PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in Apparatus for the Expulsion of Liquid from Fibrous Materials

We, THE BRITISH WEDGE WIRE COMPANY LIMITED, a British Company, of Academy Street, Warrington, Lancashire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

For many purposes there is need for a press which will satisfactorily separate water and other fluids from fibrous materials, particularly vegetable matters such as leaves, grasses and certain kinds of fruits, on an industrial scale and without rubbing or churning. It is desirable that the fluid expulsion should be effected under such conditions that the bed of material being pressed is kept thin so that compacted fibre does not act as a very fine filter.

These conditions are particularly desirable in the expulsion of juices from fragments of vegetable matter that have been produced in a suitable mill, or for the expulsion of water from leaves that have been suitably pretreated for example, by steaming.

Many attempts have been made to effect fluid expulsion with conventional apparatus. However, experience has shown that the main disadvantage of the screw expeller is that there is so much internal friction that the material is disintegrated and an excessive amount of power is consumed; roller presses have the disadvantage that pressure is not maintained for a sufficiently long time on the material; hydraulic presses are unsatisfactory by reason of the labour required for charging and emptying the press when the thickness of material to be treated is small.

An object of the invention is to avoid the aforesaid disadvantages, and the invention accordingly provides a continuous press for the expulsion of liquid from fibrous materials such as vegetable matters, comprising an intermittently-operable permeable endless conveyor of grid-like or slatted construction for carrying a relatively thin layer of said material through a pressing station, intermittently-operable pressure-applying means at said station for pressing the material on the conveyor, operating means for periodically advancing the conveyor to bring the material to and immobilise it at the pressing station and for causing the pressure-applying means to press the immobilised material, and express liquid therefrom, a grid structure for supporting the conveyor against the force of the pressure-applying means, and means beneath the grid structure for collecting the expressed liquid.

Preferably, the pressure is applied by hydraulic means so as to remain uniform notwithstanding decrease of depth of the layer of material undergoing pressure.

The conveyor is preferably made up of a chain or series of substantially rigid elements. It may be periodically advanced to an extent substantially equal to the dimension of the pressure-applying means in the longitudinal direction of the conveyor, so that each successive portion of the material is subjected to a single pressing, or to an extent which is a fraction of said dimension so that each successive portion of the material is subjected to a series of successive pressings. In the latter case, the pressure applying means may be rockable to distribute the pressure over several adjacent portions of material progressively reduced in thickness by the successive pressings.

For example, a tumbler or a sprocket system whereby such a conveyor is driven may be turned as the pressure-applying ram or other means moves to release the pressure. Thus, a ratchet wheel on the tumbler or sprocket shaft may be angularly displaceable by a pawl actuable by preferably adjustable lever linkage means connected with the ram or equivalent.

Advantageously, the face of the pressure-applying ram or equivalent means (which for convenience of description will hereinafter be referred to as a ram) is covered with a movable endless band, arranged to be displaced substantially in synchronism with the means for advancing the layer of material, and in the same direction, during the periods when the ram is raised to relieve the material of pressure.

Preferably, the intermittent advancing of said band is effected automatically each time the ram is raised, and with a delayed action, so that the band is clear of the upper surface of the material before it is displaced.

For example, the band may be displaceable around at least two rollers mounted in bearings on extensions from the ram, one run of the band traversing the pressure face of the ram, and the intermittent advance may be effected by engagement of an angularly displaceable member with a fixed abutment on a frame in which the ram is mounted.

Such means may conveniently comprise a rack and pinion arrangement, more particularly a free-wheel sprocket and a length of roller chain secured in a fixed position under tension, and for adjusting the timing, the rack or equivalent roller chain may be adjustable in a direction parallel to the axis of the ram.

According to a subsidiary feature of the invention, the continuous press has a preliminary pressing means, associated with the conveyor at a location in advance of the pressing station, for effecting a preliminary pressing operation on the material before arrival at the pressing station.

There may be a lever-linkage system actuatable with the pressure-applying means to operate said preliminary pressing means.

By such means not only is the material subjected to an initial pressing which expels the more easily removable portion of fluid contained in the material, but the layer of material is partially compressed and consequently the stroke of the ram, necessary to lift it above the upper surface of the material during displacement of the layer, is reduced.

The ram is preferably associated with known means for effecting independently (a) variation of the duration of the pressure stroke, (b) variation of the frequency of the strokes and (c) variation of the pressure applied.

The foregoing and other features of the invention will be better understood from the following description by way of example of an embodiment illustrated in Figures 1 and 2 of the drawings which accompanied the Provisional Specification, and Figure 3 of the accompanying drawing, wherein:

Figure 1 is a side elevation of a press,

Figure 2 is a vertical section on the line II—II of Figure 1, and

Figure 3 is a diagrammatic side elevation of a part of the press shown in Figures 1 and 2, illustrating a modification in which preliminary pressing means are included.

The press as shown in the drawings has a main frame comprising four uprights 1 and two main longitudinal beams 2, the ends of which are supported on legs 3.

Mounted on two transverse members 4 at the top of the uprights 1 are two longitudinal beams 5 to which the upper end of a hydraulic cylinder 6 is secured in a suitable manner, e.g. on a pivot pin 7 as shown.

The lower end of the hydraulic piston rod 8 is secured by an adjustable screw threaded means 9 (Figure 1) to a cross-head member 10 connected by pivot pin 11 to a ram structure. The latter comprises a cross member 12 mounted on the pin 11 by means of angle brackets 13, and having secured below it a pair of longitudinal beams 14 which in turn carry two transverse beams 15 to the outer ends of which are in turn connected a further pair of longitudinal beams 16.

Secured below the beams 16 is a group of hardwood blocks, of which the middle block 17 is cuboid in form and constitutes the pressure applying member of the ram assembly, while the two outer blocks 18 are wedge shaped and serve as guides for a shrouding endless band 19 of rubber, plastic or other suitable sheet material. The band 19 is mounted on a driving roller 20 and a tension roller 21, both these rollers being mounted in bearings carried by the beams 16. The bearings for the tension roller 21 are indirectly supported by the beams 16 upon a plate 22 which is adjustable by screw and nut means 23 engageable with an abutment member 24 fixed to the beam 16.

The ram assembly is vertically guided by brackets 58 secured to the members 14 and 16 of said assembly.

These brackets are slidable upon fixed, vertical guides 59 mounted in upper and lower angle members 60 and 61 secured to beams 62 and 63 extending longitudinally between the uprights 1.

