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SHEET CUTTING AND FEEDING MACHINE

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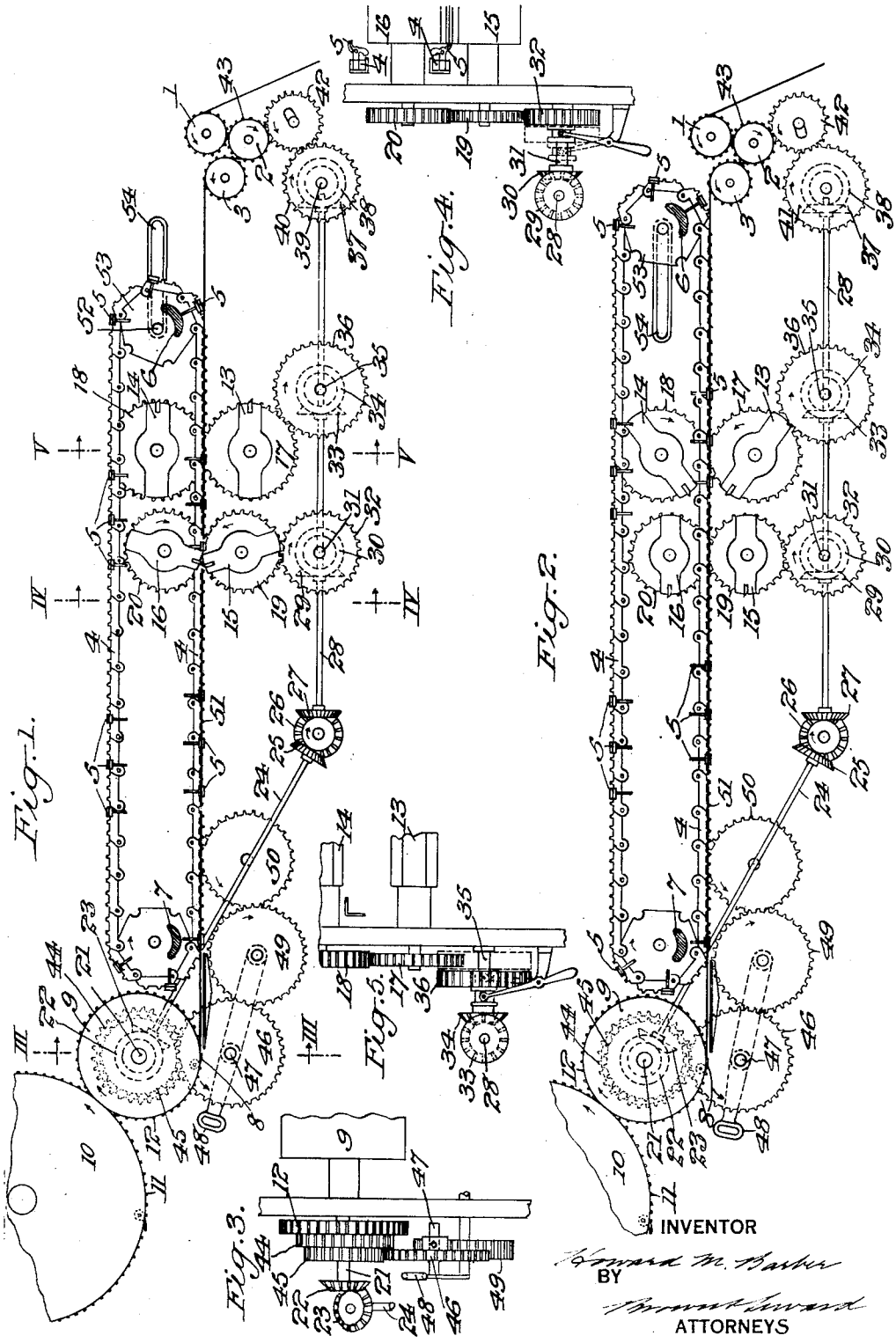


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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SHEET CUTTING AND FEEDING MACHINE

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Heretofore in variable length sheet cutting and feeding mechanisms it has been cutomary to provide a single variable speed sheet cutting unit for cutting sheets of different lengths from a traveling web. There are disadvantages in this type of cutter. Unless great care is exercised in adjusting the drive for the cutter it is impossible to impart a perfectly square cut to the sheet.

The object of my invention is to obviate the disadvantages of the single variable speed sheet cutting unit by providing a plurality of sheet cutting units adapted to be driven at different constant speeds according to different lengths of sheets to be cut; means being provided for bringing into operation a selected cutting unit according to the predetermined length of sheet to be cut.

My invention comprises, generally, a sheet taking device, such for instance as a sheet feeding cylinder, a web feeding unit, such for instance as a plurality of web feeding rolls, a plurality of sheet cutting units, such for instance as pairs of coacting rotary cutters, and an endless web and sheet carrier arranged to take a web from the web feeding unit, pass the web through the cutting units and feed the sheets to the sheet taking device; means being provided for putting into operation a selected cutting unit according to the length of sheet to be cut from the web.

