Feb. 26, 1946. T. ROWLANDS 2,395,644

APPARATUS FOR SEPARATING SHEETS FROM A PILE

Filed Feb. 1, 1944 2 Sheets-Sheet 1

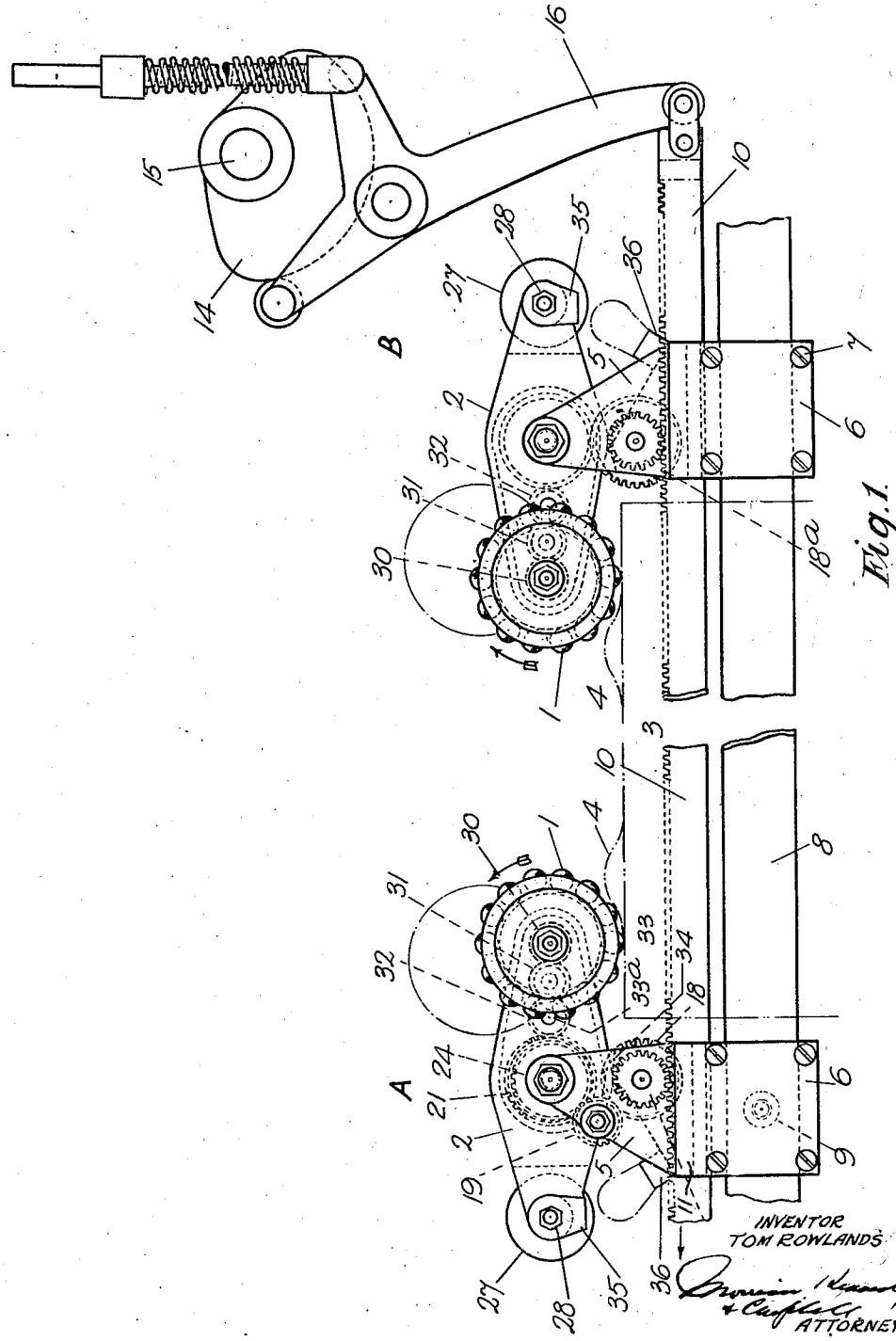


Fig. 1.

INVENTOR
TOM ROWLANDS

Irwin Kenny & Campbell
ATTORNEYS.