A conveyor for the material to be treated, which consists of an endless chain of links 25, each comprising a rigid frame enclosing a grid-like structure, is mounted on a pair of driving sprocket wheels 26 and a pair of tension sprocket wheels 27, the shafts 28 and 29 of which are supported in bearings adjacent the ends of the longitudinal beams 2.

On the shaft 28 of the driving sprockets 26 is secured a ratchet wheel 30. Loosely mounted on said shaft is a lever 31 carrying a pawl 32 which is resiliently urged into engagement with the ratchet wheel 30.

Articulated to the end of the lever 31 is a rod 33, the other end of which is in turn articulated to a depending lever 34 secured to a transverse shaft 35 mounted in bearings 35a on two of the uprights 1. As shown these

lever-linkage elements 31—34 are mounted at the middle of the frame, and towards one side of the frame there is secured to the shaft 35 a lever 36 which oscillates about the horizontal. To the end of this lever is articulated a vertical rod 37, the upper end of which is secured to a pivot member 38 located below one of the longitudinal beams 16.

For facilitating adjustment of the displacement of the driving sprockets 26, the rods 33 and 37 are shown articulated to the levers 31, 34 and 36 by means of clevises 39, each of which is adjustable on a screw-threaded portion of the rod. Furthermore, the articulation of the rod 33 to the lever 31 is preferably adjustable by the engagement of a pin 40 (which is engaged by the associated clevis 39), in a selected one of a series of holes (not shown) in the lever 31, so that notwithstanding a substantially constant stroke of the ram the pawl-and-ratchet means may be displaced to advance the conveyor chain 25 at each operation to an extent substantially equal to the longitudinal dimension of the block 17, or by a fraction of the dimension as required.

Mounted at the top of the uprights 1, for example on a plate carried by the beams 4, is an electrically driven pump and operating gear (not shown) of known kind for the hydraulic cylinder 6, which is of double acting type, having both downward and upward strokes positively effected.

The operating gear preferably includes a reservoir for hydraulic fluid with which is associated control means for the pump whereby the pressure created in the reservoir is adjustable. There is preferably mounted on the press a pressure indicator calibrated to show both the pressure in the cylinder and the pressure applied in pounds per square inch upon the material pressed beneath the ram face of the block 17.

Furthermore, there is preferably provided on the frame control means of known kind which determines the frequency of the strokes of the hydraulic piston 8, and also independently the dwell of said piston in its lower, protruded position during which pressure is maintained upon the material.

As the ram effects each upward stroke, the pawl 32 engages and turns the ratchet wheel 30 on the shaft of the driving sprockets 26, under actuation of the lever-linkage means 31, 33, 34, 36, 37, so that as the ram rises the link conveyor 25 is displaced in the direction of the arrow A to bring a fresh charge of material below the effective surface of the block 17, or a part of the said surface.

The band 19 is provided to prevent adherence of the pressed material to the block 17, and the press includes means for displacing this band in substantial synchronism with, and in the same direction as, the conveyor 25. That is to say, the upper run of the conveyor 25 and the lower run of the band 19 are moved simultaneously to the left as seen in Figure 1, and preferably to a substantially equal extent. Movement of the band 19 is however delayed until the lifting of the ram has proceeded to such an extent that the band is displaced from contact with the material on the conveyor 25, including the material entering the ram area which has not been pressed.

To this end, movement of the band 19 is effected by means of the rack and pinion type, the position of the rack or equivalent being such that effective engagement does not commence until the ram has lifted to a predetermined extent. As shown, the rack and pinion means consists of a free-wheel chain sprocket 41 mounted on one or each end of the shaft 42 carrying the driving drum 20 for the band 19, and a length of roller chain 43 held in tension in a vertical attitude upon a bracket 44 secured to one of the uprights 1. The chain 43 is preferably held in tension by screw thread means at each end, whereby the vertical location of the chain may be suitably adjusted. Evidently as the ram rises, and when the teeth of the sprocket 41 engage the chain 43, the sprocket is turned clockwise as seen in Figure 1, and turns the drum 20 likewise so that the lower run of the band 19 is displaced to the left in the direction of the arrow A.

In case any of the pressed material might adhere to the band 19, a scraper 45 is disposed to bear lightly upon the band, transversely below the pair of beams 16.

During each successive pressing operation the portion of the conveyor links 25 located below the ram block 17 is supported by a fixed grid structure 46 carried by a pair of transverse beams 47. Below this fixed grid is a collecting pan 48 the base of which is inclined and from which extends a discharge channel or duct 49.

The chains (not shown) by which the links 25 of the conveyor are interconnected and mounted on the sprockets 26 and 27 are supported, in the upper run, by a pair of angle members 50 carried by uprights 51 from the longitudinal members 2, and in the lower run by a pair of angle members 52 supported on the lower parts of the uprights 1 and by the legs 3. Towards the left-hand end of the members 50, as seen in Figure 1, is mounted a scraper 53 for loosening material adhering to the conveyor links 25 so that the said material is discharged from these links as they pass round the driving sprockets 26.

Below the feed or right-hand portion of the upper run of the conveyor, and suspended from the angle members 50, are two pans or trays 54 and 55 for collecting any fluid which may drain naturally from the material or may be expelled therefrom by an initial pressing as will be described. These pans have dis-

charge channels or ducts 56 and 57 respectively which project from the side of the press in the same direction as the discharge duct 49 of the pan 48, so that all the expelled fluid may be collected, for example, in a channel, on one side of the machine.

It has been found by experiment that a press as described by reason of the application of uniform pressure for a controlled duration on successive portions of the material to be treated, effects expulsion of fluids from fibrous materials, particularly vegetable matters such as leaves, in a more satisfactory and efficient manner than has hitherto been possible, with apparatus of known types.

In a development of the invention (see Figure 3), auxiliary pressing means are provided above the conveyor and before the main pressure means. These serve to remove some of the more easily expellable fluid from the material and at the same time serve to effect an initial compression of the material prior to the main pressing operation.

The auxiliary pressure means comprise a pressure member which desirably is of similar construction to the means 17, 18, 19 hereinbefore described but is shown as a plate 64 carried by shanks 65 to which are articulated a pair of links 66. Extending laterally at the upper and lower ends of the shanks 65 are rollers 67 and 68, which run in a guideway formed between angle brackets 69 and 70 mounted on the angle irons 50.

The links 66 are pivotally connected at 71 to a lever 72, one end of which is articulated to the ram assembly and the other end of which is pivotally mounted between brackets 73 provided on extensions 74 of the uprights 3. The means 64—70 may be located at any suitable position in relation to the feed portion of the conveyor. As shown, the location of the pivot 71 is selected, for example, so that its distance from the articulation to the ram assembly is half that of its distance from the pivotal connection to the brackets 73, whereby the material is subjected to a preliminary compression equal to two-thirds of that effected by the hydraulic ram assembly.

