tive bights extending oppositely to one another in directions from the center of the chair frame toward opposite sides of the latter and with said leg portions of each of said frame members diverging from one another fore-and-aft of the chair frame; a resilient back and under-seat frame structure comprising a rear upstanding part and two laterally spaced portions extending forwardly from the bottom of said rear upstanding part and each crossing the two side portions of respective ones of said bights; and second means securing said laterally spaced portions to said bight side portions where said laterally spaced portions cross said bight side portions, the securing by said first means at said single location and the securing by said second means providing the only securing of said resilient leg and under-seat frame members and said resilient back and under-seat frame structure together, whereby said chair frame is resilient, enabling load thereon to be distributed evenly through all four leg portions to a floor.

2. A chair frame construction according to claim 1 in which said second securing means includes spacers interposed between and connecting each of said laterally spaced portions and one of the side portions of the respective bights.

3. A chair frame construction according to claim 2 in which said spacers are respectively interposed between said laterally spaced portions of said back and under-seat frame structure and the two foremost side portions of said leg and under-seat frame member bights.

4. A chair frame construction according to claim 3 in which each of said spacers comprises a U-shaped membed having two spacer legs and a connecting part, said connecting part being dished to form a seat for the associated forwardly extending portion of said back and under-seat frame structure, and the spacer legs of each of said spacers being dished transversely to the dishing of said connecting part to form seats for receiving the associated side portion of one of said leg and under-seat frame members.

5. A chair frame construction according to claim 1 in which said combination leg and under-seat frame members and said back and under-seat frame structure are metallic, and in which said securing means comprises welds.

6. A chair frame construction according to claim 1 in which said back and under-seat frame structure comprises a unitary elongated element including an inverted V-shaped part constituting said upstanding part, said two laterally spaced portions respectively extending forwardly from the bottoms of opposite sides of said V-shaped part.

7. A chair frame construction according to claim 1 in which said bights are inclined from the center of the chair frame towards the opposite sides thereof.

8. A chair frame construction according to claim 1 in which said bights are inclined downwardly from the center of the chair frame towards the opposite sides thereof.

9. In a chair, a frame including two unitary combination leg and under-seat frame members, each comprising an elongated resilient element having intermediate its ends a bight including a central connecting portion and two side portions spaced from each other fore-and-aft of the frame and extending from opposite ends of said central connecting portion, said side portions terminating in continuing downwardly extending mutually divergent leg portions; first means securing the central connecting portions of the bights of said two combination leg and under-seat frame members together at a single location at the center of said chair frame with the side portions of the respective bights extending oppositely to one another in directions from the center of the chair frame toward opposite sides of the latter and with said leg portions of each of said frame members diverging from one another fore-and-aft of the chair frame; a resilient back and under-seat frame structure comprising a rear upstanding part and two laterally spaced portions extending forwardly from the bottom of said rear upstanding part and each crossing above the two side portions of respective ones of said bights; second means securing said laterally spaced portions to said bight side portions where said laterally spaced portions cross said bight side portions, the securing by said first means at said single location and the securing by said second means providing the only securing of said resilient leg and under-seat frame members and said resilient back and under-seat frame structure together, whereby said chair frame is resilient, enabling load thereon to be distributed evenly through all four leg portions to a floor; a back panel secured to said rear upstanding part of said back and under-seat frame structure; and a seat panel secured on top of and to said forwardly extending portions of said back and underseat frame structure.

10. A chair frame construction according to claim 9 in which said second securing means comprises spacers respectively interposed between and connecting each of said laterally spaced portions of said back and under-seat frame structure and the foremost of the side portions of the respective bights, and in which said seat panel is downwardly dished with its central portion being disposed substantially directly above the secured-together connecting portions of said bights, the side marginal edges of said seat panel being spaced above the junctures of said bight side portions and said downwardly extending mutually divergent leg portions.

11. A chair frame construction according to claim 10 in which said seat panel is yieldable.

12. A chair frame construction according to claim 10 in which said seat panel has a down-turned marginal edge, the portion of said edge extending across the back of the seat panel passing over said laterally spaced forwardly extending portions of said back and under-seat frame structure and being supportable thereby.