My invention comprises more specifically, means for driving the selected cutting unit at a certain speed, change speed means for driving the web feeding unit and change speed means for driving the endless web and sheet feeding carrier.

A practical embodiment of my invention is represented in the accompanying drawing in which:

Fig. 1 represents in diagram my improved variable sheet cutting and feeding mechanism, the parts being in the positions they assume when short sheets are being cut by a selected sheet cutting unit and fed to the sheet taking device;

Fig. 2 represents a similar view with the parts in the positions they assume when another selected sheet cutting unit is employed for cutting sheets of a longer length from the web;

Fig. 3 represents a detail cross section taken in the plane of the line III—III of Fig. 1, looking in the direction of the arrows;

Fig. 4 represents a detail cross section taken in the plane of the line IV—IV of Fig. 1, looking in the direction of the arrows; and

Fig. 5 represents a detail cross section taken in the plane of the line V—V of Fig. 1, looking in the direction of the arrows.

In the embodiment illustrated herein the web feeding unit is shown as comprising three intergeared web feeding rolls 1, 2, 3 located in position to feed measured amounts of the web to an endless chain link web and sheet feeding chain carrier 4, which carrier is provided with groups of side grippers 5 spaced greater or lesser distances apart, according to the number of links interposed between the said groups of side grippers. The length of this endless carrier therefore varies according to the number of links. The stationary gripper opening cams 6 of any well known or approved form may be provided for successively opening the side grippers 5 to grasp the side edges of the web as it is fed from the web feeding rolls. It will be understood that these stationary cams 6 are adjustable to open the grippers to receive the side edges of the web at different distances from the web feeding rolls, as clearly illustrated in Figs. 1 and 2 of the drawing.

Fixed cams 7 of any well known or approved form are provided to successively open the grippers to permit the sheets cut from the web to be fed to a sheet taking device, such for instance as the grippers 8 of a sheet taking device 9, which sheet taking device may be the rotary sheet feeding cylinder of a printing press, the impression cylinder 10 of which is illustrated in the accompanying drawing. This cylinder 9 may be positively driven through the gears 11 and 12 from the said impression cylinder 10.

A plurality of sheet cutting units are provided in position to cut sheets of different lengths from the web as it is fed by the endless carrier 4. In the present instance I have shown two pairs of coacting rotary cutters, the first pair of cutters being denoted by 13 and 14 and the second pair of rotary cutters being denoted by 15 and 16. The cutter 14 is driven from its coacting cutter 13 through the gears 17, 18 and the cutter 16 is driven from the cutter 15 through the gears 19, 20. The circular paths of the cutters 13 and 14 are greater than the circular paths of the cutters 19 and 20, thus adapting the cutters 13, 14 to cut sheets of longer length than the cutters 15, 16, it being understood that only a selected one of these cutting units is used at any one time. The means for driving these two cutting units is as follows:

The shaft 21 of the sheet feeding cylinder 9 has a bevel gear driving connection 22, 23 with a shaft 24, which shaft in turn has a bevel gear driving connection 25, 26, 27 with a shaft 28. This shaft 28 has a bevel gear driving connection 29, 30 with

the cross shaft 31 which carries a gear 32. This gear 32 is manually shiftable into and out of mesh with the gear 19 of the second cutting unit, as shown in Fig. 4.

This shaft 28 also has a bevel gear driving connection 33, 34 with the cross shaft 35 which carries a gear 36. This gear 36 may be shifted along the shaft 35 into and out of mesh with the gear 17 of the first cutting unit, as shown in Fig. 5. The web feeding rolls 1, 2, 3 are driven from the cutter drive shaft 28 through a change speed mechanism as follows:

The shaft 28 has a bevel gear drive 37, 38 with the cross shaft 39, on which cross shaft a change gear 40 or 41 is mounted for driving an adjustable intermeshed gear 42, which gear in turn meshes with the gear 43 on the shaft of the web feed roll 2. The variable length endless web and sheet feeding carrier is driven from the shaft 21 of the sheet feeding cylinder 9 through a change speed device as follows:

This cylinder shaft 21 is provided with two gears 44, 45 of different diameters. A gear 46 is shiftable laterally on a stud shaft 47 carried by a rocking support 48 so that the said gear 46 may be brought into mesh with either the gear 44 or the gear 45. This gear 46 is at all times in mesh with a wide faced gear 49, which gear 49 is in mesh with a gear 50 which engages the rack teeth 51 on the endless carrier chain 4.

In the present instance, when the grippers 5 are spaced the shorter distance apart, as shown in Fig. 1, and the coacting rotary cutters 15, 16 are to be used for cutting short sheets from the web, the gear 46 is meshed with the gear 45. When the groups of side grippers 5 are spaced a longer distance apart, as shown in Fig. 2, and the coacting rotary cutters 13 and 14 are to be used for cutting longer sheets from the web, the gear 46 is meshed with the gear 44.

