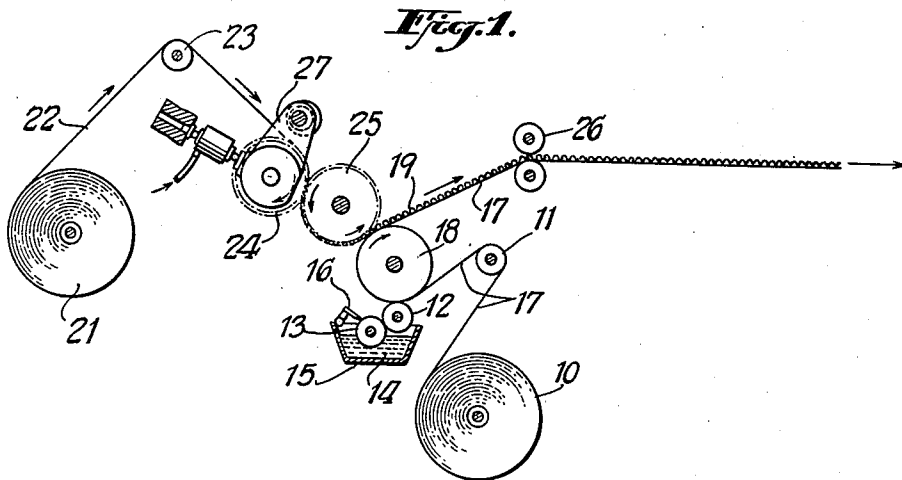
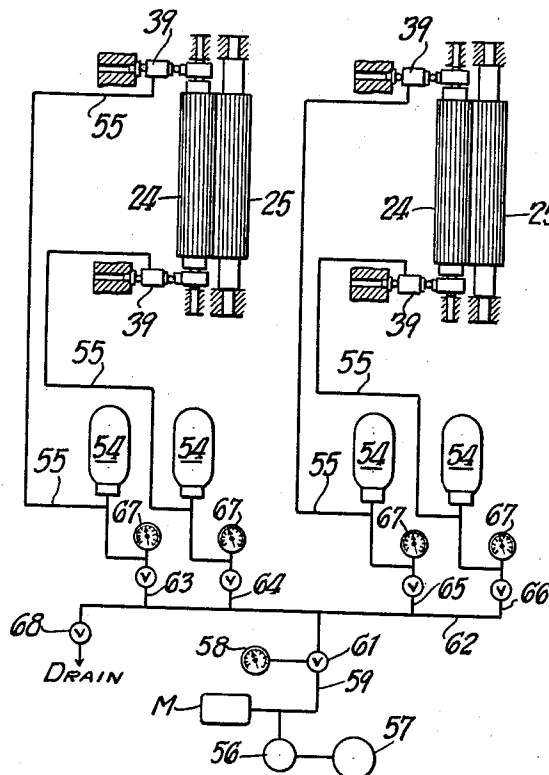