13. A chair frame construction according to claim 10 in which said seat panel is concave on its bottom adjacent its front and in which said back and under-seat frame structure is formed of a single piece of tubular material, said two laterally spaced, forwardly extending portions thereof terminating in front end parts which are closed and curved convexly on their upper surfaces to conform to the concavity of the seat panel bottom adjacent the seat panel front.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| D. 161,177 | 12/1950 | Harrison | 297—457 X |
| 2,539,919 | 1/1951 | Meek et al. | 297—451 |
| 2,815,801 | 12/1957 | Fingerhut et al. | 297—451 |
| 2,961,037 | 11/1960 | Keefer | 297—451 |
| 3,000,669 | 9/1961 | Silverman | 297—451 |
| 3,201,172 | 8/1965 | Bliss | 297—445 |


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Oct. 4, 1966 A. LÖBBE ETAL 3,276,819

BACKING ARRANGEMENT

Filed Sept. 6, 1963

Fig. 1

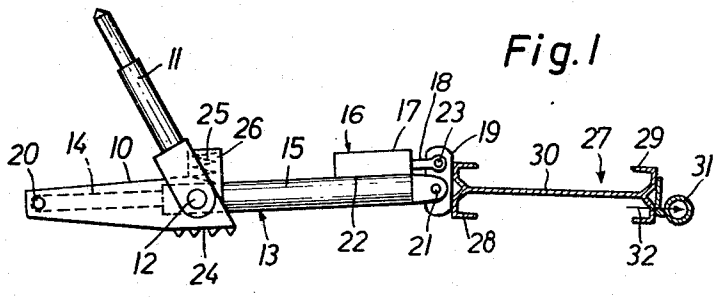
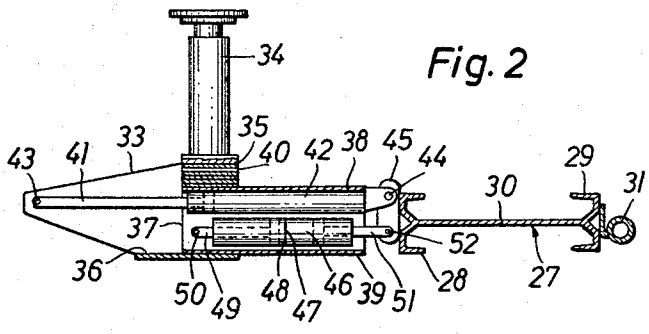



Fig. 2




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United States Patent Office

3,276,819

Patented Oct. 4, 1966



3,276,819

# BACKING ARRANGEMENT

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Filed Sept. 6, 1963, Ser. No. 307,244
Claims priority, application Germany, Sept. 7, 1962, G 35,870
9 Claims. (Cl. 299—32)

The present invention relates to a backing arrangement for lateral urging abutment against a mining conveyor adapted to extend longitudinally along a mine face to urge such conveyor toward the mine face, especially wherein such conveyor is provided with track means thereon upon which a planer is slidably mounted for back and forth movement of such planer while in extractive engagement with the mine face. More particularly, the present invention relates to such a backing arrangement, preferably hydraulically operated, in which a secondary or auxiliary urging means is provided linkably interconnected with the main urging means through an abutment bar, whereby such bar may be angularly displaced in a vertical plane for changing the resultant direction of force of the backing arrangement when placed against a mining conveyor with the abutment bar in urging contact with the side of the conveyor remote from the mine face.

Where minerals, such as coal, are mined or extracted by scraping methods, as for example using a planer guided on a conveyor for back and forth movement along the mine face, the harder the mineral, for example coal, becomes the more difficult it is to guide the planer consistently so that it cuts the coal or other mineral loose from the mine face precisely at the floor level of the mine. Of course, for the desired results to be achieved, the planer must not penetrate, or at least must not penetrate too deeply, into the mine floor, but neither should the planer be permitted to turn out of the coal face, i.e. be transversely displaced from the coal face, for instance, where the coal being extracted is so hard that the planer backs off.

It is an object of the present invention to overcome the foregoing drawbacks and to provide a backing arrangement for conveyors, especially where the conveyor is equipped with a planer guided for back and forth movement thereon, whereby the conveyor may be satisfactorily urged toward the mine face, with the conveyor and in turn the planer being maintained precisely at the desired level with respect to the mine floor.