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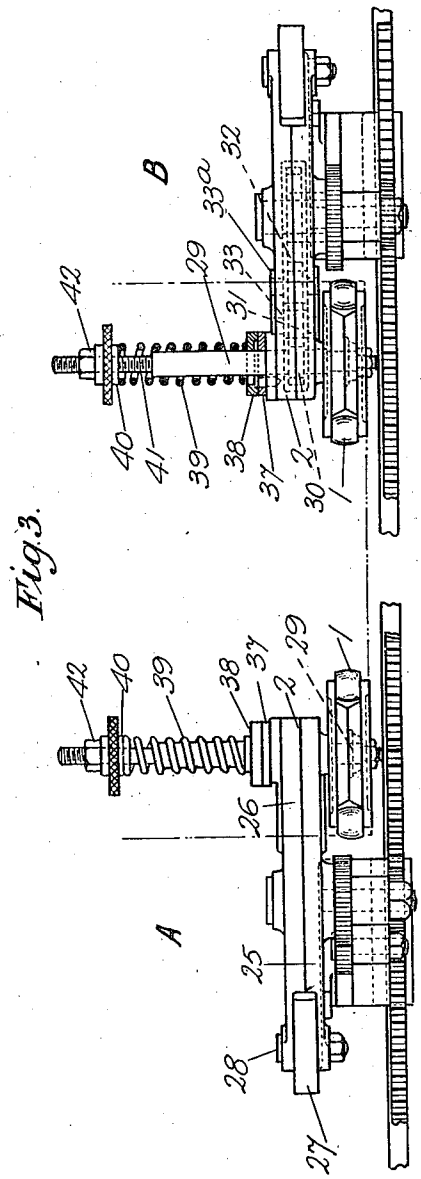


Fig. 3.

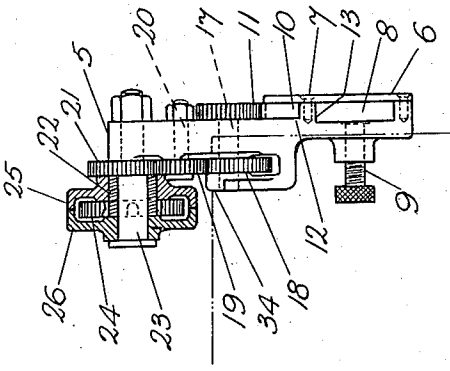


Fig. 2.

INVENTOR
TOM ROWLANDS

BY Morrison Kennedy & Campbell
ATTORNEYS

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APPARATUS FOR SEPARATING SHEETS FROM PILES

Tom Rowlands, Altrincham, England, assignor to Linotype and Machinery Limited, a limited liability company of Great Britain

Application February 1, 1944, Serial No. 520,625
In Great Britain February 5, 1943

11 Claims. (Cl. 271—36)

This invention relates to apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine.

The invention is concerned with the type of separating apparatus in which a rotatable combing wheel capable of being raised out of, or lowered into, contact with the top sheet of a pile, serves to separate the sheet from the pile and to facilitate its adherence to a suction lifter.

It has heretofore been necessary to use cam and lever mechanisms for raising or lowering the combing wheel in addition to mechanism which has continuously rotated the combing wheel, and it is the object of the present invention to provide an improved mechanism which, in addition to effecting a required rotation of the combing wheel, will quickly effect the raising or lowering of same. A further object of the invention is to provide an improved mechanism which ensures that the combing wheel is not rotated during the raising or lowering thereof. A still further object of the invention is to provide an improved separating mechanism which may be arranged to operate on any convenient part of the sheet pile.

With these objects in view there is provided, according to the invention, in an apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, a sheet separating mechanism comprising a combing wheel which is rotatable to form a wave in a sheet and a movable support on which the combing wheel is mounted and driving mechanism which is adapted first to effect movement of the support towards or away from the pile and on completion of a movement of the support to effect rotation of the combing wheel.

In carrying out the invention there is provided a reversible driving mechanism comprising a sun gear in driving connection with a rack which receives a reciprocating motion from any suitable mechanism, the sun gear being carried by a normally stationary bracket which is adjustable according to the size of the sheet to be separated. The combing wheel is secured to a shaft carried by a support which is loosely mounted about the axis of the sun gear. A planet wheel in driving connection with the sun gear is secured to the combing wheel shaft. Rotation of the sun gear in either direction causes the combing wheel support to move around with the sun gear until the support is arrested when the combing wheel commences to rotate.

A preferred constructional form of apparatus according to the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation showing sheet separating apparatus in operative position in relation to a pile of sheets;

Figure 2 is a side elevation, partly in section, of the separating apparatus, and

Figure 3 is a plan view, partly in section, of Figure 1.

The sheet separating apparatus shown in Figures 1 and 3 comprises two separating mechanisms A and B, each having a combing wheel 1 carried by a support 2 which is lowered so as to move the combing wheel 1 from the position shown in dot-and-dash lines into contact with the top sheet of a pile 3. The combing wheel 1 is then rotated to form a wave 4 in the sheet to facilitate the separation thereof from the pile 3. After the wave has been formed in the sheet the support 2 is raised to return the combing wheel 1 to its original position, there being no rotation of the combing wheel during movement of the support.

