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MECHANICAL MOVEMENT FOR SCREENING MACHINES

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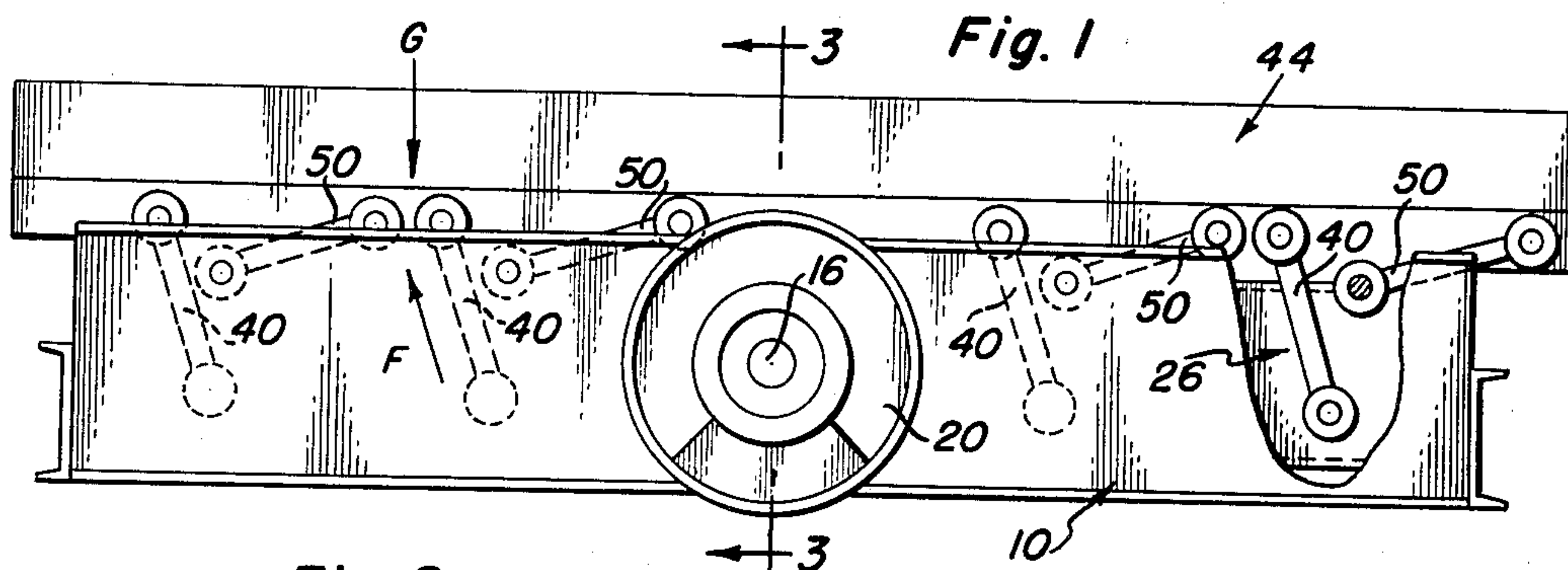