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CORRUGATING MACHINES

2 Sheets-Sheet 1



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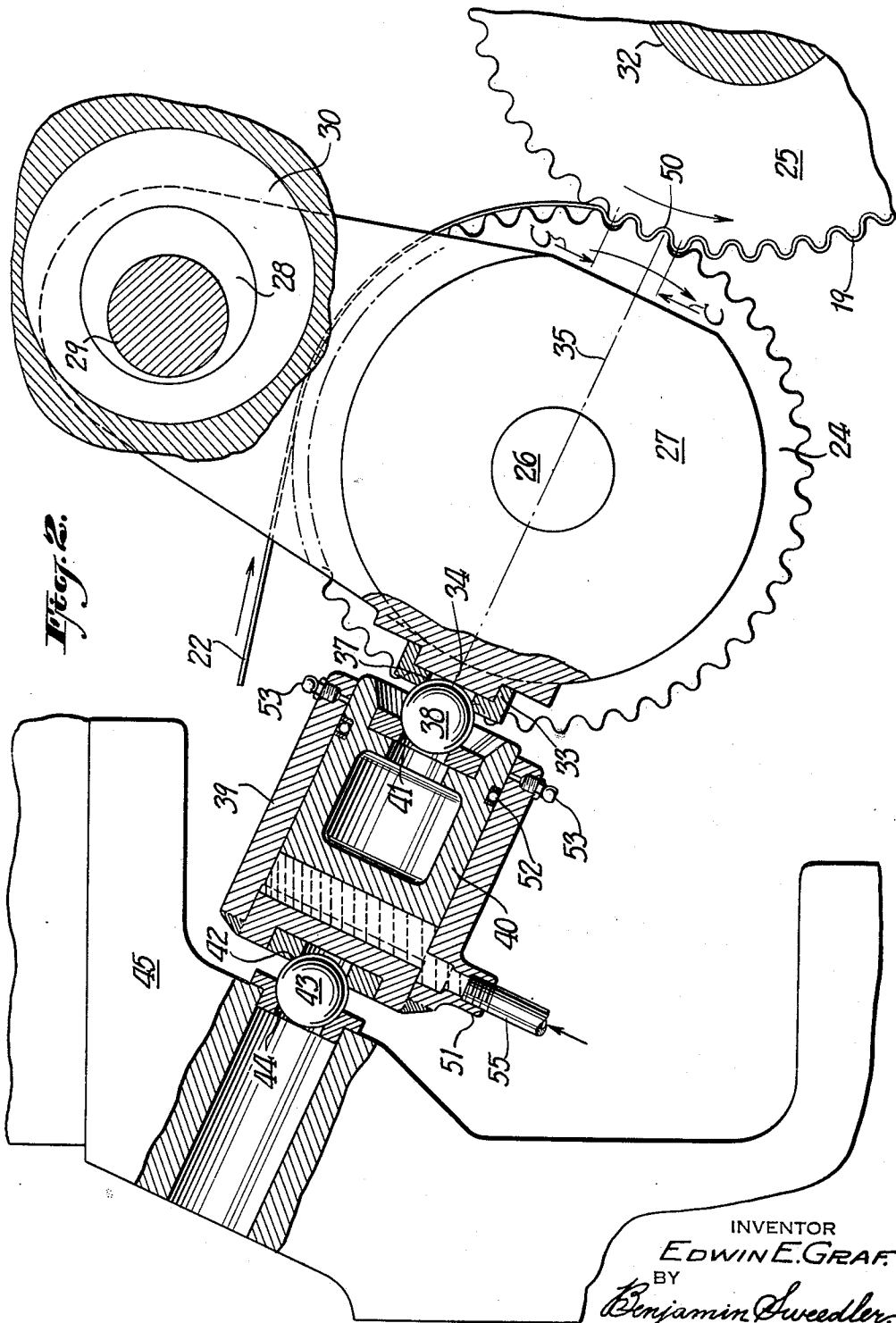
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CORRUGATING MACHINES

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2 Sheets-Sheet 2



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CORRUGATING MACHINES

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This invention relates to corrugating machines including the so-called single and double facer corrugators.

Machines for corrugating paper and adhesively bonding a lining or facing sheet to the apexes of the corrugations are well known. The present invention has for one of its objects, the improvement of such machines, to maintain the corrugating rolls under constant controlled yielding pressure to obtain uniform fluting of the paper fed therethrough and this efficiently and economically.

Still another object of this invention is to provide such corrugating machine of relatively simple, compact, exceptionally rugged design.

Other objects and advantages of this invention will be apparent from the following detailed description thereof, taken in connection with the accompanying drawings which shows for purposes of exemplification preferred forms of this invention as embodied in single and double facer corrugating machines. It will be understood this invention is not limited to these embodiments.

Fig. 1 of the drawings is a side elevational view of a single facer corrugating machine.

Fig. 2 is a fragmentary vertical sectional view, on an enlarged scale, showing the mounting and fluid pressure applying means for the movable corrugating roller of a pair of rollers.

Fig. 3 is a diagrammatic plan view, including a circuit diagram of the pressure fluid system for placing the movable corrugating rollers of a double facer corrugating machine under constant controlled yielding pressure.

Referring first to Fig. 1, 10 indicates a roll of paper, from which the paper passes over a guide roll 11 and then over an adhesive applying roll 12 which receives adhesive from roll 13 rotating in a bath of adhesive 14 in container 15. An adjustable doctor blade 16 controls the amount of adhesive applied to the web 17. The adhesive coated web then passes around roll 18 into contact with the corrugated web 19.

A roll 21 of paper 22 to be corrugated is suitably mounted in the machine. Paper 22 passes over a guide roller 23 between the bite of a pair of corrugating rollers 24, 25. In its passage between the corrugating rollers 24, 25 the paper 22 is corrugated forming the corrugated web 19 which is bonded with the adhesive coated web 17, above described. The assembly is fed by the feed rollers 26 from the machine in the case of a single facer machine. In the case of a double facer machine, the assembly is adhesively bonded to a like assembly formed in the same manner.