The separating mechanism A is carried in a normally stationary bracket 5 which is mounted by means of a plate 6 and screws 7 on a cross bar 8 fixed to the frame of the sheet separating apparatus. The bracket 5 is adjustable to any desired position along the cross bar 8 and is secured in position by a knurled-headed setscrew 9. A reciprocating rack 10 extends transversely of the sheet pile 3 and passes through a guideway 12 (see Figure 2) formed on the bracket 5 by the plate 6 and portion 13 of the bracket. The rack 10 is reciprocated by any suitable mechanism, such as a cam 14 (Figure 1) on a driven shaft 15, and a cam lever 16 connected to rack 10. The rack 10 meshes with a pinion 11 which is fixed to a short shaft 17 (see Figure 2) journalled in the bracket 5. A gear wheel 18 is fixed to the short shaft 17 and meshes with a pinion 19 loosely mounted on a stud 20 secured to the bracket 5, pinion 11 through the above described in- is integral with a sleeve 22 loosely mounted on a stud 23 secured to the bracket 5. The sleeve 22 has keyed thereto a sun gear 24. The sun gear 24 is thus in driving connection with, and is reversibly driven by, the reciprocating rack 10 and pinion 11 through the above above described intermediate gearing so that movement of the rack 10 towards the left in Figure 1 will rotate the sun gear 24 in a clockwise direction, whereas movement of the rack towards the right in Figure 1 will rotate the sun gear 24 in an anti-clockwise direction.

The support 2 comprises a split casing 25, 26 (see Figure 2) which is loosely mounted about

the axis of the sun gear 24, the casing portion 25 being loosely carried by the sleeve 22 and the casing 26 being loosely carried by the stud 23. A counter-balancing roller 27 is mounted at one end of the support 2 by means of a stud 28 (see Figure 3) and the stud 28, together with the stud 23, hold the split casing 25, 26 together to form the support 2. The combing wheel 1 is mounted at the other end of the support 2 and is keyed to a shaft 29 journalled in the support. The shaft 29 has secured thereto a planet gear 30 (see Figure 1 and mechanism B of Figure 3) which is in driving connection with the sun gear 24 through intermediate pinions 31, 32 located inside the casing 25, 26 and secured to spindles 33, 33a. Rotation of the sun gear 24 in either direction will tend to swing the support 2 towards or away from the pile 3 until such swinging movement is arrested, when the combing wheel 1 will rotate. Movement of the support 2 towards the pile 3 is arrested by the engagement of the combing wheel 1 with the top sheet of the pile 3, but a stop 34 (see Figures 1 and 2) is provided on the bracket 5 to engage with the underside of the casing 25 of the support 2 and limit such movement if the sheet pile is too low or if the pile is not in position. Movement of the support 2 away from the pile 3 is limited by the engagement of an abutment 35 on the casing 25 with a stop 36 on the bracket 5.

The combing wheel shaft 29 is extended beyond the support 2 (see mechanism B—Figure 3) and is surrounded by two washers 37, 38, one of which (37) is fixed to the casing 26, and the other of which (38) is keyed to the shaft 29. A spring 39 surrounds the shaft 29 and extends between the washer 38 and a knurled-headed nut 40 which is adjustable on a screw-threaded portion 41 of the shaft 29 in conjunction with a locking nut 42. Friction between the washers 37 and 38 can thus be adjusted so that the force required to rotate the combing wheel 1 can be varied, and hence the pressure exerted by the combing wheel 1 on to the pile is adjustable.

In operation, movement of the rack 10 towards the left in Figure 1 rotates the sun gear 24 in a clockwise direction through the pinion 11, the intermediate gearing 18, 19, 21 and sleeve 22. Rotation of the sun gear 24 causes the intermediate pinions 31, 32 and planet gear 30 to move around with the sun gear 24 and hence the loosely mounted support 2 to be given a swinging movement. The intermediate pinions 31, 32, planet wheel 30 and combing wheel 1 do not rotate until the movement of the support 2 is arrested by the combing wheel 1 coming into contact with the top sheet of the pile 3. When movement of the support is so arrested, the sun gear 24 rotates the intermediate pinions 31, 32 and planet wheel 30, and hence the combing wheel 1 is rotated in an anti-clockwise direction to form a wave 4 in the top sheet of the pile 3. Movement of the rack 10 towards the right in Figure 1 rotates the sun gear 24 in an anti-clockwise direction, whereupon rotation of the combing wheel 1 ceases and the intermediate pinions 31, 32 and planet wheel 30 move around with the sun gear 24 to swing the support and combing wheel away from the pile. Such movement of the support brings the abutment 35 in contact with the stop 36, whereupon the movement of the support is arrested and the combing wheel idly rotates. Any suitable mechanism such as a free wheel device may, if desired, be employed for preventing such idle rotation of the combing wheel.