It will be seen that the auxiliary pressing means will exert pressure on the material simultaneously with the pressing action of the main assembly. The provision of the guideway between the plates 69 and 70 ensures that the pressure plate 64 exerts an evenly distributed pressure on the material on the conveyor.

Alternatively, the plate 64 or equivalent pressure member may be rockable, for example, about the axis of the rollers 67, particularly when the displacement of the conveyor is a fraction of the longitudinal dimension of said means, so as to distribute the pressure thereby applied over several adjacent portions of material progressively reduced in thickness by the successive preliminary pressings.

Further such preliminary pressing means may be provided with a movable endless band covering its face, such as the band 19 of the hydraulic ram assembly; in such case, since the material will be drier and less liable to adhere to the main ram assembly, the band 19 and associated mechanism of said assembly may be dispensed with. Alternatively, a single band may be provided with passes around both the preliminary and main pressure means.

In the event of a press according to the invention being installed where it is required to operate on one kind of material only, it may be possible to provide a covering for the ram face such that the material and the expressed fluids do not adhere thereto, whereby the displaceable band 19 and the means for mounting and displacing it may be eliminated.

Evidently the mode and details of construction of a press and the details and modes of operation of the several elements and assemblies therein may be modified considerably without departing from the scope of the invention.

WHAT WE CLAIM IS:—

1. A continuous press for the expulsion of liquid from fibrous materials such as vegetable matters, comprising an intermittently-operable permeable endless conveyor of grid-like or slatted construction for carrying a relatively thin layer of said material through a pressing station, intermittently-operable pressure-applying means at said station for pressing the material on the conveyor, operating means for periodically advancing the conveyor to bring the material to and immobilise it at the pressing station and for causing the pressure-applying means to press the immobilised material and express liquid therefrom, a grid structure for supporting the conveyor against the force of the pressure-applying means, and means beneath the grid structure for collecting the expressed liquid.

2. A continuous press according to Claim 1, wherein the pressure applying means is operable by hydraulic means so as to apply uniform pressure notwithstanding decrease of depth of the layer of material undergoing pressure.

3. A continuous press according to Claim 1 or Claim 2, wherein the conveyor is made of a chain or series of substantially rigid elements.

4. A continuous press according to any of the preceding Claims wherein said operating means for the conveyor serves to advance it periodically to an extent substantially equal to the dimension of the pressure-applying means in the longitudinal direction of the conveyor, so that each successive portion of the material is subjected to a single pressing.

5. A continuous press according to any of

the preceding Claims 1—3, wherein said operating means for the conveyor serves to advance it periodically to an extent which is a fraction of the dimension of the pressure-applying means in the longitudinal direction of the conveyor, so that each successive portion of the material is subjected to a series of successive pressings.

6. A continuous press according to Claim 5, wherein the pressure-applying means is rockable to distribute the pressure over several adjacent portions of material progressively reduced in thickness by the successive pressings.

7. A continuous press according to any of the preceding Claims wherein a tumbler or sprocket driving system for the conveyor is turnable as the pressure-applying means moves to release the pressure.

8. A continuous press according to Claim 7, having a ratchet wheel on the driving tumbler or sprocket shaft, a pawl engaging said ratchet wheel and preferably adjustable lever-linkage means connected with the pressure-applying means for actuating said pawl.

9. A continuous press according to any of the preceding claims, having a preliminary pressing means, associated with the conveyor at a location in advance of the pressing station, for effecting a preliminary pressing operation on the material before arrival at the pressing station.

10. A continuous press according to Claim 9, having a lever-linkage system actuable with the pressure-applying means to operate said preliminary pressing means.

11. A continuous press according to any of the preceding claims, having a movable endless band covering the face of said pressure-applying means and means for displacing said band in synchronism with the means for advancing the layer of material and in the same direction, during the period when the pressure-applying means is displaced to relieve the material of pressure.

12. A continuous press according to Claim 9, having a movable endless band covering the face of said preliminary pressing means, and means for displacing said band in synchronism with the means for advancing the layer of material and in the same direction, during the period when said preliminary pressing means is displaced to relieve the material of pressure.

13. A continuous press according to Claim 9, having a single movable endless band covering the faces of said pressure applying means and said preliminary pressing means, and means for displacing said band in synchronism with the means for advancing the layer of material and in the same direction, during the period when said pressure applying means and said preliminary pressing means are jointly displaced to relieve the material of pressure.

14. A continuous press according to any one of Claims 11—13, wherein the band is displaceable around at least two rollers mounted in bearings on extensions of the pressure applying means and/or preliminary pressing means, one run of the band traversing the pressure face or faces of said means.

15. A continuous press according to any one of Claims 11—14, wherein the band-displacing means is operable automatically each time the material is relieved of pressure, and with a delayed action so that the band is clear of the upper surface of the material before it is displaced.

16. A continuous press according to Claim 15, wherein the band displacing means is actuable by an angularly displaceable member engaging a fixed abutment on a frame in which the pressure-applying means is mounted.

17. A continuous press according to Claim 15, wherein the band displacing means comprises a free-wheel sprocket mounted to engage a length of chain serving as a rack, secured under tension, and preferably adjustable for timing the displacements of the band, in a direction parallel to the axis of the pressure-applying means.

18. A continuous press for the expulsion of liquid from fibrous materials such as vegetable matters, substantially as hereinbefore described with reference to Figures 1 and 2 of the drawings which accompanied the Provisional Specification.

19. A continuous press according to Claim 16, modified by the addition of means substantially as hereinbefore described with reference to Figure 3 of the accompanying drawing.

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PROVISIONAL SPECIFICATION

Improvements in Apparatus for the Expulsion of Liquid from Fibrous Materials

We, THE BRITISH WEDGE WIRE COMPANY LIMITED, a British Company, of Academy Street, Warrington, Lancashire, do hereby declare this invention to be described in the following statement:—

For many purposes there is need for a press which will satisfactorily separate water and other fluids from fibrous materials, particularly vegetable matters such as leaves, grasses and certain kinds of fruits, on an industrial scale and without rubbing or churning. It is desirable that the fluid expulsion should be

effected under such conditions that the bed of material being pressed is kept thin so that compacted fibre does not act as a very fine filter.

These conditions are particularly desirable in the expulsion of juices from fragments of vegetable matter that have been produced in a suitable mill, or for the expression of water from leaves that have been steamed.