Fig. 2

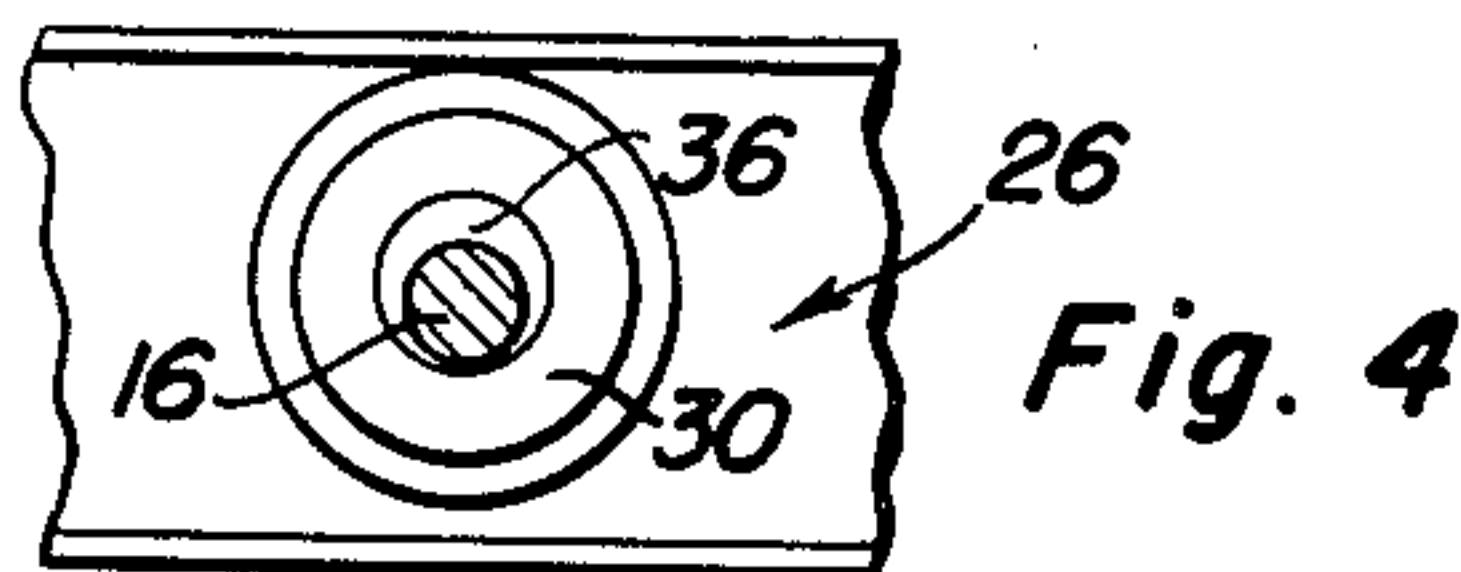
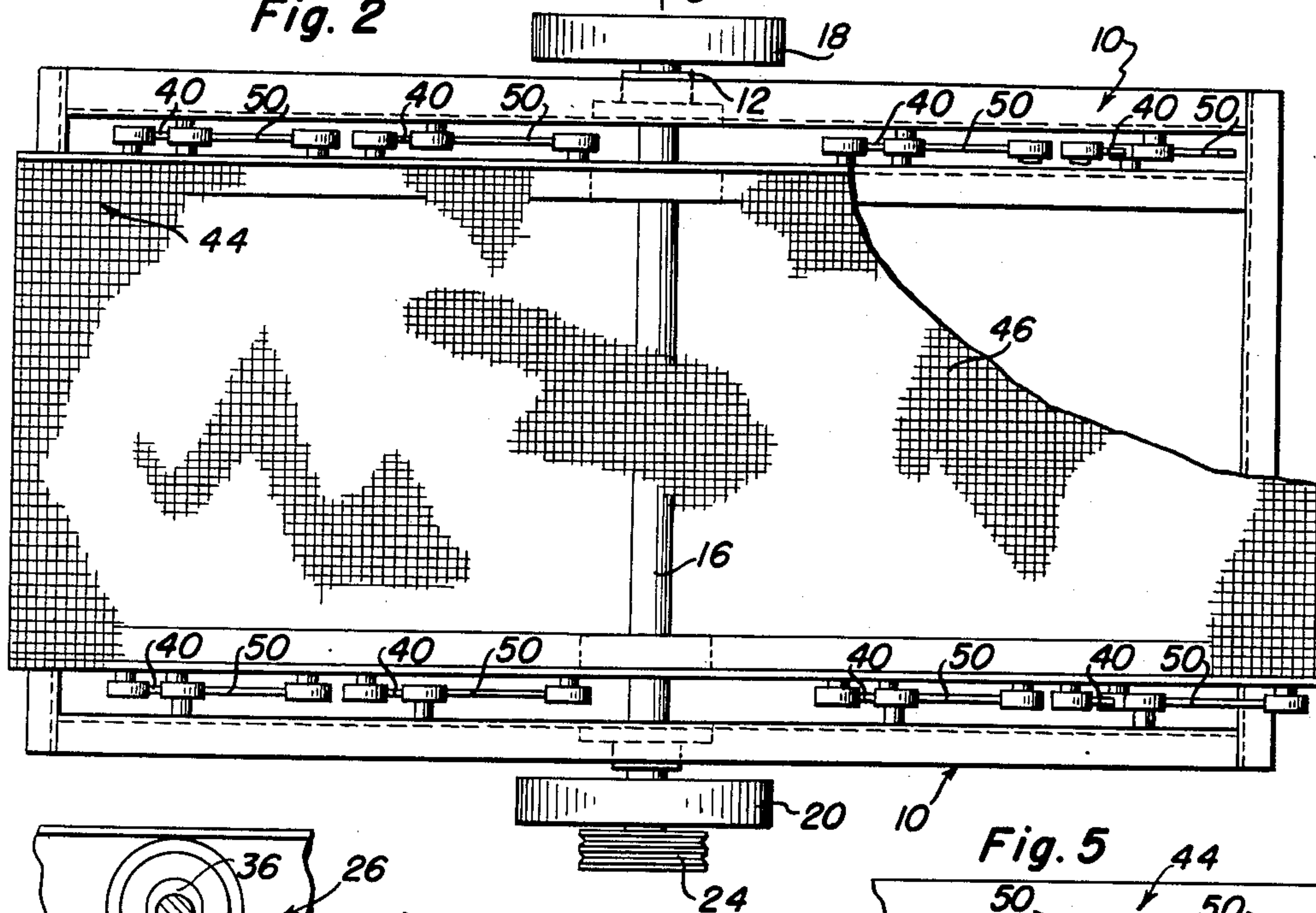


