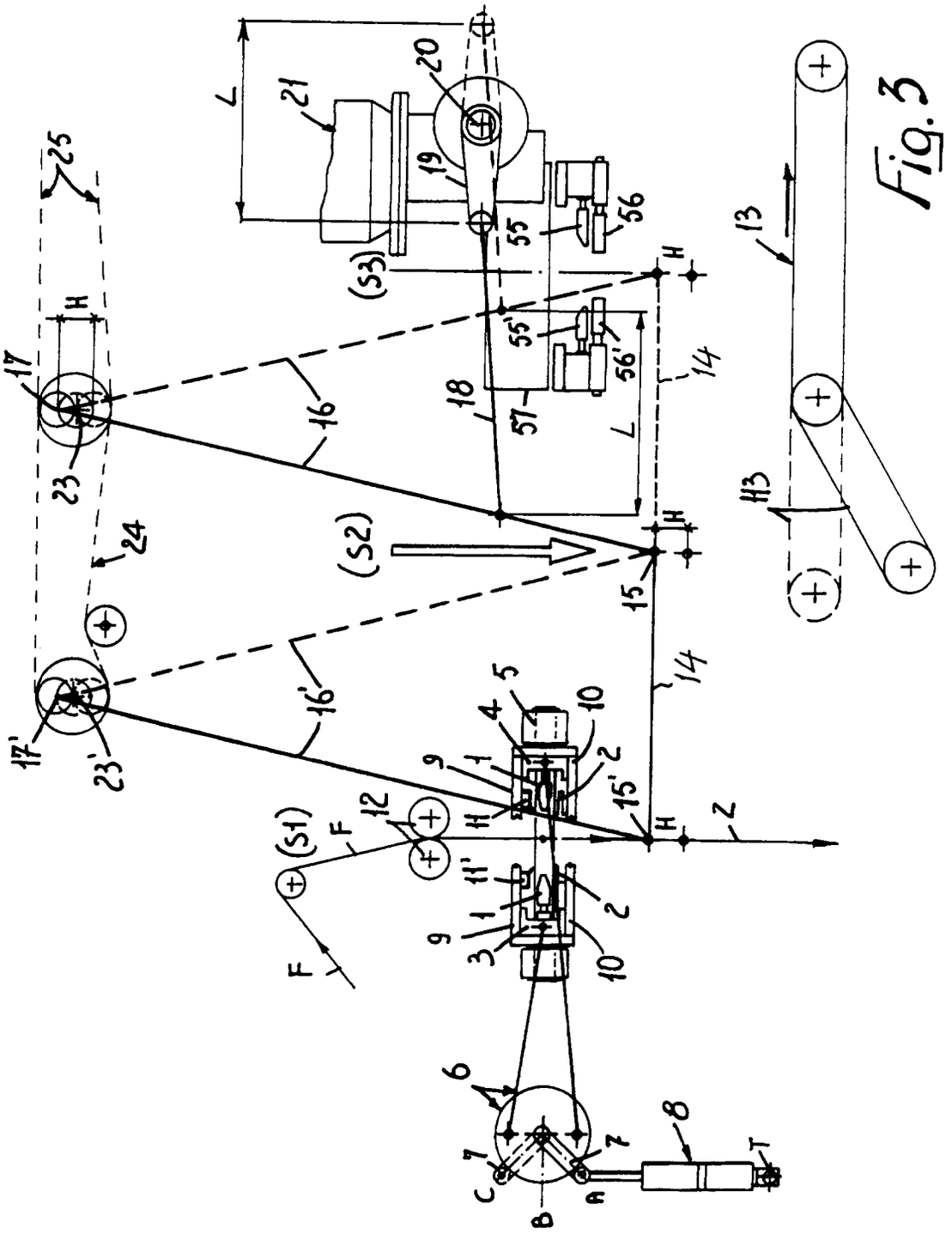


Fig. 3

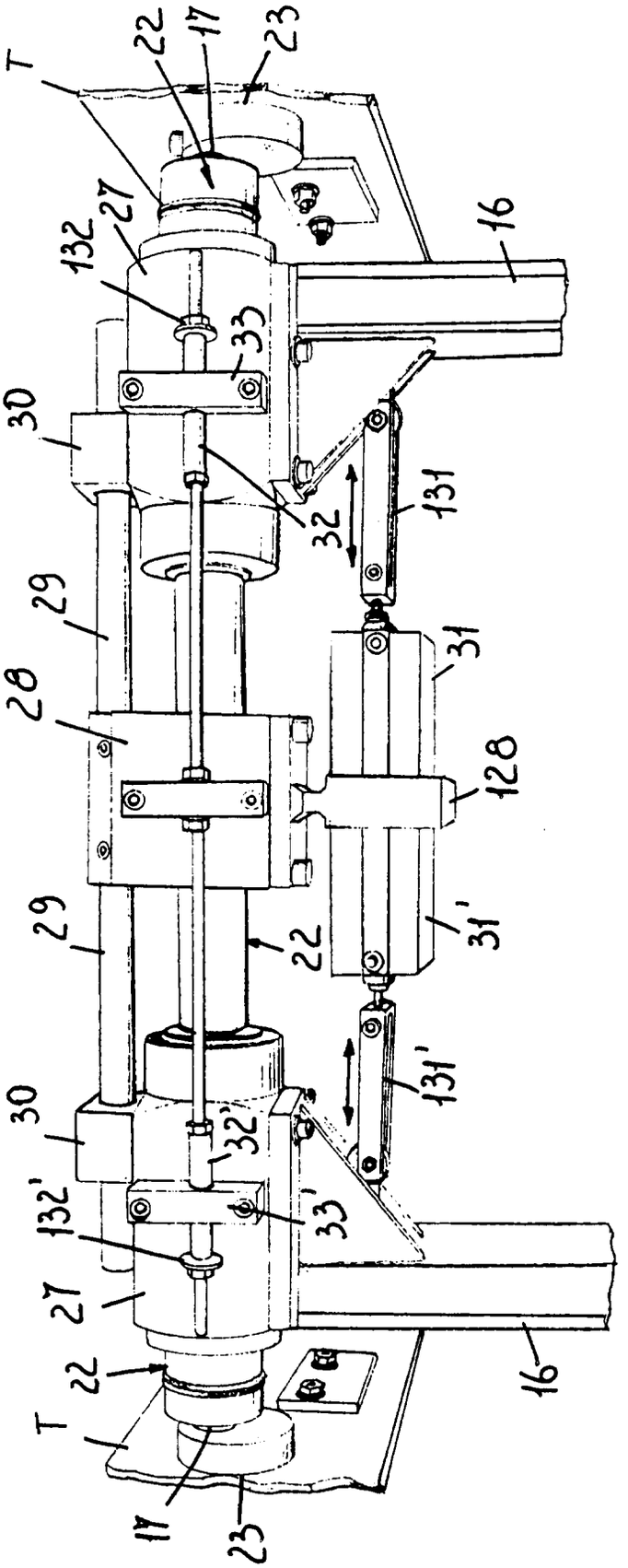