Many attempts have been made to effect fluid expulsion with conventional apparatus. However, experience has shown that the main disadvantage of the screw expeller is that there is so much internal friction that the material is disintegrated and an excessive amount of power is consumed; roller presses have the disadvantage that pressure is not maintained for a sufficiently long time on the material; hydraulic presses are unsatisfactory by reason of the labour required for charging and emptying the press when the thickness of material to be treated is small.

An object of the invention is to avoid the aforesaid disadvantages, and the invention accordingly provides a continuous press for the expulsion of liquid from fibrous materials such as vegetable matters, characterised by means for periodically advancing an immobilizing a relatively thin layer of said material, and means for applying pressure during each period of immobilization to successive, stationary portions of said material.

Preferably, the pressure is applied by hydraulic means so as to remain uniform notwithstanding decrease of depth of the layer of pressed material.

The layer of material may be periodically advanced and immobilized by an endless conveyor of grid-like or slatted construction, preferably made of a chain or series of substantially rigid elements, and operated in synchronism with the pressure-applying hydraulic ram or equivalent means.

For example, a tumbler or a sprocket system whereby such a conveyor is driven may be turned as the pressure-applying ram or other means moves to release the pressure. Thus, a ratchet wheel on the tumbler or sprocket shaft may be angularly displaceable by a pawl actuable by preferably adjustable lever-linkage means connected with the ram or equivalent.

Advantageously, the face of the pressure-applying ram or equivalent means (which for convenience of description will hereinafter be referred to as a ram) is covered with a movable endless band, arranged to be displaced substantially in synchronism with the means for advancing the layer of material, and in the same direction, during the periods when the ram is raised to relieve the material of pressure.

Preferably, the intermittent advancing of said band is effected automatically each time the ram is raised, and with a delayed action, so that the band is clear of the upper surface of the material before it is displaced.

For example, the band may be displaceable around at least two rollers mounted in bearings on extensions from the ram, one run of the band traversing the pressure face of the ram, and the intermittent advance may be effected by engagement of an angularly displaceable member with a fixed abutment on a frame in which the ram is mounted.

Such means may conveniently comprise a rack and pinion arrangement, more particularly a sprocket wheel and a length of roller chain secured in a fixed position under tension, and for adjusting the timing, the rack or equivalent roller chain may be adjustable in a direction parallel to the axis of the ram.

According to a further feature of the invention, the means for advancing the material towards the ram may be extended on the entry side and a preliminary pressing means associated with such extension, said pressing means being operated by a lever-linkage system actuable by the ram.

By such means not only is the material subjected to an initial pressing which expels the more easily removable portion of fluid contained in the material, but the layer of material is partially compressed and consequently the stroke of the ram, necessary to lift it above the upper surface of the material during displacement of the layer, is reduced.

The ram is preferably associated with known means for effecting independently (a) variation of the duration of the pressure stroke, (b) variation of the frequency of the strokes and (c) variation of the pressure applied.

The foregoing and other features of the invention will be better understood from the following description by way of example of an embodiment illustrated in the accompanying diagrammatic drawings, wherein:—

Figure 1 is a side elevation of a press, and

Figure 2 is a vertical section on the line II—II, of Figure 1.

The press as shown in the drawings has a main frame comprising four uprights 1 and two main longitudinal beams 2, the ends of which are supported on legs 3.

Mounted on two transverse members 4 at the top of the uprights 1 are two longitudinal beams 5 to which the upper end of a hydraulic cylinder 6 is secured in a suitable manner, e.g. on a pivot pin 7 as shown.

The lower end of the hydraulic piston rod 8 is secured by an adjustable screw threaded means 9 (Figure 1) to a cross-head member 10 connected by a pivot pin 11 to a ram structure. The latter comprises a cross member 12 mounted on the pin 11 by means of angle brackets 13, and having secured below it a pair of longitudinal beams 14 which in turn carry two transverse beams 15 to the outer ends of which are in turn connected a further

pair of longitudinal beams 16.

Secured below the beams 16 is a group of hardwood blocks, of which the middle block 17 is cuboid in form and constitutes the pressure applying member of the ram assembly, while the two outer blocks 18 are wedge shaped and serve as guides for a shrouding endless band 19 of rubber, plastic or other suitable sheet material. The band 19 is mounted on a driving roller 20 and a tension roller 21, both these rollers being mounted in bearings carried by the beams 16. The bearings for the tession roller 21 are indirectly supported by the beams 16 upon a plate 22 which is adjustable by screw and nut means 23 engageable with an abutment member 24 fixed to the beam 16.

The ram assembly is vertically guided by brackets 58 secured to the members 14 and 16 of said assembly. These brackets are slidable upon fixed, vertical guides 59 mounted in upper and lower angle members 60 and 61 secured to beams 62 and 63 extending longitudinally between the uprights 1.

A conveyor for the material to be treated, which consists of an endless chain of links 25, each comprising a rigid frame enclosing a grid-like structure, is mounted on a pair of driving sprocket wheels 26 and a pair of tension sprocket wheels 27, the shafts 28 and 29 of which are supported in bearings adjacent the ends of the longitudinal beams 2.

On the shaft 28 of the driving sprockets 26 is secured a ratchet wheel 30. Loosely mounted on said shaft is a lever 31 carrying a pawl 32 which is resiliently urged into engagement with the ratchet wheel 30.

Articulated to the end of the lever 31 is a rod 33, the other end of which is in turn articulated to a depending lever 34 secured to a transverse shaft 35 mounted in bearings 36 on two of the uprights 1. As shown these lever-linkage elements 31—34 are mounted at the middle of the frame, and towards one side of the frame there is secured to the shaft 35 a lever 36 which oscillates about the horizontal. To the end of this lever is articulated a vertical rod 37, the upper end of which is secured to a pivot member 38 located below one of the longitudinal beams 16.

For facilitating adjustment of the displacement of the driving sprockets 26, the rods 33 and 37 are shown articulated to the levers 31, 34 and 36 by means of clevises 39, each of which is adjustable on a screw-threaded portion of the rod. Furthermore, the articulation of the rod 33 to the lever 31 is preferably adjustable by the engagement of a pin 40 (which is engaged by the associated clevis 39), in a selected one of a series of holes (not shown) in the lever 31.

Mounted at the top of the uprights 1, for example on a plate carried by the beams 4, is an electrically driven pump and operating gear of known kind for the hydraulic cylinder 6, which is of double acting type, having both downward and upward strokes positively effected.

The operating gear preferably includes a reservoir for hydraulic fluid with which is associated control means for the pump whereby the pressure created in the reservoir is adjustable. There is preferably mounted on the press a pressure indicator calibrated to show both the pressure in the cylinder and the pressure applied in pounds per square inch upon the material pressed beneath the ram face of the block 17.