Other and further objects of the invention will become apparent from a study of the within specification and accompanying drawing in which:

FIG. 1 is a schematic elevational view of a backing arrangement in accordance with one embodiment of the invention showing the backing arrangement in position against a longitudinally extending mining conveyor, and

FIG. 2 is a schematic elevational view, partially in section, of another embodiment of the backing arrangement in accordance with the present invention, also shown adjacent a longitudinally extending mining conveyor.

It has been found in accordance with the present invention that a backing arrangement of versatility and effectiveness may now be provided for lateral urging abutment against a mining conveyor adapted to extend longitudinally along a mine face to urge such conveyor toward the mine face, especially where the mining conveyor is equipped with track means for slidably mounting a planer thereon for back and forth movement of the planer while in extractive engagement with the mine face. The backing arrangement of the invention generally comprises base means for engaging the mine floor and mine ceiling, first urging means and second urging means operatively connected to the base means, each said urging means including a linearly displaceable urging member having a free end remote from said base means, the linear displaceable member of one of said urging means being operatively situated above the displaceable member of the other urging means, and an abutment bar disposed in a substantially vertical plane and pivotally connected by a separate pivot to each of said free ends to linkably interconnect said members at their free ends and to permit angular displacement of said bar in said vertical plane in response to linear displacement of at least one of said displaceable members. In this way, during abutment of the bar against the side of the conveyor remote from the mine face, the first and second urging means will urge the conveyor toward the mine face with a resultant direction of force which varies in dependence upon the angular disposition of the abutment bar with respect to the mine floor.



Conveniently, the urging means in each instance may comprise a piston-cylinder arrangement including a piston part and a cylinder part, one of said parts being the corresponding linearly displaceable urging member and the other of said parts being operatively connected to the base means. The base means more specifically may include a supporting leg for engaging the mine floor and prop means mounted on said leg for engaging the mine ceiling, so as to advantageously keep the arrangement from executing undesired horizontal displacements with respect to the conveyor.

In accordance with one particular feature of the present invention, the prop means may include a prop pivotally mounted on the supporting leg and normally upwardly slanted in a direction away from the abutment bar for engaging the mine ceiling at an acute angle therewith on the side of the prop means facing the abutment bar. The supporting leg may be provided conveniently on its under side with projections for gripping the mine floor more effectively. Also, one of the piston-cylinder arrangements in this instance is pivotally connected by one of its parts to the supporting leg and by the other of its parts to the abutment bar. Resilient means are provided on the supporting leg in this connection for normally downwardly urging such one piston-cylinder arrangement intermediate the pivotal connections thereof. Moreover, the other of the piston-cylinder arrangements may be operatively connected to the base means via said other of the parts of said one piston-cylinder arrangement with one of the corresponding parts of said other piston-cylinder arrangement being fixed to said other of the parts of said one piston-cylinder arrangement and with the other of the corresponding parts of said other piston-cylinder arrangement being pivotally connected to the abutment bar.

In accordance with an alternate feature of the present invention, the prop means may take the form of a vertical prop mounted on the supporting leg for engaging the mine ceiling, with a carriage horizontally displaceably mounted on the supporting leg. In this instance, one of the piston-cylinder arrangements may be pivotally connected by one of its parts to the supporting leg and by the other of its parts to the abutment bar, said other of its parts being also connected at least along a portion thereof to said carriage. Additionally, the other of said piston-cylinder arrangements may be operatively connected to the base means via said carriage with one of the corresponding parts of said other piston-cylinder arrangements being operatively connected to the carriage and with the other of the corresponding parts of said other piston-cylinder arrangements being pivotally connected to the abutment

bar. More specifically, the supporting leg in this regard may be provided with an upper retaining means and a lower retaining means, said retaining means being vertically spaced apart, and the carriage may be provided in turn with an upper slide surface and a lower slide surface, such that a portion of the carriage is displaceably received within the supporting leg with a vertical clearance between the upper slide surface and the upper retaining means and with the lower slide surface in sliding engagement with the lower retaining means. Adjustable shim means also may be provided effectively in the vertical clearance in question to limit adjustably the upward displacement of the carriage with respect to the supporting leg.

Advantageously, the other piston-cylinder arrangement may be further provided with a damping means operatively connected between said one of the corresponding parts of said other piston-cylinder arrangement and said carriage for absorbing excessive forces exerted on said other piston-cylinder arrangement during abutment of the bar against the conveyor.