As best shown in Fig. 2, movable corrugating roller 24 at each of its opposite ends has a shaft 26 journaled for rotation in the free end of an arm 27. Two such arms are provided, one for each end of the corrugating roller 24. The other end of each arm 27 is pivotally mounted on an eccentric sleeve 28, positioned for adjustable movement on the supporting pin 29 carried by the bracket 30. Each end of the movable corrugating roller 24 is similarly mounted, so that the ends of the movable corrugating roller 24 may be adjusted independently of each other by

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properly positioning the eccentric sleeve 28 individual thereto. Once the sleeve is adjusted, it is locked in place on supporting pin 29 by bolt or other suitable locking member.

Corrugating roller 25 is mounted for rotation on shaft 32 which is journaled in the frame of the machine. Roller 25 is not adjustable. Proper meshing of the raised and depressed portions of the corrugating rollers 24 and 25 is obtained by adjusting roller 24 as hereinabove described. The structure thus far described is conventional; it is disclosed more fully for example, in United States Patent No. 1,642,782. Accordingly, it is believed further description of this conventional mounting for the corrugating rollers is unnecessary.

In accordance with the present invention, each arm 27 at each of the opposite ends of the movable corrugating roller 24 has fixed thereto a bearing member 33 to which constant controlled yielding pressure is applied as hereinafter described. As the construction at each end is the same, only one will be described in detail. The bearing member 33 is positioned, as shown in Fig. 2, so that its axis 34 is in alignment (straight line) with the diameter 35 of the circle delineating the cross section of the movable corrugating roller 24. Bearing member 33 is provided with a cylindrical seat 37 in which seats the base portion of a pressure transmitting steel ball or sphere 38.

A pressure cylinder 39 has slidably mounted therein a piston 40. The base of this piston 40 is provided with a cylindrical seat 41 for receiving the upper portion of ball 38. Cylinder 39 has at its top a seat 42 for the base portion of a steel ball or sphere 43, the upper portion of which is disposed in a seat 44 on the frame 45 of the machine. Pressure cylinder 39 is thus maintained in the machine, the balls or spheres 38 and 43 and their cooperating seats in effect form universal joints which enable pressure to be transmitted at right angles to the length of the movable corrugating roller, always directly along a line coincident with the diameter 35.

The diameter 35 intersects the area where the ridges on the movable roll 24 mesh with the valleys between the ridges on the fixed roll 25. This area is indicated by the lines c—c on Fig. 2. Thus, the pressure applied by piston 40 is at right angles to the axis of both rolls 24 and 25 linearly along a line intersecting the area where the two corrugating rollers are in meshing agreement. Stated otherwise the pressure is applied at the point where a valley of movable corrugating roller 24 is filled with a projection of roller 25 as the two rollers rotate, which point is indicated by 50 on Fig. 2.

Cylinder 39 may be provided with pressure fluid through port 51. Preferably, but not necessarily, this pressure fluid may be a lubricating oil, although other pressure fluid may be employed if desired. The piston 40 in cylinder 39 is provided with O ring packing at 52. Desirably, cylinder 39 has near its base lubricating inlets 53.

Each cylinder 39 communicates with an accumulator 54 individual thereto. Thus, in the case of a double facer, involving two movable corrugating rollers, as shown in Fig. 3 four pressure fluid cylinders 39 are employed, each individual to one end of a movable corrugating roller and each connected by a pressure line 55 with an accumulator 54.

The accumulators may be of any desired type maintaining a constant pressure of fluid on piston 40 of pressure fluid cylinder 39. Preferably bladder type accumulators are employed, in which the bladder divides the accumulator into two compartments, one of which receives air or other gas under any desired pressure and the other compartment contains a lubricating oil or other pressure fluid under the pressure in the first mentioned compartment. Examples of such accumulators are dis-

closed in United States Patents Nos. 2,484,418, 2,786,488 and 2,801,067.

The pressure fluid system shown in Fig. 3, involves a pump 56 actuated by a motor 57 for pumping oil or other pressure fluid into tank or reservoir M to maintain it under any desired pressure. A pump pressure gauge 58 communicates with tank M through line 59 having valve 61 therein. Tank M communicates with a main header 62 provided with branch lines 63, 64, 65 and 66, each valve controlled, provided with a gauge 67 and communicating with the accumulators 54.

It will be noted each accumulator has one of the branch lines 63, 64, 65 or 66 individual thereto and thus the pressure in each accumulator can be adjusted independently of the others. The pressure thus imparted to each accumulator is transmitted to the end of the movable corrugating roller 24 as hereinabove described; this pressure is applied to the end of the bearing member 33 on arm 27 in which shaft 26 of the accumulator roller 24 is journaled. The pressure is applied at right angles to the axis of the accumulator roll in a linear direction at point 50 of the drawings.