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Fig.4

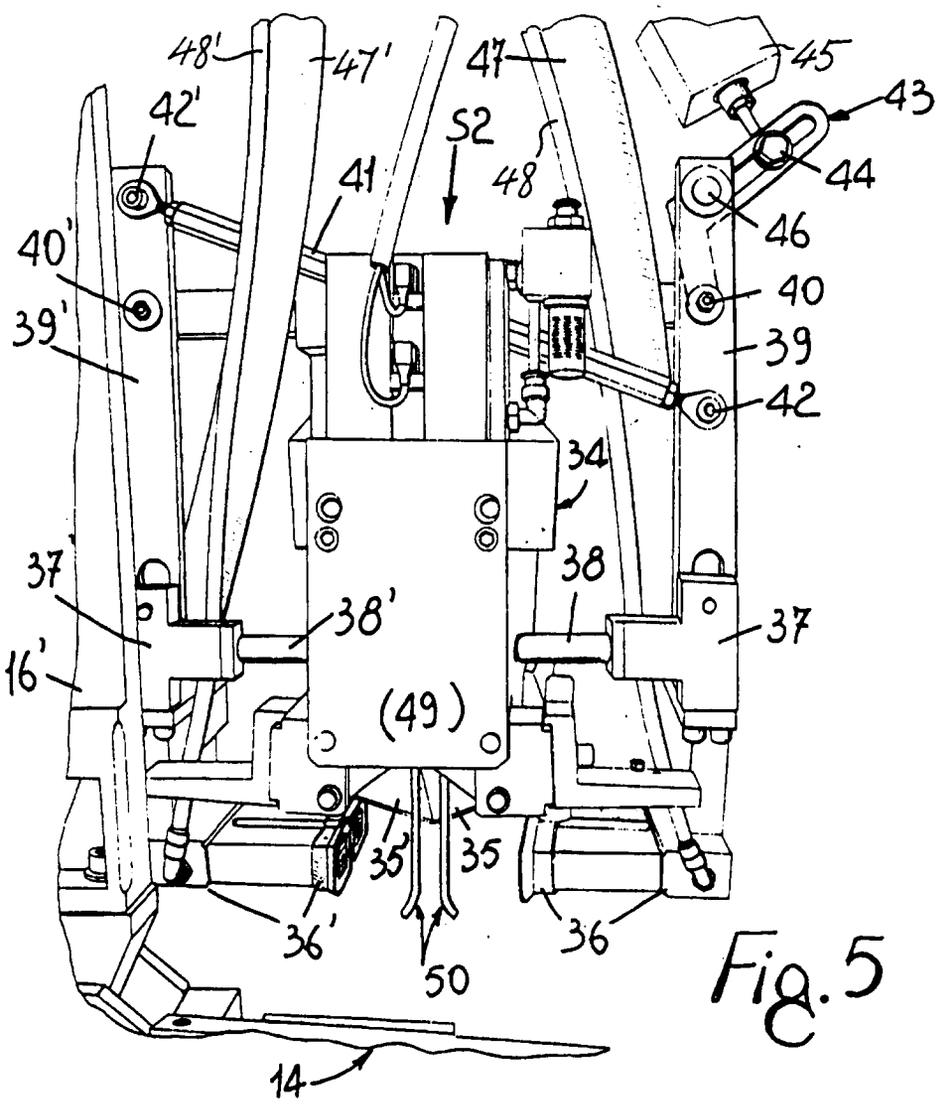

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