Furthermore, there is preferably provided on the frame control means of known kind which determines the frequency of the strokes of the hydraulic piston 8, and also independently the dwell of said piston in its lower, protruded position during which pressure is maintained upon the material.

As the ram effects each upward stroke, the pawl 32 engages and turns the ratchet wheel 30 on the shaft of the driving sprockets 26, under actuation of the lever-linkage means 31, 33, 34, 36, 37, so that as the ram rises the link conveyor 25 is displaced in the direction of the arrow A to bring a fresh charge of material below the effective surface of the block 17.

The band 19 is provided to prevent adherence of the pressed material to the block 17, and the press includes means for displacing this band in substantial synchronism with, and in the same direction as, the conveyor 25. That is to say, the upper run of the conveyor 25 and the lower run of the band 19 are moved simultaneously to the left as seen in Figure 1, and preferably to a substantially equal extent. Movement of the band 19 is however delayed until the lifting of the ram has proceeded to such an extent that the band is displaced from contact with the material on the conveyor 25, including the material entering the ram area which has not been pressed.

To this end, movement of the band 19 is effected by means of the rack and pinion type, the position of the rack or equivalent being such that effective engagement does not commence until the ram has lifted to a predetermined extent. As shown, the rack and pinion means consists of a free-wheel chain sprocket 41 mounted on one or each end of the shaft 42 carrying the driving drum 20 for the band 19, and a length of roller chain 43 held in tension in a vertical attitude upon a bracket 44 secured to one of the uprights 1. The chain 43 is preferably held in tension by screw thread means at each end, whereby the vertical location of the chain may be suitably adjusted. Evidently as the ram rises, and when the teeth of the sprcket 41 engage the chain 43, the sprocket is turned clockwise as seen in Figure 1, and turns the drum 20 likewise so that the lower run of the band 19 is dis-

placed to the left in the direction of the arrow A.

In case any of the pressed material might adhere to the band 19, a scraper 45 is disposed to bear lightly upon the band, transversely below the pair of beams 16.

During each successive pressing operation the portion of the conveyor links 25 located below the ram block 17 is supported by a fixed grid structure 46 carried by a pair of transverse beams 47. Below this fixed grid is a collecting pan 48 the base of which is inclined and from which extends a discharge channel or duct 49.

The chain (not shown) by which the links 25 of the conveyor are interconnected and mounted on the sprckets 26 and 27 are supported, in the upper run, by a pair of angle members 50 carried by uprights 51 from the longitudinal members 2, and in the lower run by a pair of angle members 52 supported on the lower parts of the uprights 1 and by the legs 3. Towards the left-hand end of the members 50, as seen in Figure 1, is mounted a scraper 53 for cleaning material adhering to the conveyor links 25 after the greater part of such material has been discharged from these links as they pass round the driving sprockets 26.

Below the feed or right-hand portion of the upper run of the conveyor, and suspended from the angle members 50, are two pans or trays 54 and 55 for collecting any fluid which may drain naturally from the material or may be expelled therefrom by an initial pressing as will be described. These pans have discharge channels or ducts 56 and 57 respectively which project from the side of the press in the same direction as the discharge duct 49 of the pan 48, so that all the expelled fluid may be collected for example, in a channel, on one side of the machine.

It has been found by experiment that a press as described, by reason of the application of uniform pressure for a controlled duration on successive portions of the material to be treated, effects expulsion of fluids from fibrous materials, particularly vegetable matters such as leaves, in a more satisfactory and efficient manner than has hitherto been possible, with apparatus of known types.

In a development of the invention there may be mounted above the feed end of the conveyor, e.g. substantially above the tray 55, an auxiliary pressure member which depends from a lever, or system of levers, the right-hand end of which is pivoted on a support afforded for example, by upward extension of the right-hand pair of uprights 51, the left-hand end of said lever or system being articulated to a suitable point on the ram assembly. By means of this auxiliary pressing member, which with the aid of a second order lever is depressed simultaneously with the main ram assembly but with a smaller stroke, a preliminary pressing of the material being fed by the conveyor may be effected, for the purpose of an initial removal of more easily expellable fluid and for effecting an initial compression of the material prior to its entry below the band 19.

In the event of a press according to the invention being installed where it is required to operate on one kind of material, it may be possible to provide a covering for the ram face such that the material and the expressed fluids do not adhere thereto, whereby the displaceable band 19 and the means for mounting and displacing it may be eliminated.

Evidently the mode and details of construction of a press and the details and modes of operation of the several elements and assemblies therein may be modified considerably without departing from the scope of the invention,

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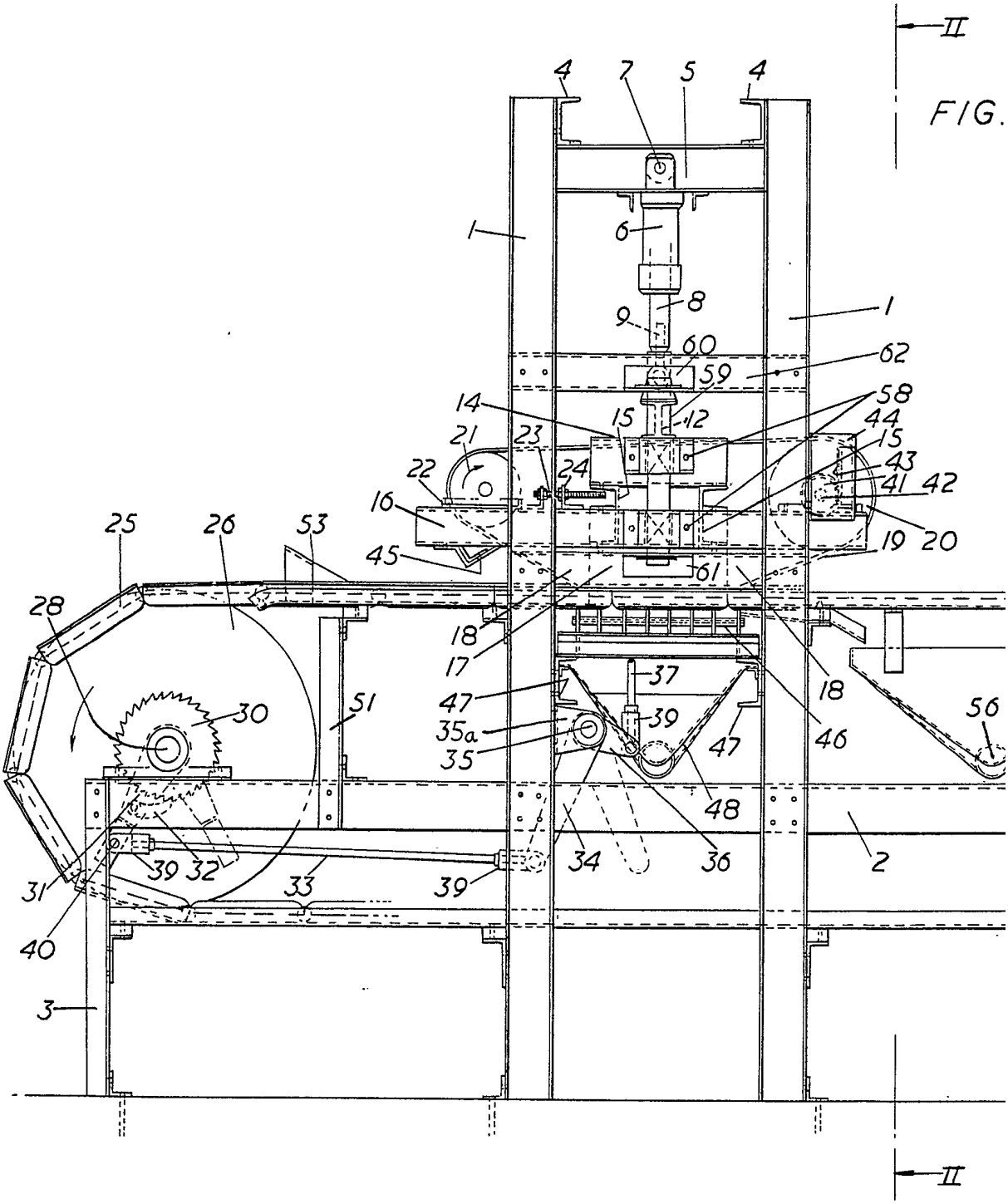
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FIG.