In accordance with one particular embodiment of the invention, hydraulically operated piston-cylinder means are provided in addition to the usual bracing piston-cylinder means, such that pressure components of various magnitude may be exerted on the mining conveyor and/or planer guide means depending upon the extent to which the adjusting piston-cylinder arrangements are stressed to change the angle of the abutment bar with respect to its normal vertical position. Thus, the resultant components of force may be exerted such that the over-all force is directed diagonally downwardly toward the mine floor or diagonally upward toward the mine ceiling, in addition to the normal horizontal direction toward the mine face, for overcoming an adverse position of the conveyor on the mine floor, so as to prevent the conveyor from lifting from its normal position or from digging undersirably downwardly into a soft area in the mine floor. By avoiding such possibilities, through suitable adjustment of the backing arrangement and in turn the planer guide and/or conveyor, the planer will always be guided along its true longitudinal course, precisely along the horizontal level of the mine floor desired.

Referring to the drawing, in FIG. 1, a backing arrangement is shown in accordance with one embodiment of the invention, including a base means **10** of U-shaped construction, with the free ends of the U downwardly facing, a pit prop **11** being pivotally mounted by pivot **12** onto the supporting leg **10** at an angle with the mine floor sufficient to brace the base means against any displacement thereof in the direction toward the left as viewed in FIG. 1. A main piston-cylinder arrangement **13** including a piston **14** and a cylinder **15** is provided as well as a secondary piston-cylinder arrangement **16** including the secondary cylinder **17** and the secondary piston **18**. The piston-cylinder arrangements **13** and **16** are connected linkably via the normally vertical abutment bar **19**. More specifically, main piston **14** is pivotally connected by pivot **20** to supporting leg **10** and main cylinder **15** is pivotally connected to abutment bar **19** by pivot **21**, whereas secondary cylinder **17** is fixedly connected to the upper side **22** of main cylinder **15** while secondary piston **18** is pivotally connected by pivot **23** to abutment bar **19**.

A longitudinally extending mining conveyor **27** of conventional construction is shown having the side members **28** and **29** which are interconnected intermediate their height by trough plate **30**. On side member **29** a suitable guiding track **31** in the form of a guiding tube is provided such that a planer of the usual type may be mounted thereon for movement back and forth along the mine face adjacent that side of the conveyor. In this connection, the conveyor in question may be of the usual double chain scraper conveyor type such as that shown in U.S. Patent 2,810,565, issued October 22, 1957, and U.S. Patent 2,990,168, issued June 27, 1961. Usually the coal or other mineral, extracted by the planer from the mine face is loaded onto the conveyor and hauled therealong by a scraper bar mechanism comprising parallel chains interconnected along their common length by scraper bars for conveying the coal from the site of extraction.

In order to ensure a firm grip with the mine floor, the under side of the supporting leg **10**, i.e. for example, along the free ends of the U-shaped portion may be provided with downwardly extending projections **24** which sink into the mine floor. Inasmuch as there may be a tendency for the main piston-cylinder arrangement **13** to rotate upwardly about the axis of pivot **20**, a loaded spring **25** within a casing **26** is downwardly urged against the upper portion of main cylinder **15** to offset any such upward pivotal displacement of the piston-cylinder arrangement **13**.

As will be appreciated, the secondary or auxiliary piston-cylinder arrangement **16** may be utilized to move the upper pivot **23** farther toward the mine face than the pivot **21** so as to counteract any upward dsiplacement of the side member **28** of the conveyor **27** which might result in buckling of the arrangement or the causing of the planer to dig too deeply into the mine floor. It will be appreciated that without the presence of the pair of piston-cylinder arrangements, situated one above the other, in accordance with the present invention, it would not be possible to offset any lifting of the conveyor from its normal position or tendency of the conveyor to dig into the mine floor in an undesirable manner. Suitably, the cylinder **15** is connected to the bar **19** such that main cylinder **15** abuts the side member **28** of the conveyor **27** approximately at the height of the trough plate **30**. In this way, main piston-cylinder arrangement **13** will normally urge the conveyor **27** in the horizontal direction, i.e. at the height of the trough plate **30**. By the presence of the secondary piston-cylinder arrangement **16**, a higher point of engagement at pivot **23** is provided, such that if secondary piston **18** is urged toward the conveyor **27**, a resultant force is produced via the abutment bar **19** which is directed slantingly downwardly toward the coal face, such as in the direction of the arrow **32**.

