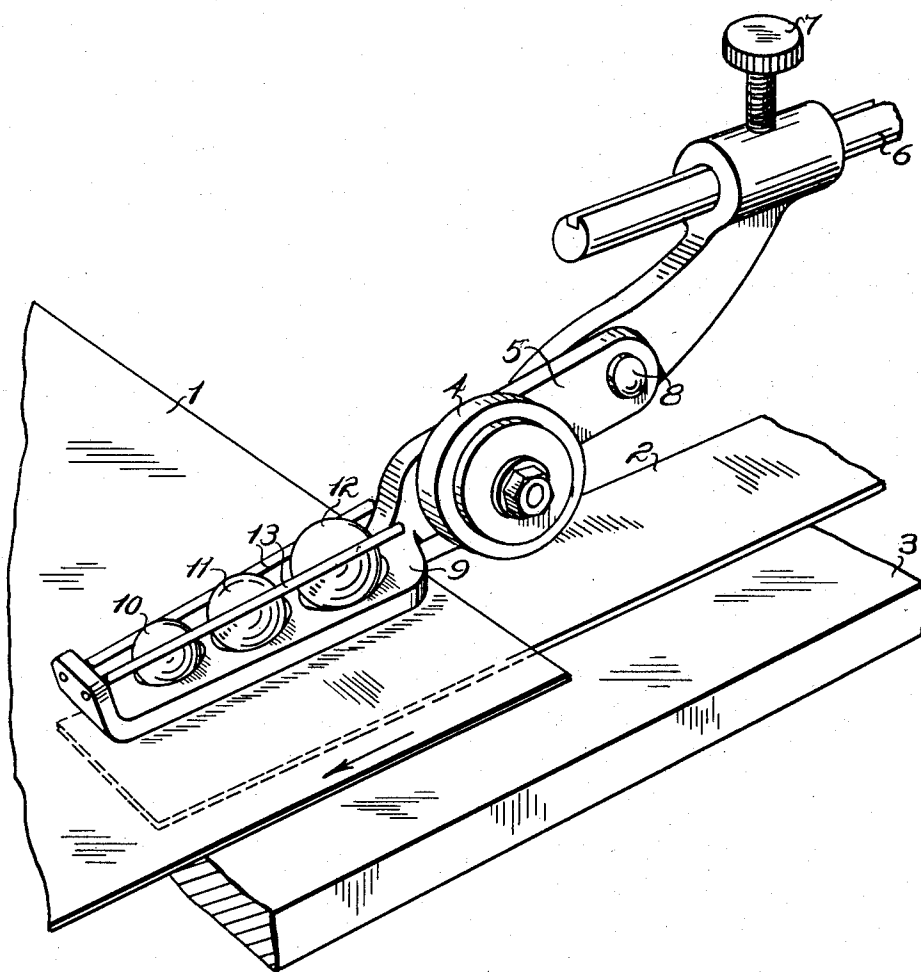


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MULTIPLE BALL CONTROL
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MULTIPLE BALL CONTROL

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9 Claims. (Cl. 271—50)

This invention consists of improvements in or relating to machines for feeding sheets of paper, card or the like either singly or as a series of single sheets in partially overlapped formation from a stack or pile of such sheets to a machine or press, and has particular though not exclusive reference to such feeders for feeding sheets to printing presses.

In machines of this kind a known method of conveying the sheets from the stack or pile towards the printing press or like machine is the use of continuously moving bands or tapes which ride upon the feed board and upon which the sheets are placed singly or in partly overlapped formation by means with which the present invention is not concerned. The sheets are held in contact with the moving tapes by means of small rollers or wheels termed running-in wheels, which rest upon the upper surface of the moving sheets and are pressed against them either by their own weight or by spring loading. It is common practice to use several sets of such running-in wheels between the pile of sheets and the press, each set comprising two or more running-in wheels symmetrically disposed across the conveyor or the feed board. The running-in wheels are commonly mounted on brackets which are adjustably but not rigidly attached to bars located above the conveyor or feed board, and in the operation of the machine that set of running-in wheels which is furthest from the pile of sheets is so located that when the front edge of the leading sheet on the conveyor reaches a station at which lateral adjustment may be required (e. g. the front lays of a press) then the rear edge of that sheet has just passed from beneath the running-in wheels. This arrangement leaves the sheet free for the lateral adjustment operation to be performed (e. g. by a sidelay), which operation could not be freely performed if the sheet were still gripped between the running-in wheels and the moving tapes.