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2 SHEETS

PROVISIONAL SPECIFICATION

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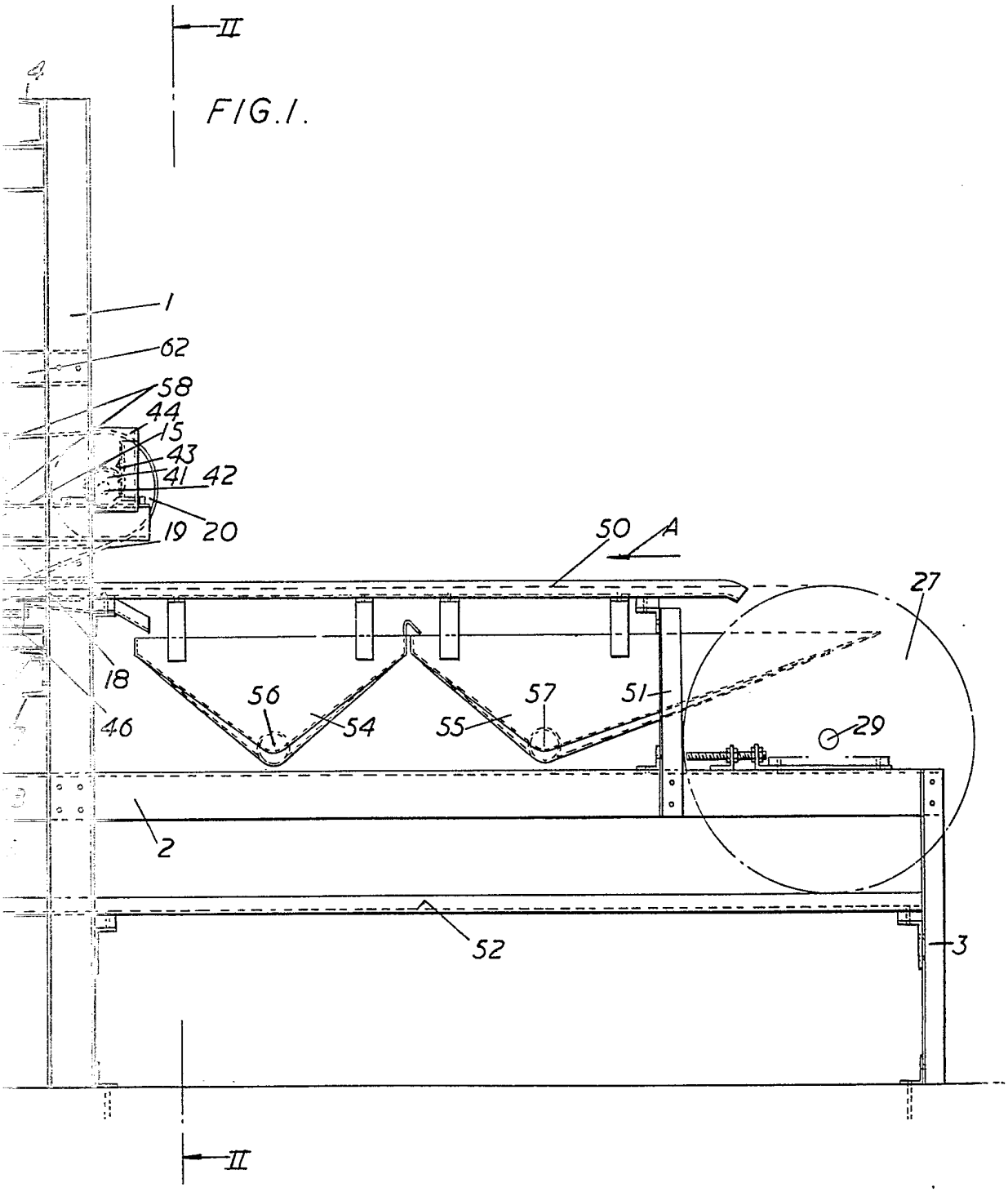
Sheet 1

FIG. 1.



