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Bolza-Schünemann

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[54] **SHEET-FEEDING DEVICE FOR PRINTING PRESSES**

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[52] **U.S. Cl.** **271/51**

[51] **Int. Cl.** **B65h 5/06**

[58] **Field of Search** 271/51, 80, 82; 101/234, 235, 236

[56] **References Cited**

UNITED STATES PATENTS

2,892,630 6/1959 Schünemann ..... 271/82 X

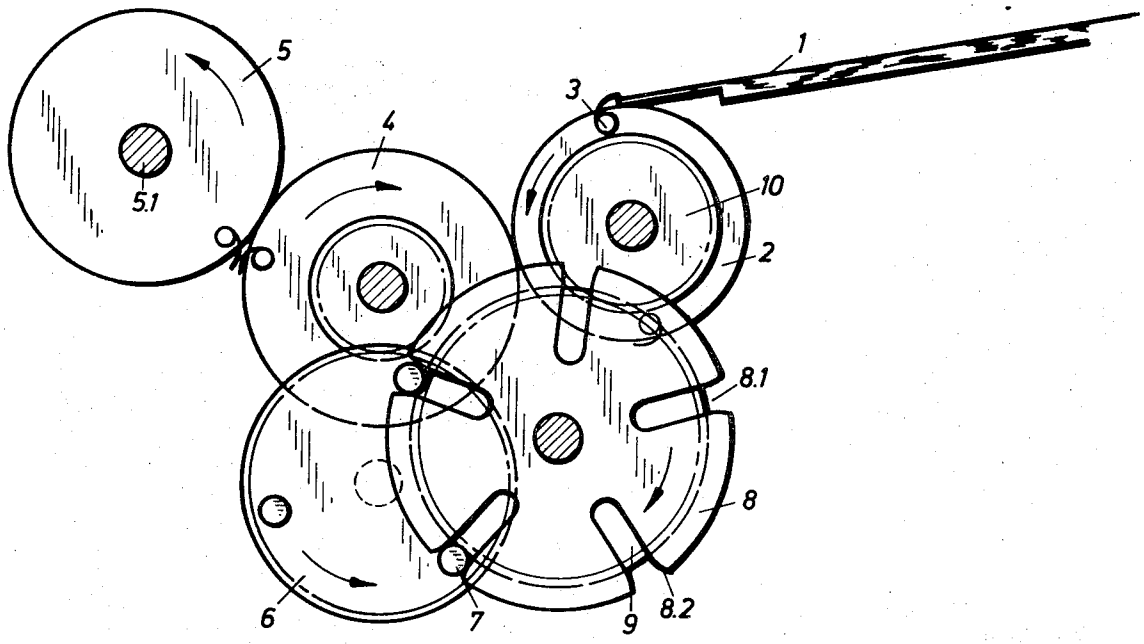
Primary Examiner—Edward A. Sroka

Attorney—Jones and Lockwood

[57] **ABSTRACT**

The invention relates to a sheet feeding device for printing presses with rotating pregripper seizing aligned sheets in standstill attitude at the feeding table and accelerating them to the circumferential speed of the printing cylinder and passing them in true register at same speed.