In order to maintain the leading sheet in the flat condition in which it was drawn from beneath the running-in wheels, it is common practice to employ balls (usually of metal) which rest upon the upper surface of the leading sheet when it is at the adjusting station. Each ball is commonly held loosely in a cage or container having in its base a hole through which the ball protrudes but cannot pass. This assembly is known as a ball control and is located above the conveyor or feed board and sufficiently close to it to enable the protruding ball to rest upon the sheets being fed.

In practice it has been found that different weights of ball are required to suit the various thicknesses and stiffnesses of different classes of sheet being fed, and on this account it is frequently necessary to remove a set of ball controls and to replace them with a set having a different weight.

In the accompanying drawing, the single figure is a fragmental perspective view of a ball control applied to a sheet feeder, showing a sheet engaged by the control.

The present invention provides in a sheet feeding machine a ball control for applying pressure to the surface of each sheet in turn as it reaches a predetermined position, while allowing adjusting movement of the sheet in any direction in its own plane comprising the combination with a set of balls of a ball cage mounted above the feed way of the sheets and so arranged as to permit, by adjustment of the cage in relation to the sheet, of variation of the ball pressure on the sheet without substitution of the cage. Preferably the balls which may be of different weight, are arranged in the cage in line in the direction of feeding of the sheets and the cage is movable in that direction to vary the number of balls in contact with the sheet. The cage may also carry a running-in wheel located behind the balls, considered in the direction of movement of the sheets, and free of the sheets when they reach the predetermined position.

A specific embodiment of my invention as applied to a printing press will now be described, by way of example, with reference to the accompanying drawing in which 1 is a sheet being fed towards the press, in the direction of the arrow, by means of endless tapes 2 moving upon a feed board 3 and the running-in wheel 4 is mounted on bracket 5 which consists of two portions hinged together at 8 and is adjustably secured to bar 6 by means of thumb-screw 7. The point of the screw 7 engages with a keyway cut in bar 6 and prevents the bracket 5 from rotating about bar 6 which itself is attached to and supported by the framework (not shown) of the sheet feeding machine. That part of bracket 5 which is nearest to the press forms a cage 9 for metal balls 10, 11 and 12 which protrude downwardly through holes in the cage into contact with the sheet. The balls are graded in weight and are held in position by pins 13. The running-in wheel 4 is provided with a rubber tire and the over-all diameter of the running-in wheel is so determined in relation to bracket 5 that when the tire rests upon the sheets being

fed then the base of the cage 9 is close above those sheets but does not touch them, although the balls 10, 11, 12 protruding through the holes in the base of the cage rest upon the sheets.

5 It is to be understood that although only one running-in wheel assembly with ball control is shown and described two or more such assemblies are usually used and with the arrangement employed in this example are disposed across the
10 feed board or the conveyor at such a distance from the front lays of the press that when the front edge of the leading sheet reaches the front lays then the rear edge of that sheet has just passed from beneath the wheels 4 which do not
15 then touch the sheet.

In the operation of the device, if it is desired to use the full weight of the balls then the bracket 5 is so adjusted along the bar 6 that when the front edge of the leading sheet is at the
20 press front lays then the balls are approximately in the position shown in the drawing, namely all the balls are resting upon the leading sheet and are near to its rear edge. If it is desired to use a lesser weight of balls, then bracket 5 is
25 moved a short distance along bar 6 in a direction away from the press and is then so located that when the front edge of the leading sheet is at the press front lays then the rear portion of that sheet is not touched by all the balls in the
30 ball control, as one or more of the balls are resting upon the tapes or (if the sheets are being fed in overlapped formation) upon the next following sheet. The position of bracket 5 may be further altered until only one or even none of
35 the balls is in contact with the rear portion of the leading sheet when the front edge of that sheet is at the press front lays.