Fig. 4

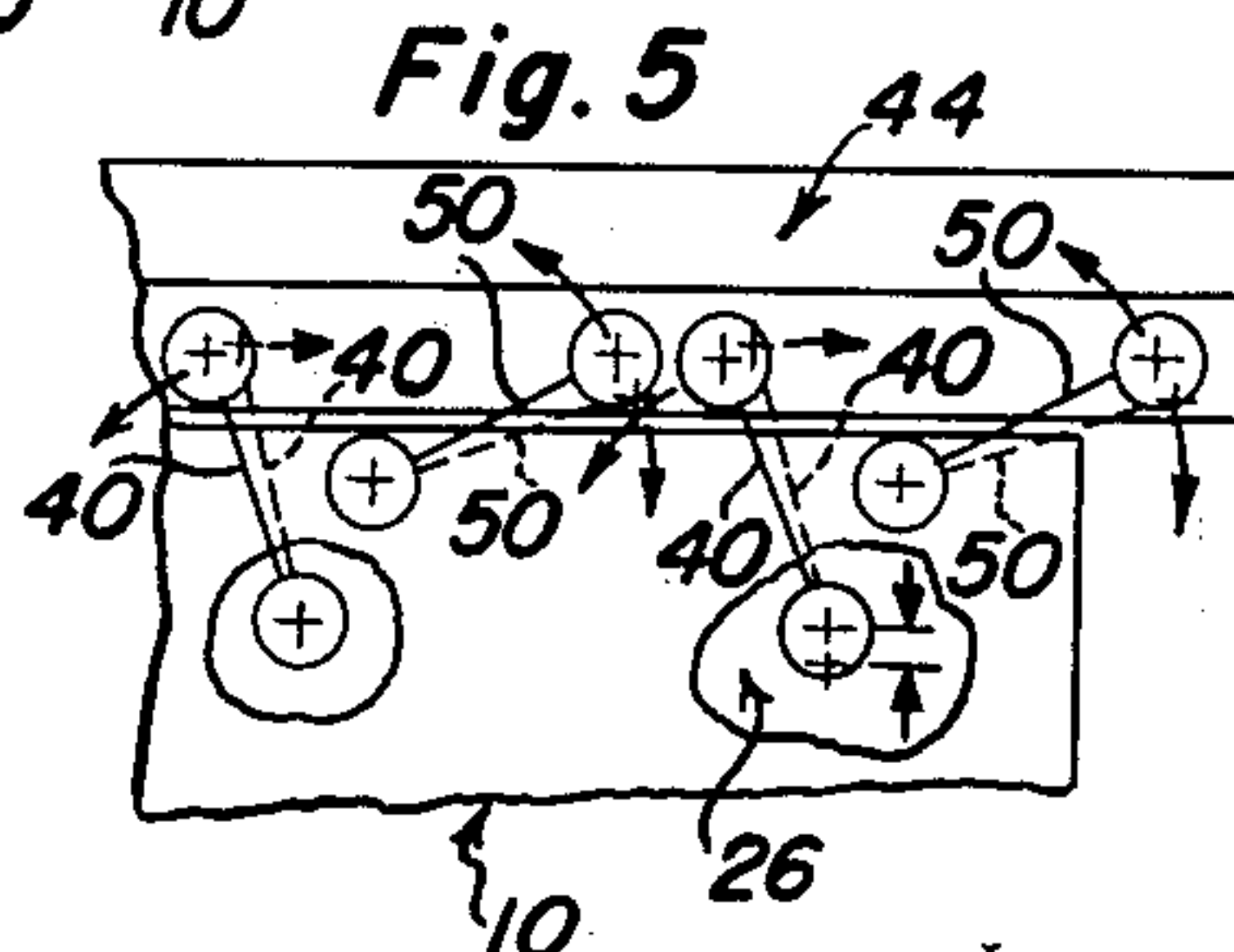


Fig. 5

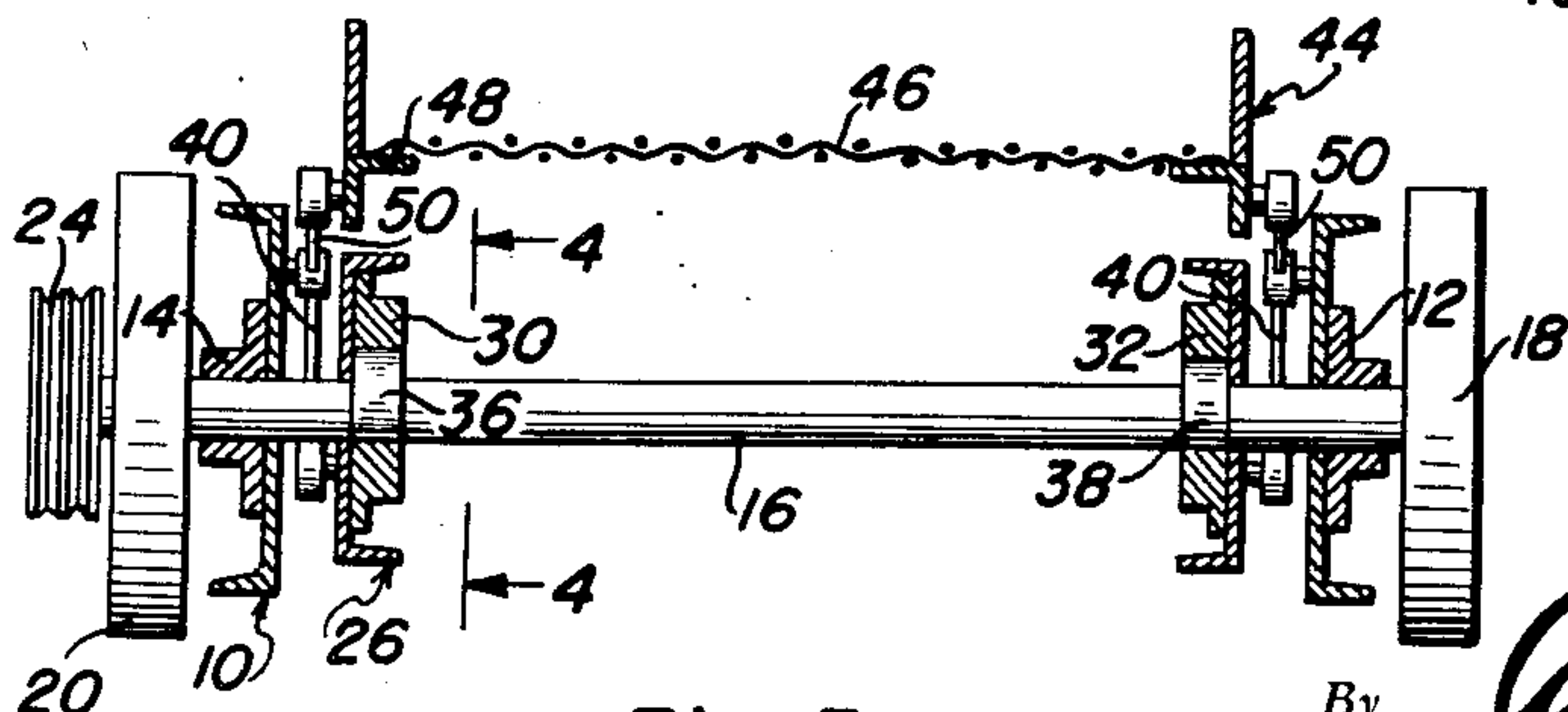


Fig. 3

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MECHANICAL MOVEMENT FOR SCREENING MACHINES

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This invention relates to novel and useful improvements in improved mechanical means for movement of a screening machine.

An object of this invention is to more effectively and satisfactorily screen or grade objects by the employment of an improved mechanical movement for a screening frame, which screening frame is operated in a substantially reciprocating travel by employment of a suitable motive force supplying member, as a cam, which imparts movement to a driving member which is preferably a form of parallel beams, bars, etc., rigidly held together with a spreader; and this driving member imparts movement to a screen frame through the medium of an improved linkage arrangement.

Other objects and features will become apparent in following the description of the illustrated form of the invention.