19 Claims, 2 Drawing Figures



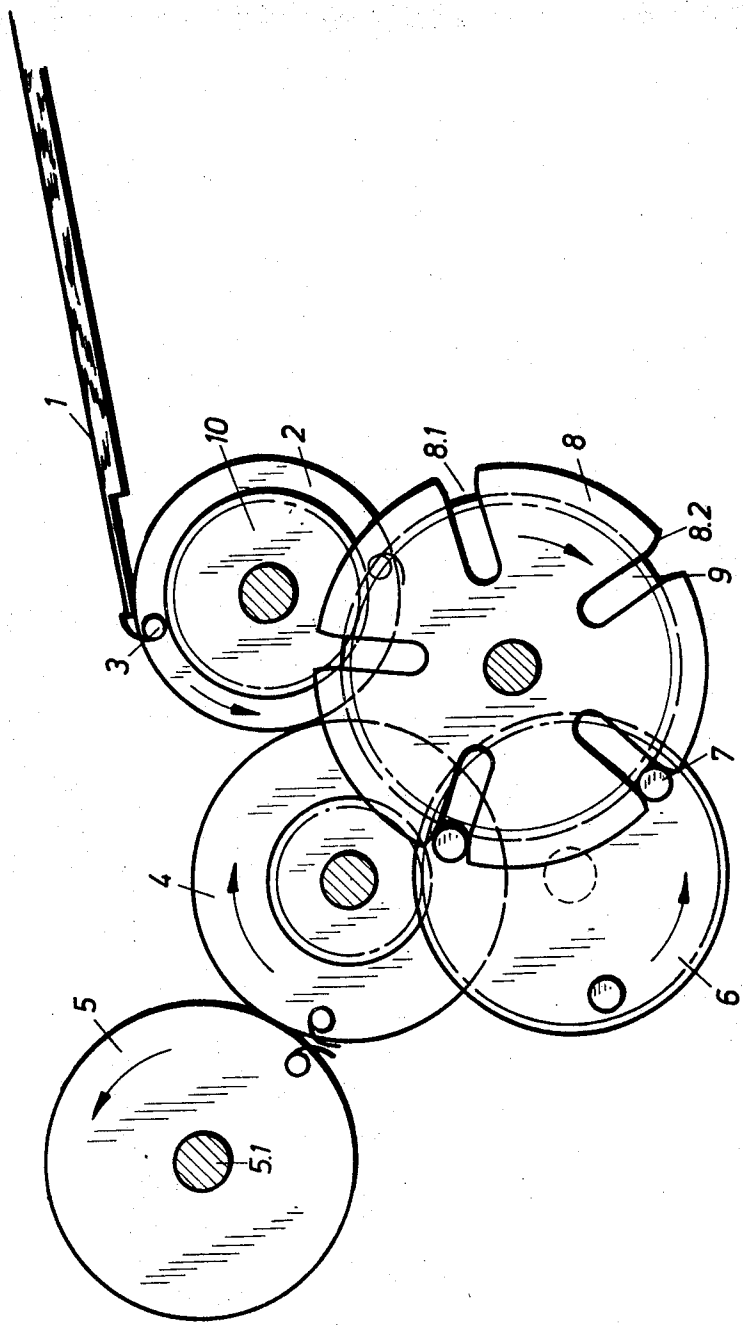


Fig. 1

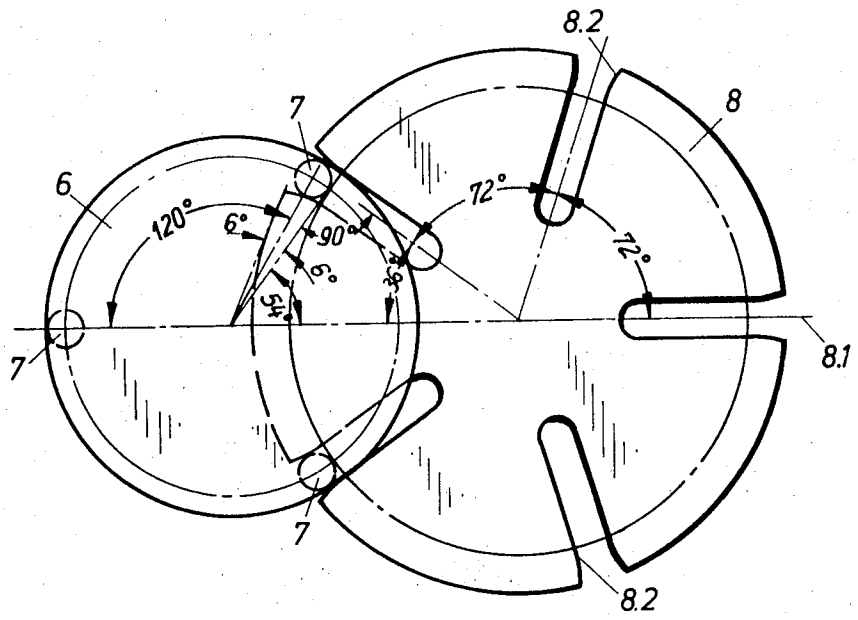


Fig. 2

SHEET-FEEDING DEVICE FOR PRINTING PRESSES

BACKGROUND OF THE INVENTION

Such pregrippers are already known. For instance they are driven by a single revolution printing cylinder axle by means of transmissions similar to Maltese crosses e.g., on a sheet feeding device according to German Pat. No. 1 033 224, whereby interconnected tooth segments provide a longer synchronism, the time of standstill amounting to 120° of printing cylinder revolution.

Furthermore it is known by the German Auslegeschrift Pat. No. 1 102 760 to equip the pregripper with at least three gripper systems and to step it up with a six-part Maltese cross transmission once per printing cylinder revolution so that after a 120° turn a very long 240° time of rest will follow, an effect pointed out as inventive and especially desired.