The lengthening and shortening of the endless chain carrier is accomplished by the addition or removal of one or more links between each group of grippers, it being understood that the shaft 52 of the sprocket wheels 53 is adjusted along the frame within the elongated slot 54.

From the above description it will be seen that I have provided a constant speed cutting unit for each length of sheet to be cut from the web and that I have also provided means whereby the web and sheet carrier may be lengthened or shortened so that the selected length sheets can be cut and fed to the sheet taking device in exact register therewith. It will also be seen that I have provided a change speed feed for the web and a corresponding change speed feed for the web and sheet carrier.

As the endless carrier should be a multiple of the length sheet to be cut, it is necessary to insert or remove one or more links between each group of side grippers, thus lengthening or shortening the carrier according to the length of sheet to be cut and fed. Furthermore, by using a plurality of side grippers in each group, it will be seen that the sheet cut from the web is still held by the last side grippers until the leading edge of the sheet is taken by the grippers of the sheet taking device, thus assuring perfect sheet register.

It is evident that various changes may be resorted to in the construction, form and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the particular embodiment herein shown and described, but

What I claim is:

1. A sheet taking device, a web feeding unit, an endless web and sheet feeding carrier, a plurality of units for cutting sheets of different lengths from the web and means for driving the web feeding unit, a selected sheet cutting unit and the endless carrier at predetermined speeds.

2. A sheet taking device, a web feeding unit, an endless web and sheet feeding carrier, a plurality of units for cutting sheets of different lengths from the web and means for driving from the sheet taking device, the web feeding unit, a selected sheet cutting unit and the endless carrier at predetermined speeds.

3. A sheet feeding cylinder, web feeding rolls, an endless web and sheet feeding carrier, a plurality of pairs of coacting rotary cutters for cutting sheets of different lengths from the web and means for driving the web feeding rolls, a selected pair of sheet cutters and the endless carrier at predetermined speeds.

4. A sheet taking device, a web feeding unit, a variable length endless web and sheet feeding carrier, means for driving the web feeding unit and endless carrier at a selected speed, a plurality of units for cutting sheets of different lengths from the web and means for driving a selected cutting unit at a predetermined speed.

5. A sheet taking device, a web feeding unit, a variable length endless web and sheet feeding carrier, means for driving the web feeding unit and endless carrier from the sheet taking device at a selected speed, a plurality of units for cutting sheets of different lengths from the web and means for driving a selected cutting unit from the sheet taking device at a predetermined speed.

6. A sheet feeding cylinder, web feeding rolls, a variable length endless web and sheet feeding carrier, means for driving the feeding rolls and endless carrier from the sheet feeding cylinder at a selected speed, a plurality of pairs of coacting rotary cutters for cutting sheets of different lengths from the web and means for driving a selected pair of sheet cutters from the sheet feeding cylinder at a predetermined speed.

7. A sheet taking device, a web feeding unit, a variable length endless web and sheet feeding carrier, a plurality of units for cutting sheets of different lengths from the web, means for driving a selected cutting unit at a predetermined speed, a change speed drive for the endless carrier and a change speed drive for the web feeding unit.

8. A sheet taking device, a web feeding unit, a variable length endless web and sheet feeding carrier, a plurality of units for cutting sheets of different lengths from the web, means for driving a selected cutting unit from the sheet taking device at a predetermined speed, a change speed drive from the sheet taking device to the endless carrier and a change speed drive from the sheet taking device to the web feeding unit.

9. A sheet taking device, a web feeding unit, an endless change link web and sheet feeding chain carrier, a change gear drive for the endless carrier, a plurality of units for cutting sheets of different lengths from the web, a constant speed drive for said cutting units, means for selecting a predetermined cutting unit for operation and a change gear drive for the web feeding unit.

10. A sheet taking device, a web feeding unit, an endless change link web and sheet feeding chain carrier, a change gear drive from the sheet taking device to the endless carrier, a plurality of units for cutting sheets of different lengths from the web, a constant speed drive from the sheet taking device to said cutting units, means

for selecting a predetermined cutting unit for operation and a change gear connection between the constant speed drive and the web feeding unit.

11. A sheet feeding cylinder, web feeding rolls, an endless change link web and sheet feeding chain carrier, a change gear drive for the endless carrier, a plurality of pairs of coacting rotary cutters for cutting sheets of different lengths from the web, a constant speed drive for said sheet cutters, means for selecting a predetermined pair of sheet cutters for operation and a change gear drive for the web feeding rolls.

12. A sheet feeding cylinder, web feeding rolls, an endless change link web and sheet feeding chain carrier, a change gear drive from the sheet feeding cylinder to the endless carrier, a plurality of pairs of coacting rotary cutters for cutting sheets of different lengths from the web, a constant speed drive from the sheet feeding cylinder to said sheet cutters, means for selecting a predetermined pair of sheet cutters for operation and a change gear connection between the cutter drive and the web feeding rolls.

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