Once the machine is set for a desired pressure, the pressure remains constant, but yielding (due to the fluid pressure used) to accommodate variations in the paper stock, etc. When changing paper stocks, adjustments can readily be made in the pressure, by operating pump 56, if necessary and opening appropriate valve or valves in branch lines 63, 64, 65, 66 to place the accumulators under desired fluid pressure. A drain valve 68 is placed in main header 62 to permit reduction in pressure in any or all of the accumulators 54 below that in tank M, when desired.

An important feature of the present invention is the mounting of the cylinders 39. Spheres 38 and 43 in the seats 37 and 41 (for sphere 38) and seats 42 and 44 (for sphere 43), maintain the piston 39 so that at all times it exerts pressure linearly along diameter 35 and at point 50. This pressure once set, is constant but yielding. Hence, for any given paper stock, it may be set to give optimum fluting or corrugating of that stock.

It will be noted the present invention provides a corrugating machine of simple, compact and exceptionally rugged design.

Since certain changes may be made in the above described corrugating machine and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A corrugating machine comprising in combination, a pair of meshing corrugating rollers, a pair of pivoted arms for supporting one of said rollers and permitting rocking movement thereof toward and from the other roller and means for maintaining said rollers in meshing engagement under constant yielding pressure, said means comprising a pressure cylinder individual to each arm and positioned to apply pressure to said arm in a linear direction substantially at right angles to the axis of said roller, a piston slidable in said cylinder having one end communicably connected to said arm to apply pressure thereto, and a pressure accumulator individual to each pressure cylinder and communicably connected with the said cylinder to apply pressure on said piston in the direction of applying said pressure to said arm only.

2. A corrugating machine as defined in claim 1 in which said arm has a bearing member positioned with the axis

of said bearing member in longitudinal alignment with the diameter of a circle defining a cross section through said corrugating roller, said diameter intersecting the portion of said roller in meshing engagement with the other roller, said pressure cylinder having a piston therein, and means providing a universal joint connection between said piston and said bearing member.

3. A corrugating machine as defined in claim 1 including in combination means for adjusting the pressure in each accumulator individually and independently of the pressure in the other accumulator.

4. A corrugating machine, comprising in combination, a supporting frame, a pair of corrugating rollers one of which is movably mounted relative to the other, said movable mounting involving a pair of pivoted arms in the free ends of which said movable corrugating roller is journaled for rotation, each of said arms having a bearing member thereon provided with a seat for a spherical surface positioned with the axis of said seat at right angles to the axis of said corrugating roller, a pressure cylinder individual to each of said bearing members, a bearing member having a seat for a spherical surface at one end of said pressure cylinder, a bearing member on said supporting frame having a seat for a spherical surface, said seat being disposed directly opposite said seat on said pressure cylinder, a spherical member in said seats, a piston in said pressure cylinder, the free end of said piston having a seat for a spherical surface disposed directly opposite said seat on said bearing member on said arm and a second spherical member seating in said seats on said piston and said bearing member on said arm and a pressure accumulator individual to each pressure cylinder and communicably connected therewith to apply pressure on said piston in the direction of applying said pressure to said arm only.

5. A corrugating machine comprising, in combination, a supporting frame; a pair of corrugating rollers, one of which is movably mounted relative to the other, said movable mounting involving a pair of pivoted arms in the free ends of which said movable corrugating roller is journaled for rotation, each of said arms having a bearing member thereon positioned with the axis thereof at right angles to the longitudinal axis of said corrugating roller; a pressure cylinder individual to each of said bearing members; a bearing member at one end of said pressure cylinder; means forming a universal joint connection between said bearing member on said pressure cylinder and said supporting frame; a piston slidable in said pressure cylinder; a bearing member on one end of said piston, said last mentioned bearing member being positioned opposite the first mentioned bearing member; means providing a universal joint connection between said bearing member on said piston and said bearing member on said arm for transmitting pressure exerted by said piston to said arm; and a pressure accumulator individual to each pressure cylinder and communicably connected with said cylinder to apply pressure on said piston in the direction of applying said pressure to said arm only.

References Cited in the file of this patent

UNITED STATES PATENTS

1,642,782	Langston	Sept. 20, 1927
1,717,485	Wirz	June 18, 1929
2,687,165	Hollis	Aug. 24, 1954
2,801,094	Ball	July 30, 1957

FOREIGN PATENTS

729,750	Great Britain	May 11, 1955
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