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2 SHEETS

PROVISIONAL SPECIFICATION

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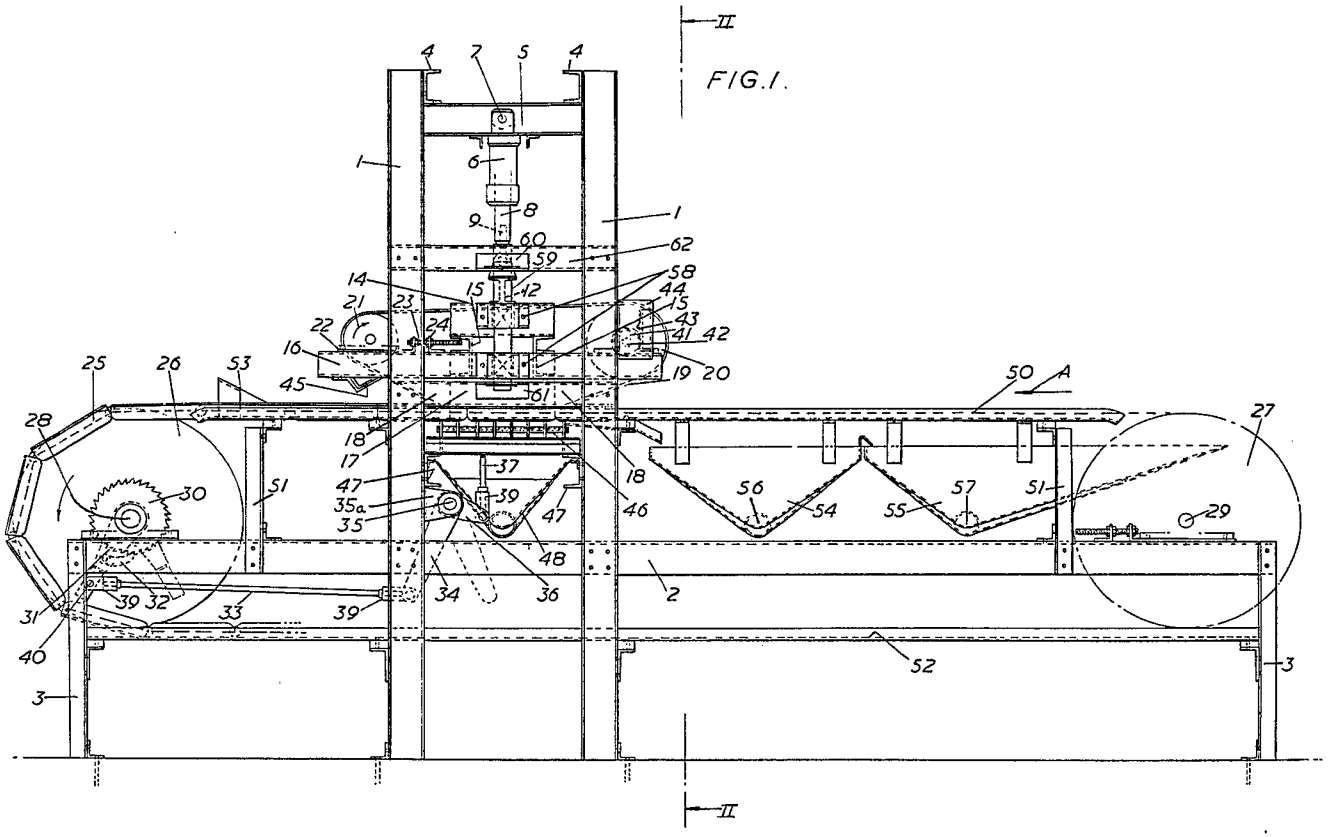
Sheet 1

FIG. 1.



PROVISIONAL SPECIFICATION
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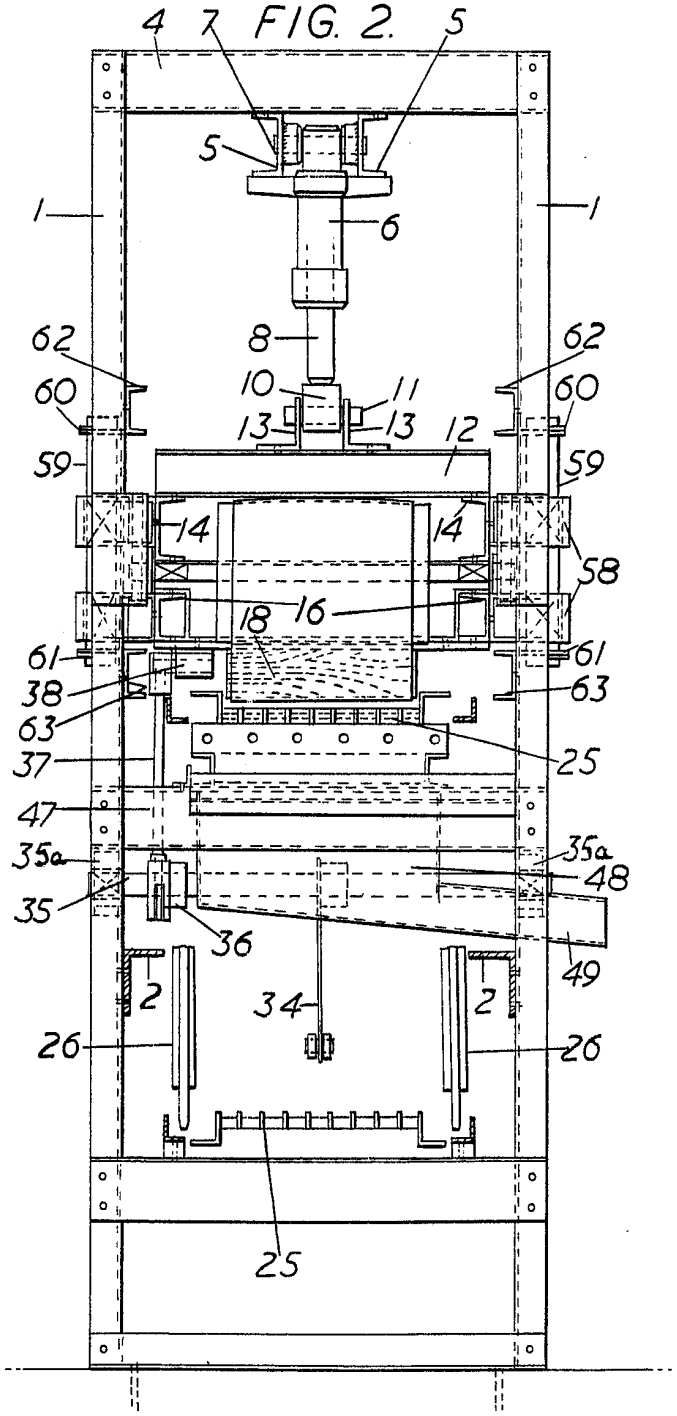
Sheet 2

FIG. 2.