It is not essential that the variation in pressure applied to the sheets be obtained by variation of the number of balls in contact with the
40 sheet. Thus only one ball may be in contact with the sheet at any time and the variation in pressure may be obtained by employing balls of different weight. For this purpose a plurality of
45 balls of different weight may be mounted in a cage which is rotatable about a vertical axis or about a horizontal axis. In the former case the cage may be in the form of a horizontal disk with the balls protruding from the under surface and the position of the axis of rotation so
50 chosen that at any time only one ball is on the sheet being controlled, the remaining balls resting on the next following sheet or on the conveyor surface. In the latter case the cage may be in the form of a vertical disk with the balls
55 arranged to protrude from the circumference so that on rotation of the disk only the lowermost ball contacts with the sheet. It will be appreciated that with this arrangement the cage may be located in any position above the sheet and not necessarily near an edge of the sheet.

Having thus described my invention, I claim:

1. A ball control for sheet feeding machines adapted to cooperate with moving means for
65 producing travel of sheets thereover while permitting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein, said cage being mounted above the feed-way of the sheets, and means for adjusting
70 the cage in such manner as to subject a sheet passing therebeneath to greater or lesser ball pressure for the said sheet adjusting movement.

2. A ball control for sheet feeding machines adapted to cooperate with moving tapes for pro-
75 ducing travel of sheets thereover while permit-

ting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein, said balls being of different characteristics in respect to insuring traction between said
5 tapes and the sheets being fed, said cage being mounted above one of the tapes, and means for adjusting the cage parallel to the plane of the tapes to subject a sheet passing therebeneath to different traction effects during the sheet adjusting movement.

3. A ball control for sheet feeding machines adapted to cooperate with moving means for
10 producing travel of sheets thereover while permitting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein, said balls being of different weights, said cage being mounted above the feed-way of the sheets, and means for adjusting the cage to alter the ball pressure exerted upon the sheets being fed during the sheet adjusting move-
15 ment.

4. A ball control for sheet feeding machines adapted to cooperate with moving means for producing travel of sheets thereover while permit-
20 ting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein arranged in the cage parallel with the direction of travel of the sheets, said cage being mounted above the feed-way of the sheets, and means for adjusting the cage in the direction of
25 such feed to vary the number of balls in engagement with a sheet at a predetermined point in its travel.

5. A ball control for sheet feeding machines adapted to cooperate with moving means for pro-
35 ducing travel of sheets thereover while permitting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein of different weights arranged in the cage parallel with the direction of travel of the sheets, said cage being mounted above the feed-way of the sheets, and means for adjusting the cage in the direction of such feed to vary the weight of balls in engagement with a sheet at a predeter-
40 mined point in its travel.

6. In mechanism of the class described, moving means for producing travel of sheets there-
45 over, a bracket mounted above said moving means, a running-in wheel carried by said bracket adapted to engage sheets passing over said moving means, a ball cage also carried by said bracket in advance of said running-in wheel, and means for adjusting said bracket parallel with the direc-
50 tion of travel of the sheets.

7. In mechanism of the class described, moving means for producing travel of sheets there-
55 over, a bracket mounted above said moving means, a running-in wheel carried by said bracket adapted to engage sheets passing over said moving means, a ball cage also carried by said bracket in advance of said running-in wheel, said cage having a plurality of balls therein arranged parallel with the direction of travel of the sheets, and means for adjusting said bracket parallel with the direction of travel of the sheets.

8. A ball control for sheet feeding machines adapted to cooperate with moving means for pro-
60 ducing travel of sheets thereover while permitting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein, said cage being mounted above the feed-way of the sheets, and means for adjusting the cage to bring different balls into contact with a sheet lying therebeneath during said sheet adjusting movement.

5 9. A ball control for sheet feeding machines adapted to cooperate with moving tapes for producing travel of sheets thereover while permitting adjusting movement of the sheet in its own plane, comprising a ball cage, a plurality of balls therein, said balls being of different characteristics in respect to insuring traction between said

tapes and the sheets being fed, said cage being mounted above one of the tapes, and means for adjusting the cage to bring different balls into contact with a sheet lying therebeneath during said sheet adjusting movement.

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