March 3, 1959 B. C. JERGRELL 2,875,693

CONTROL MECHANISM FOR SWING GRIPPERS IN PRINTING PRESSES

Filed June 9, 1955 2 Sheets-Sheet 1

FIG. 1.

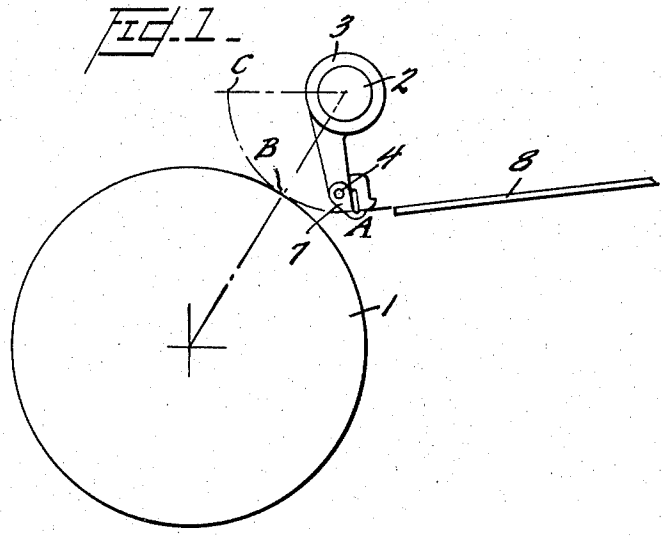
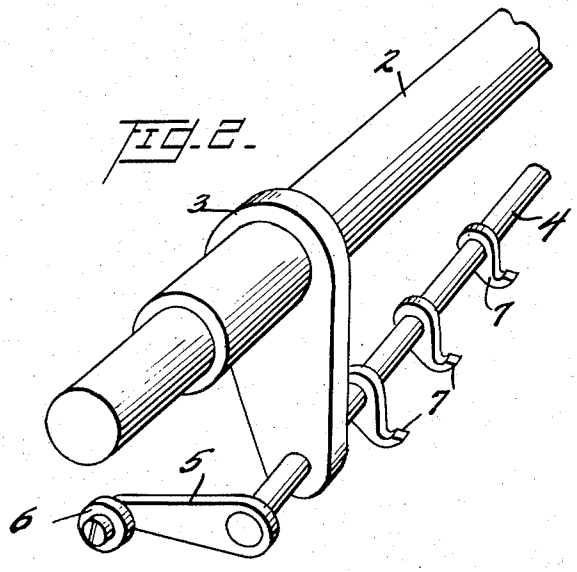


FIG. 2.



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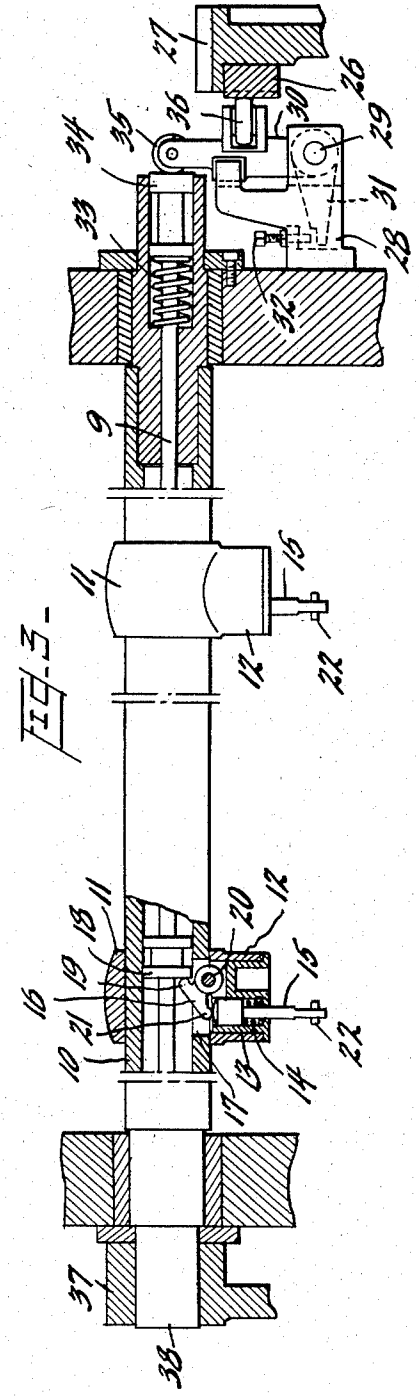

FIG. 3.