While the presence of the secondary piston-cylinder arrangement **16** connected to the main cylinder **15** might otherwise cause a rotation of the arrangement about the pivot **20** on the supporting leg **10**, due to the presence of the downwardly urging spring **25**, any such tendency is suitably offset. At least, any unilateral lifting of the conveyor in the manner shown in FIG. 1 is minimized by the presence of the spring **25** on the base means.

Where the secondary piston-cylinder arrangement **16** is operated, such that the piston **18** moves away from the conveyor **27**, the guiding track **31** might be caused to press against the coal face with a component of force directed slantingly upwardly rather than as shown by arrow **32**. In such case, the digging of the planer into the mine floor would be prevented, even if the mine floor were soft and friable.

Naturally, the positioning of the main piston-cylinder arrangement and the secondary piston-cylinder arrangement may be reversed, such that the main piston-cylinder arrangement is situated above the secondary piston-cylinder arrangement, yet with the construction permitting the desired angular displacement of the abutment bar **19**. Moreover, it will be appreciated that the secondary piston-cylinder arrangement may be connected directly or indirectly, and fixedly or pivotally onto the main piston-cylinder arrangement. Furthermore, the angle of pivot of the main piston-cylinder arrangement **13** about the pivot **20** may be suitably limited by the provision for adjustable stop means on the supporting leg **10**, i.e. above and below the normal horizontal position of the main piston **14** to prevent too high or too low a movement of piston **14** with respect to the normal horizontal disposition thereof. It will be appreciated, from FIG. 1, that by providing the supporting leg **10** as a U-shaped member with

the free ends of the U directed downwardly, the main piston-cylinder arrangement **13** will be suitably protected from coal, dirt, dust, etc. which might otherwise clog and damage the operating parts.

As will be appreciated by the artisan, any conventional means may be employed for actuating the piston-cylinder arrangements **13** and **16**, as well as the pit prop **11** which may be extended or retracted. Usually, the pit prop takes the form of a hydraulic jack and the piston-cylinder arrangements take the form of hydraulically operated pistons of the double-acting type. More specifically, a reservoir for hydraulic fluid may be connected via separate lines to each end of the particular cylinder in question so that hydraulic fluid may be injected or removed from that portion of the cylinder on the appropriate side of the piston. Such arrangements are well known and need not be exemplified further herein. The operation to be achieved in any case, of course, is that the piston and cylinder may be actuated to urge the same further into and further out of telescopic engagement with one another, depending on whether the linear displacement desired is to increase the distance between the free end of the piston and the free end of the cylinder or to decrease such distance. This will immediately affect the angular disposition of the abutment bar **19** with respect to the mine floor.

With respect to FIG. 2, an alternate embodiment of the invention is shown including a base means having a supporting leg **33** situated on the mine floor and a vertical prop **34** for engaging the mine ceiling, whereby the base means will be fixed against undesired horizontal displacement thereof. The supporting leg **33** is provided with an upper retaining means **35** and a lower retaining means **36** which are vertically spaced apart from one another such that the carriage **37** which is provided with an upper slide surface **38** and a lower slide surface **39**, may be horizontally displaceably received at least along one end portion thereof within the space between the retaining means **35** and **36**. In order to prevent undue upward displacement of carriage **37** within the space between the retaining means **35** and **36**, adjustable shims are provided in stacked relation between the upper slide surface **38** and the retaining means **35**. While the carriage **37** may be displaced in horizontal direction in an undisturbed manner, even though shims **40** are present, this is because the shims are suitably retained against horizontal displacement. If desired, other stop means may be used in place of the shims **40** to limit the upward displacement of the carriage **37**.