Fig. 5

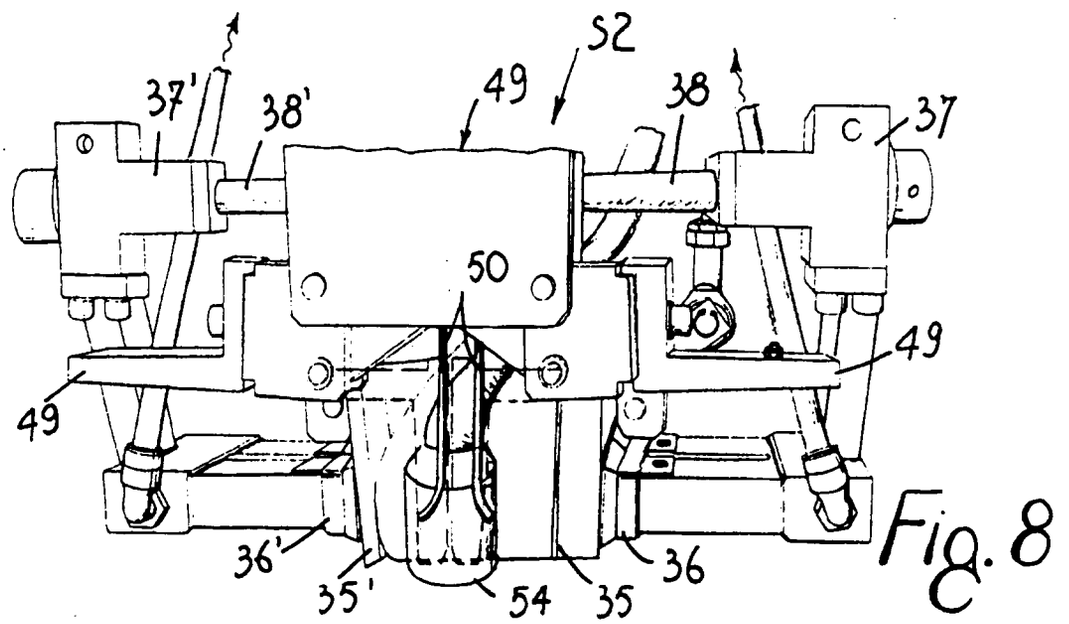
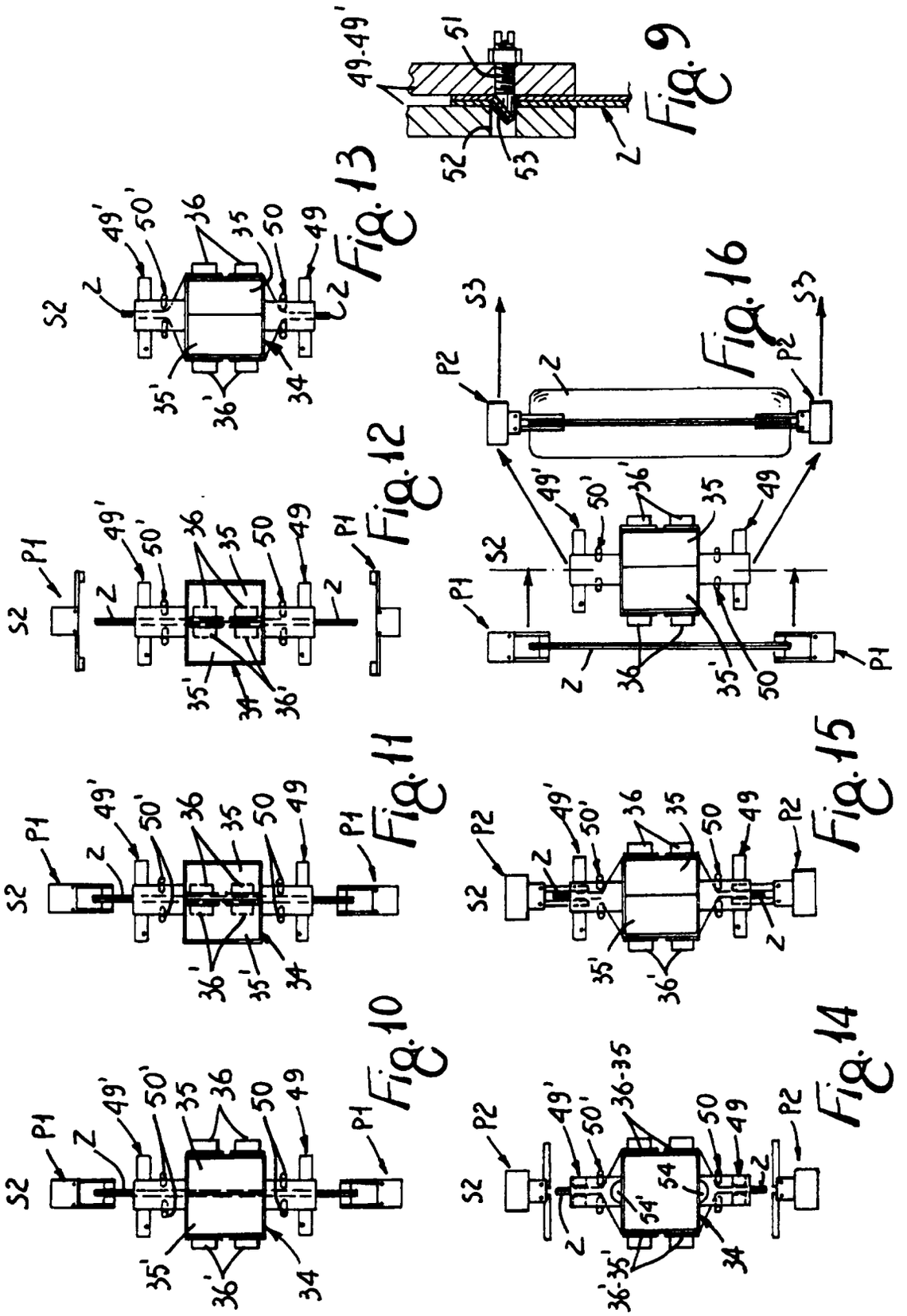

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Fig. 8


Fig.9
Fig.10
Fig.11
Fig.12
Fig.13
Fig.14
Fig.15
Fig.16