Figure 1 is an elevational view of one form of the invention;

Figure 2 is a top view of the device in Figure 1, portions being broken away to illustrate detail of construction;

Figure 3 is a view taken on the line 3—3 of Figure 1 and in the direction of the arrows, and;

Figure 4 is a view taken on the line 4—4 of Figure 3 and in the direction of the arrows,

Figure 5 is a schematic view showing the movement of the arms and screen as well as drive member during operation of the device.

The instant invention consists of a mechanical means useful particularly to produce and control a reciprocating movement for a screening machine. A base, generally indicated at 10 is provided of any suitable material and preferably of rectangular configuration. This base has bearings 12 and 14 fixed to opposite sides thereof accommodating the shafts 16. The shaft has fly wheels 18 and 20 secured thereto together with drive pulley or sheave 24 which is illustrated for the purpose of showing that any suitable drive may be employed for applying torque to either end of the shaft 16.

A driving member or mechanism generally indicated at 26 is juxtaposed with respect to the base 10. This driving member may be of any suitable shape, however, the use of a rectangular frame composed of channels appropriately fixed together has proved satisfactory in operation. Bearings 30 and 32 are fixed to the driving member and have the shaft 16 passed therethrough. Cams 36 and 38 are fixed with the shaft 16 and are disposed in the bearings 30 and 32 respectively. Hence, upon operation of the shafts 16,

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the driving member is caused to be moved in such manner that every point will travel in a circular orbit.

A plurality of driving links or arms, each of which is indicated at 40 are secured pivotally to said drive member 26 and the screen frame generally indicated at 44. This screen frame has a conventional screen 46 disposed on the inwardly extending flanges 48 forming a part of the substantially rectangular screen frame. The driving arms 40 or links which are pivoted at both ends, are disposed almost in a vertical plane. The member 26 is heavier than said frame 44 and hence it acts as a counterbalanced fly wheel in controlling operation of frame 44.

In operation when the shaft 16 is actuated the drive member 26 rotates and every point of the drive member 26 rotates or travels in a circular orbit. This circular movement through the driving links and guiding links give frame 44 a rectilinear motion. The guide links, each of which is indicated at 50, are pivotally arranged in a plane close to horizontal. One end of each guide link is secured to the screen frame 44 while the other end of each guide link is pivoted by means of a fixed pivot to the base 10. Taking the length of the guide arms 50 into consideration and their position with respect to the vertical and horizontal, the ends of each guide link are spaced horizontally further than they are vertically.

Due to the arrangement of guide arms and driving links, although the movement imparted to the screen frame 44 is actually very slightly arcuate, the arc of the circle through which it passes is taken from a circle having an extremely large radius. Therefore, the movement of the frame 44 is substantially rectilinear. The movement is obviously reciprocatory whereby when the articles to be graded or sifted are disposed on the screen 46, they are subjected to this type of movement.

The screen assembly 44 is accelerated at the ends of its motion to a greater degree than the drive member 26 in the equivalent phase of motion, in the inverse ratio of their respective weights. This accounts for increased liveliness of the screening machine over a common circle throw machine.

The theory of screening or classifying materials it is easier understood to consider it in this manner.

If any single particle of material is bounced over an opening of a given size and the particle is smaller than the opening, when the particle

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becomes directly over the opening so that it can pass unhindered through the opening due to the force of gravity, this resultant action screens materials according to size of respective particles. With a ribbon of material, the number of forces and their direction prevent the free screening action of individual particles. Therefore, when outside forces are applied to the ribbon of material to diffuse the material in such manner that the particles approach the action of a single particle; the material then will be screened or classified. My machine sets up forces which diffuses materials in such manner that each particle is subjected to screening action. In Figure 1 the relationship of applied force F and force G of gravity is shown for one instant during a cycle of operation.

The component of the forces of gravity and applied force will give the force applied to the ribbon of material on the screen for screening action. Accordingly by the arrangement and relative length of links 40 and 50 the ribbon of material is subjected to almost vertical action whereby a diffusing force on the ribbon results in order to condition the material for screening action.

Had the links 40 been made appreciably longer the applied force F would be shifted to a position closer to the horizontal increasing the size of angle between the components of forces F and G thereby supplying a conveying action on the ribbon of material. This is in contradistinction to the necessary conditioning force realized by the arrangement shown in Figure 1.