However, long resting times demand correspondingly short acceleration angles limiting the speed of the machine, as the forces of acceleration would be too great.

Therefore the object of this invention is the problem of driving the rotating pregripper in such a way that the shortest possible resting times as well as the longest possible acceleration angles could be reached. Long acceleration angles are already reached by cam-controlled differential gears as described in the German Pat. No. 952 904, however, the practical manufacture of the control cams is subject to great difficulties. On the other hand Maltese cross gears are easily and exactly produced, however, allowing only throwing-on angles of approx. 60° or less.

By the Swiss Pat. No. 478 666 a five-part Maltese cross is known, driving the control device of a folding machine.

According to the invention the problem is solved by using a known five-part Maltese cross transmission with three driving rolls to drive the pregripper and the driving rolls rotate with one-third of the speed of a single revolution shaft. The slotted holes of the Maltese cross show a circular arc shaped enlargement at their ends so that two each driving rolls moving in and out temporarily block the Maltese cross. This makes further suppressors, rolls, auxiliary cams etc. unnecessary which are always otherwise required.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention is hereinafter described by way of example with reference to the accompanying drawings but it is clearly to be understood that the invention is by no means restricted to the details of this embodiment.

FIG. **1** shows a side elevation of the feeding table, the pregripper and transfer drums, the printing cylinder and the Maltese cross drive mechanism for the pregripper drum, and

FIG. **2** shows the control geometry of the drive gearing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. **1** the sheets are aligned on a feeding table **1** by front lays which can be swung downwards and by side lays in the well-known manner such as shown in U.S. Pat. No. 3,001,788. A rotating pregripper **2** (stop drum) is placed under the feeding table **1** and has two

gripper systems **3**, in an already known manner equipped as dip grippers such as shown in German Pat. No. 1,212,562 which can draw themselves back under the surface. There can also be used reversal grippers or suction grippers which in their opened state do not extend to an already aligned sheet on the feeding table **1**. The grippers **3** pass the sheet to a transfer drum **4** which in turn passes the sheet to a printing cylinder **5** which is journaled on an axle **5.1**. The axle **5.1** is a single revolution shaft. Transfer drum **4** is related to the printing cylinder **5** in a known manner as is shown in U.S. Pat. No. 2,887,317 where cylinders **3, 4** correspond to cylinders **4, 5** in the present application. Likewise, in the U.S. Pat. No. 3,001,788 referred to above cylinders **12, 13** correspond to the present application cylinders **4, 5**. The sheets come in such a close sequence one after another that the front lays are covered by the first sheet when the second sheet arrives at the front lays and is adjusted there. Because this covering over one speaks of covered front lays. This is shown in the U.S. patent referred to above which has covered lay control means and in which the sheets **S1, S2**, etc. are fed one after the other in timed relationship to the cylinder **11**. The transfer drum **4** may also be replaced by the printing cylinder **5**. From the transfer drum **4** a driving plate **6** is driven. The driving plate has driving rolls **7** spaced at 120° at a gear ratio of 1 : 3. The driving rolls enter, one after the other, into five control slotted holes **8.1** of a Maltese cross **8**. The Maltese cross **8** makes a switch step per single revolution of the transfer drum **4**, a switch step being **360** divided by **5** equals to 72°. The Maltese cross is geared by gear wheel **9** to a gear wheel **10** on pregripper drum **2** at a ratio of 2.5 : 1. At each switch step of the Maltese cross **8** the pregripper **2** rotates 180°.

Without changing the principle the pregripper or stop drum **2** could be selected with a gripper at 360° revolution and a ratio of 5 : 1 to the Maltese cross or with three grippers at 120° revolution and a ratio of 5 : 3.

FIG. **2** shows the known cooperation of Maltese cross **8** and driving plate **6**. As there are three driving rolls **7** provided their spacing amounts to 120°. The five-part Maltese cross makes 72° switch steps possible; thus half a switch step is 36° so that half the driving angle can only be 54° when diving right-angularly. Thus there remains a 6° balancing angle which each driving roll **7** has to pass through at both sides before the Maltese cross **8** can be rotated. The diameter of the Maltese cross **8** is larger by those + 6° curve parts **8.2** and the slotted holes extend outwardly in a circular shaped arc corresponding to the radius of which the circular arc on the driving rolls **7** are running. At this ± 6° motion of the driving rolls in the circular arc section of the Maltese cross slotted holes there is brought about a perfect, right-angular blocking of the Maltese cross **8**. As the driving plate **6** is geared down at a ratio 1 : 3 to the single-revolution transfer drum **4** as well as the single revolution shaft **5.1** of the printing cylinder running therewith the resting time of the pregripper **2** is $3 \times \pm 6° = 3 \times 12° = 36°$ which is sufficient to close the grippers **3**. The acceleration and breaking angle each amount to $3 \times 54° = 126°$ of the single-revolution axle-turn in comparison to 60° or less in case of the known Geneva mechanisms so that there can be attained a very considerable increase of revolutions of the printing machine.