The separating mechanism B is similar in construction and operation to the separating mechanism A, and reference numerals have been added to the parts in accordance with the description of separating mechanism A. The rack 10 also operates mechanism B, but pinion 19 and stud 20 are omitted from the intermediate gearing and gear wheel 18 is replaced by a larger gear wheel 18a meshing directly with the gear 21 on sleeve 22. The movement of rack 10 to the left will, therefore, impart an anti-clockwise movement to the sun gear 24 to move the support 2 and bring the combing wheel 1 into contact with the top sheet of the pile. In consequence, the mechanisms A and B are simultaneously operated to bring each combing wheel into and out of contact with the top sheet of the pile, the combing wheel of mechanism B rotating in a clockwise direction when in contact with the top sheet of the pile.

Each separating mechanism comprises a complete separating unit and any desired number of such mechanisms may be arranged in any required position relatively to the pile 3.

Having described my invention, I declare that what I claim and desire to secure by Letters Patent is:

1. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, sheet separating mechanism having in combination a combing wheel which is rotatable to form a wave in a sheet, a movable support on which the combing wheel is mounted, and common driving means comprising one set of driving connections which effect movement of the support towards or away from the pile and after arrest of the support effect rotation of the combing wheel, there being sufficient frictional resistance of the parts to cause movement of the support.

2. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, sheet separating mechanism having in combination a combing wheel which is rotatable to form a wave in a sheet, a driven sun gear, a combing wheel support which is loosely mounted about the axis of the driven sun gear, a shaft on the support carrying the combing wheel, a planet gear on the combing wheel shaft in driving connection with the sun gear, and means for reversibly driving the sun gear so that rotation of the sun gear in either direction first moves the support towards or away from the pile, and on arrest of the support effects rotation of the combing wheel, there being sufficient frictional resistance of the parts to cause movement of the support.

3. Sheet separating means according to claim 1 including means for counterbalancing the combing wheel support.

4. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, sheet separating mechanism having in combination an adjustable bracket provided with a stud, a sun gear secured to a sleeve carried by the stud, a rotatable combing wheel, a combing wheel support loosely mounted on the sleeve and stud, a shaft on the support carrying the combing wheel, a planet gear on the combing wheel shaft, intermediate pinions carried by the support in driving connection between the sun gear and planet gear, and a reciprocating rack for reversibly driving the sun gear so that rotation of the sun gear in either direction first moves the sup-

port towards or away from the pile and on arrest of the support effects rotation of the combing wheel, there being sufficient frictional resistance of the parts to cause movement of the support.

5. Sheet separating mechanism according to claim 4 including a roller carried by the support for counterbalancing the weight of the combing wheel.

6. Sheet separating mechanism according to claim 4 including a roller carried by the support for counterbalancing the weight of the combing wheel and wherein the combing wheel support comprises a split casing.

7. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, sheet separating mechanism having in combination a driven sun gear, a combing wheel support which is loosely mounted about the axis of the driven sun gear, a shaft on the support carrying the combing wheel, a planet gear on the combing wheel shaft in driving connection with the sun gear, means for reversibly driving the sun gear so that rotation of the sun gear in either direction first moves the support towards or away from the pile and on arrest of the support effects rotation of the combing wheel, and means for adjusting the pressure exerted by the combing wheel on to the pile.

8. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, sheet separating mechanism including in combination a rotatable combing wheel, a movable support on which the combing wheel is mounted, an extended shaft on the support for carrying the combing wheel, means for rotating said shaft, a washer surrounding the shaft and attached to said support, a washer surrounding the shaft and keyed thereto, a spring surrounding the shaft and bearing against the washer thereon, and a nut carried by a screw-threaded portion of said shaft and bearing against the other end of the spring, said nut being adjustable to vary the friction between the two washers.

9. In or for apparatus for separating sheets from a pile, the combination of a plurality of sheet separating mechanisms each comprising a rotatable combing wheel, movable supports on which the combing wheels are respectively mounted, brackets on which said movable supports are respectively mounted, common driving means which effect movement of a support towards or away from the pile and on arrest of the support effect rotation of the combing wheel, a reciprocating member of said driving means, a cross bar extending transversely of the pile on which bar said brackets are mounted and means for adjusting each bracket relatively to the reciprocating member and cross bar, there being sufficient frictional resistance of the parts to cause movement of the support.

10. In or for apparatus for separating sheets from a pile preparatory to the feeding of the sheets to a printing or like machine, a sheet separating mechanism having in combination a rotatable combing wheel, a movable support on which the combing wheel is mounted, and means whereby the combing wheel is adapted to remain non-rotatable during the movement of the support.

11. Sheet separating mechanism according to claim 10 wherein contact of the combing wheel with the sheet pile is effective to commence rotation of the combing wheel.

TOM ROWLANDS.