The guide arms 50 are responsible for the direction of force F . Actually, force F can be in any direction at any point in the driving member 26 but the controlled direction due to the presence and function of the guide arms 50, is a pertinent factor to distinguish between conveying and screening action. Accordingly, the action of the apparatus is such that the necessary classification of material takes place during a part of a cycle of operation, and during another part the larger particles are conveyed.

Accordingly, the proper size particles of material are screened during operation of the machine. At the same time the larger particles are conveyed by the action of the machine. A ribbon of material on the screen is thus conveyed while it is being classified.

Having described the invention, what is claimed as new is:

1. A screening machine comprising a base, a drive shaft having an eccentric and disposed on said base, a driving frame with an opening, said eccentric being disposed in said opening so that operation of said shaft imparts rotary motion to said driving frame, a screen frame vertically superimposed on said driving frame, substantially vertical driving rods connected with said screen frame and with said driving frame, guide links, each having a pair of ends, one end being pivoted to said screen frame and the other end being pivoted to said base, and the pivoted ends of each of said guide links being spaced horizontally farther apart than they are spaced apart vertically.

2. In a screening machine which includes a base, a driving member and means for actuating said member in a circular path, a screen frame disposed above the driving member, driving rods pivoted at each of their ends respectively to said screen frame and said member to impart movement to said screen frame from the driving mem-

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ber, and rigid links operatively connected with said base and said frame for guiding said frame in a reciprocatory path of motion and in an arc of a circle of very large radius.

3. In a screening machine which includes a base, a driving member and means for actuating all points of said member in a circular path, a screen frame juxtaposed with respect to the driving member, driving rods secured to said screen frame and said member to impart movement to said screen frame from the driving member, and means operatively connected with said base and said frame for guiding said frame in a reciprocatory path of motion and in an arc of a circle greater than said circular path and in such path of motion that all points of said screen frame receive the same motion, and said last mentioned means consisting of a plurality of links disposed substantially horizontally while said rods are disposed substantially vertically.

4. In a screening machine which includes a base, a driving member having sides and means for actuating all points of said member in a circular path, a screen frame juxtaposed with respect to the driving member, driving rods secured to said screen frame and the sides of said member to impart movement to said screen frame from the driving member, and means operatively connected with said base and said frame for guiding said frame in a reciprocatory path of motion and in an arc of a circle greater than said circular path, and said last mentioned means comprising a plurality of links having their longitudinal axes arranged substantially perpendicular to the longitudinal axes of said rods.

5. A screening machine comprising a substantially rectangular base having a pair of longitudinal side members, said members each having an opening intermediate its ends, a power driven shaft positioned in said openings for rotation, a first substantially rectangular frame disposed within the base and including a pair of spaced parallel side portions located along side of said side members, said side portions having openings medially their ends accommodating said shaft, bearings mounted on said side portions, cams fixed to said shaft and rotatable in said bearings, a screen holding frame supported over the first frame, a first plurality of links terminally pivoted to the screen holding frame and the first frame, and a second plurality of links terminally pivoted to said side members and said screen holding frame, the links of said first plurality of links alternating with the links of said second plurality of links.

6. A screen unit comprising an open substantially rectangular base, a lower frame disposed within said base for circular motion, a power driven shaft disposed transversely of and supported on said base for rotation, said lower frame having openings accommodating said shaft, cams secured on the shaft, bearings fixed to the lower frame receiving said cams therein, an upper screen supporting frame overlying the base and the lower frame, rigid drive links terminally pivoted to the upper frame and the lower frame to impart movement to the upper frame during circular motion of the lower frame, and guide links terminally pivoted to the upper frame and the lower frame, said guide links being disposed substantially perpendicular to said drive links, the ends of said guide links being spaced apart further horizontally than they are spaced apart vertically, and the ends of said drive links being

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spaced apart farther vertically than they are spaced apart horizontally.

7. A screening machine comprising an open substantially rectangular base including first and second parallel side members, a lower frame received within said base for circular motion and including first and second side portions paralleling said side members, power driven cam means carried by the base and engaging the frame to impart circular motion to the latter, an upper screen holding frame overlying the lower frame and having first and second side portions overlying the first and second side portions of the lower frame, rigid drive links terminally pivoted to the first side portion of the upper frame and the first side portion of the lower frame, additional rigid drive links terminally pivoted to the second portion of the upper frame and the second portion of the lower frame, rigid guide links terminally pivoted to the first side portion of the upper frame and the first side member of the base, and additional rigid guide links terminally pivoted to the second side portion of the upper frame and the second side member of the base, said guide links including said additional

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guide links being disposed perpendicular to said drive links and substantially horizontal.

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