With regard to the large acceleration angle and the arising losses of time, the sheet aligning is effected, as is well known, in covered state by front lays which can be swung downwards.

What is claimed is:

1. Sheet feeding apparatus for printing presses including a printing cylinder on a single revolution shaft having a rotating pregripper drum with gripper means thereon to receive sheets from a feeding table and transfer them, the improvement of drive means for rotating the pregripper drum comprising, a five-part Maltese cross transmission having radially extending slot openings between walls defining the parts and a cooperating rotating driving plate for driving the Maltese cross, said driving plate having three drive rolls mounted thereon circumferentially equally spaced for rotating the Maltese cross, said walls of the Maltese cross defining the slots extending in circular arc curves in opposite directions and adjacent slot outer ends act to temporarily block the Maltese cross between two of said driving rolls received therein, said Maltese cross having drive means thereon cooperating with drive means on the pregripper drum for periodically rotating the pregripper drum, and means for rotating said driving plate whereby it and its driving rolls rotate at one-third speed of said single revolution shaft, said temporary blocking of the Maltese cross causing a relatively short resting time of the rotary pregripper and the driving by the Maltese cross causing the rotary pregripper to have a relatively long acceleration angle.

2. Sheet feeding apparatus according to claim 1 wherein said gripper means on the pregripper drum are reversal grippers.

3. Sheet feeding apparatus according to claim 2 wherein said sheet feeding table has front lays having means operating them from below the same and said rotating pregripper drum is positioned below said feeding table.

4. Sheet feeding apparatus according to claim 3 wherein said feeding table has covered front lay control means.

5. Sheet feeding apparatus according to claim 4 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

6. Sheet feeding apparatus according to claim 3 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

7. Sheet feeding apparatus according to claim 2 wherein said feeding table has covered front lay control means.

8. Sheet feeding apparatus according to claim 7 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

9. Sheet feeding apparatus according to claim 2 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

10. Sheet feeding apparatus according to claim 1 wherein said sheet feeding table has front lays having means operating them from below the same and said rotating pregripper drum is positioned below said feeding table.

11. Sheet feeding apparatus according to claim 10 wherein said feeding table has covered front lay control means.

12. Sheet feeding apparatus according to claim 11 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

13. Sheet feeding apparatus according to claim 10 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

14. Sheet feeding apparatus according to claim 1 wherein said feeding table has covered front lay control means.

15. Sheet feeding apparatus according to claim 14 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means on the Maltese cross transmission have a drive means ratio of 2.5 to 1.

16. Sheet feeding apparatus according to claim 1 wherein said pregripper drum has two rows of gripper means and wherein said drive means on the pregripper drum and the drive means of the Maltese cross transmission have a drive means ratio of 2.5 to 1.

17. Sheet feeding apparatus according to claim 1 wherein said gripper means on the pregripper drum are dip grippers.

18. Sheet feeding apparatus according to claim 1 wherein said gripper means on the pregripper drum are suction grippers.

19. Sheet feeding apparatus for printing presses including a printing cylinder on a single revolution shaft having rotating pregripper or stop drum with gripper means thereon to receive sheets from a feeding table and transfer them, the improvement of drive means for rotating the pregripper or stop drum compringins, a five-part Maltese cross transmission for driving the pregripper or stop drum and having radially extending slot openings equally spacing said parts thereof and a cooperating rotating driving plate for rotating the Maltese cross, said driving plate having three drive rolls mounted thereon circumferentially equally spaced for rotating the Maltese cross, said Maltese cross having drive means thereon cooperating with driven means on the pregripper or stop drum for periodically rotating the same, said Maltese cross having the outer opposite ends of the walls defining said radial slots extending in circular arc curves in opposite directions and adjacent slot outer ends act to temporarily block the Maltese cross between two of said driving rolls received therein, and means for rotating said drive plate whereby the temporary blocking of the Maltese cross drive causes a relatively short resting time of the rotary pregripper and the driving by the Maltese cross causes the rotary pregripper to have a relatively long acceleration angle.

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