In the embodiment of FIG. 2, the main piston-cylinder arrangement is disposed above the secondary piston-cylinder arrangement. Thus, main piston **41** slidably received within main cylinder **42** is pivotally connected at its free end to supporting leg **33** by pivot **43**, main cylinder **42** being pivotally connected to the abutment bar **45** by the pivot **44**. On the other hand, the secondary cylinder **46** is provided with a partition **47** so as to form a separate damping cylinder compartment **48** in which the damping piston **49** is slidably received, the free end of damping piston **49** being pivotally connected to the carriage **37** at pivot **50**. At this point, it should be noted that while damping piston **49** is pivotally connected to the carriage **37**, the main cylinder **42** is fixedly connected along at least a portion of its length to the carriage **37** whereby a change in the disposition of main piston **41** within main cylinder **42** will cause the horizontal displacement of carriage **37** with respect to supporting leg **33**, while this will not be always true in the case of damping piston **49** and damping cylinder compartment **48**. Specifically, secondary piston **51** attached at its free end by pivot **52** to the abutment bar **45** is received within secondary cylinder **46** so as to urge abutment bar **45** against the side member **28** of the conveyor **27**. Nevertheless, since cylinder **46** is in fact connected with the damping cylinder compartment **48** due to the presence of the partition wall **47**, and since the damping cylinder compartment **48** is operatively connected with the damping piston **49**, undue stresses met by the conveyor upon passage of the planer therealong in engagement with the mine face, will be absorbed by the damping action of piston **49** within chamber **48**. This is true since chamber **48** is connected with the reservoir for the hydraulic fluid used for operating the arrangement as noted above in connection with the operation of the pistons and cylinders in FIG. 1. The reservoir pressure will return the damping piston **49** to its normal disposition **49** within the cylinder chamber **48** once the excessive force has been relieved, due to the maintainence of a reference pressure within the reservoir for the hydraulic fluid. However, in the case of cylinders **42** and **46**, these cylinders are provided preferably at the ends of the cylinder chambers with hydraulic fluid connections for injecting or withdrawing hydraulic fluid from the approprate sides of the piston in question. Therefore, the piston-cylinder arrangements may be operated to increase or decrease their length in the usual manner. The same is true with respect to the vertical prop **34** which may take the form of a hydraulic jack similar to the slanting jack **11** of FIG. 1, both such jacks being extensible or retractable as desired.

It will be appreciated that while FIG. 1 is directed to an embodiment in which the main piston-cylinder arrangement is situated below the secondary piston-cylinder arrangement, in FIG. 2 just the opposite construction is achieved. Naturally, the shock absorbing or yielding action provided by the damping piston **49** within the damping cylinder compartment **48** may be utilized in accordance with the embodiment of FIG. 1 as well by merely connecting the piston-cylinder arrangement **16** of FIG. 1 with the piston-cylinder arrangement **13** by a damping piston-cylinder arrangement, etc.

In the case of FIG. 2, the planer guiding track or tube **31** may be pressed against the mine face by the urgence of cylinder **42** under the action of hydraulic pressure against piston **41**, such that the point of exertion of the hydraulic force against the side member **28** will be adjacent the pivot **44** of the abutment bar **45**. This point is substantially above the intermediately positioned trough plate **30** of the conveyor **27**. Thus, if only the main piston-cylinder arrangement is actuated, the track **31** will be urged against the coal face with a downwardly slanting direction of force. In order to prevent the conveyor **27** from lifting from the mine floor at its rear side and in turn the lifting of the main piston-cylinder arrangement about the pivot point **43**, the supporting leg **33** is supplied with appropriate stop means, in the embodiment shown such stop means taking the form of adjustable shims **40**. Of course, the number of stacked shims **40** and hence the stopping point in upward direction of the carriage **37** and in turn the cylinder **42** can be adapted to the prevailing conditions in each case by adding or subtracting one or more shims from the number then being used.

The construction of the present invention advantageously permits an accurate and precise urgence of the force of the backing arrangement in a particular direction. Thus, in the embodiment of FIG. 2, for instance, if it is desired to urge the conveyor **27** at the side member **28** with a force directed approximately parallel to the mine floor, the secondary cylinder **46** may be appropriately actuated to cause the corresponding movement of the secondary piston **51** and in turn the varying of the angular disposition of the abutment bar **45**. The presence of the damping piston-cylinder arrangement connected to the hydraulic fluid reservoir or pressure line permits a desired urging pressure to be exerted against the conveyor, not only with the normal force of the cylinder **42** but also with the yieldable force of the cylinder **46**, coupled with the damping cylinder compartment **48**. By suitable adjustments of the length of extension of piston **51** and cylinder **42**, the desired pressure component