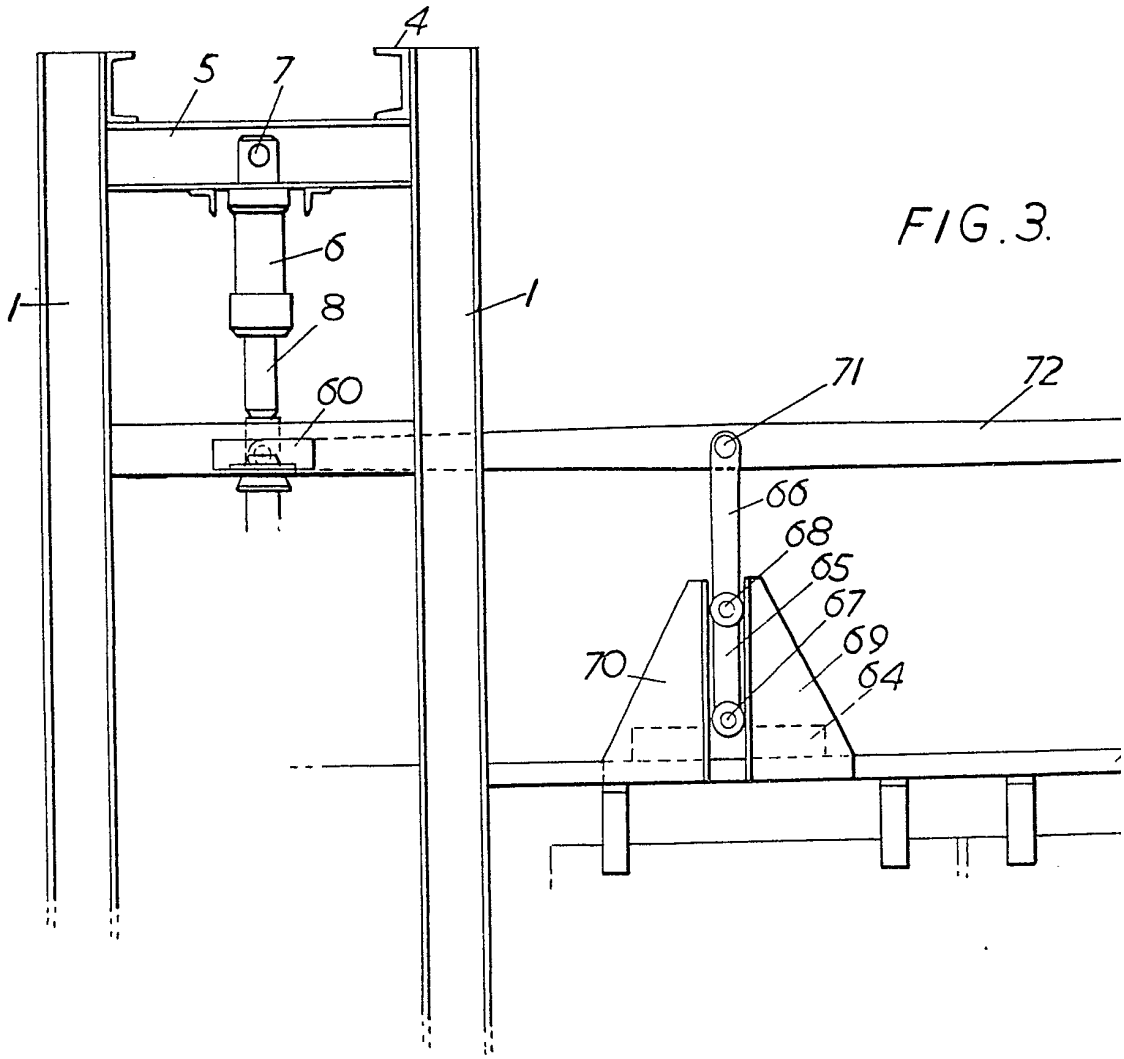


FIG. 3.

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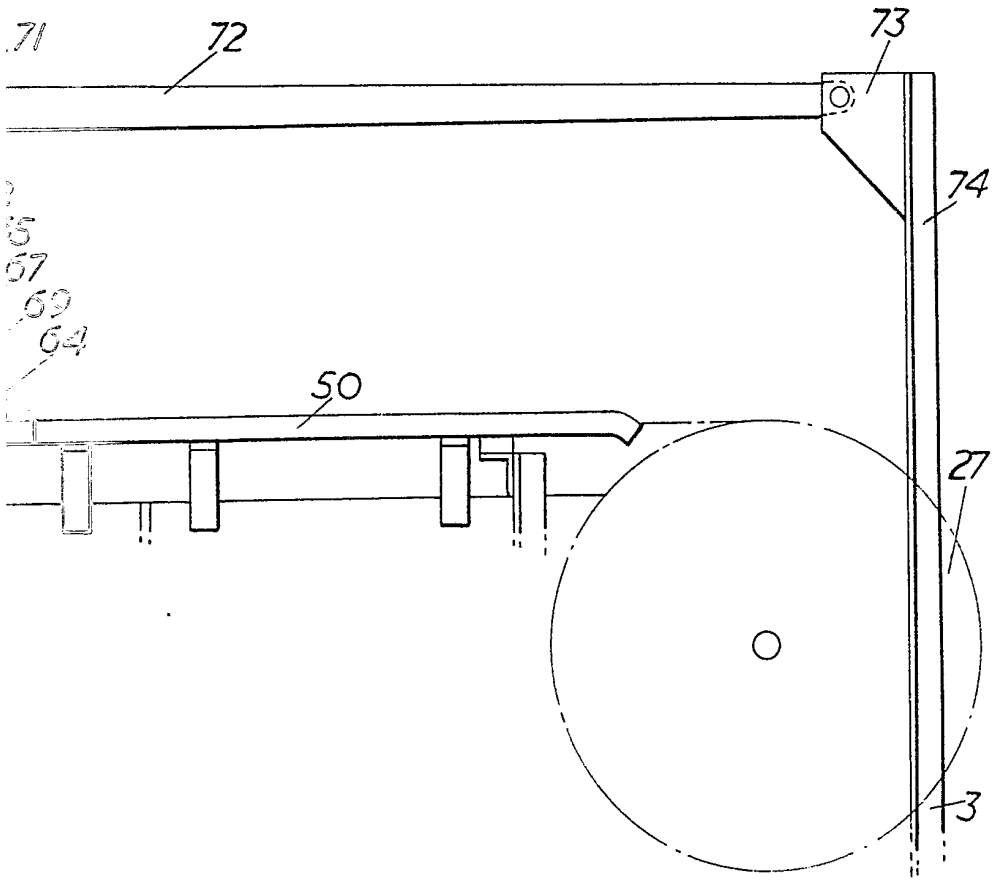
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 3.



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1 SHEET

COMPLETE SPECIFICATION

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FIG. 3.