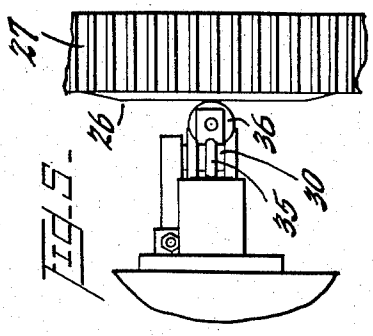

FIG. 5.

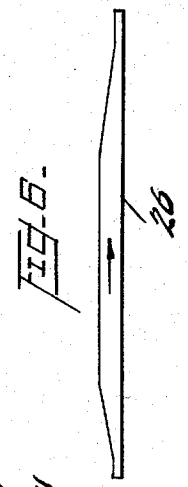

FIG. 6.

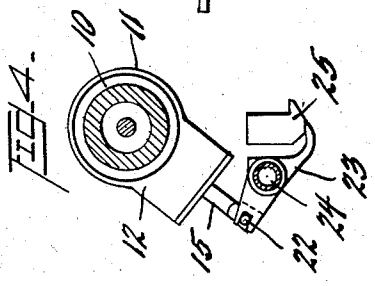

FIG. 4.

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United States Patent Office 2,875,693 Patented Mar. 3, 1959

2,875,693

CONTROL MECHANISM FOR SWING GRIPPERS IN PRINTING PRESSES

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Application June 9, 1955, Serial No. 514,155

4 Claims. (Cl. 101—408)

When it is intended simultaneously to control or influence a number of control points by means of a rod or shaft to which a rotating motion is imparted, usually, however, only part of a whole turn, it will be found that if the control points are in the longitudinal direction of the rod and are influenced, for instance, by cams, this influence will, if the rod, for instance, is turned at one end, not be the greater the farther the control point is situated from that end of the rod, to which the turning motion is applied. The reason for this is the so-called distortion resulting from the action of the turning moment upon the rod. The control difficulties resulting from this cause may become considerable and are especially noticeable when the control motion must be carried out with great speed, but at the same time shall be of short duration.

Difficulties of the kind mentioned above are encountered by the designer in connection with control devices for grippers in printing presses. In two-revolution presses, for instance, the swing grippers of the press at the feed board shall seize a sheet which is at rest there, accelerate it up to the peripheral velocity of the impression cylinder and transfer it over to the impression cylinder which rotates at constant speed. Along the gripper shaft a comparatively large number of grippers are arranged which are all influenced by the gripper shaft, which in turn by means of a lever that is attached at one end and may be provided with a rotating roller, gets a turning motion from a cam while the grippers are acted upon so that they will open and close at the right moment.

It is unavoidable, however, that a certain torsional flexure will manifest itself in the gripper shaft, and the more the speed of the press is increased the sooner such flexure will become evident by the fact that grippers situated at a greater distance from the end of the gripper shaft provided with the roller lever will be opening or closing successively later than those nearer the same end. This varying delay may altogether jeopardize the exact gripper grasp which is desirable for obtaining good register, and consequently also the higher speed which otherwise could be attained.

An object of this invention is to provide a control mechanism for swing grippers in printing presses in which the aforesaid difficulties are completely eliminated.

An illustrative embodiment according to the invention is represented in the accompanying drawings in which—

Figure 1 is a side view of a swing gripper system in a printing press, with the gripper in a position where it is just gripping a sheet on the feed board.

Fig. 2 is a perspective view of a swing gripper system with gripper shaft, a number of grippers, and the control device arranged at one end of the gripper shaft, according to the present conventional arrangement.

Fig. 3 is an elevational view partly in section of a gripper mechanism with control devices, according to the present invention.

Fig. 4 is a side view of a gripper mechanism according to Fig. 3.

Fig. 5 is a view of a detail of the control device according to Fig. 3 as seen from above.

Fig. 6 is a diagrammatic representation of the appearance of a cam which defines the magnitude and time for the action upon the control member.

In Fig. 1 numeral 1 designates the impression cylinder, 2 the shaft of the swing gripper system, and 3 a cross piece, in which a gripper shaft 4 is turnable. This gripper shaft, as will be seen from Fig. 2, is provided at one end with a lever 5, the free end of which is fitted with a roller 6 which, governed by a cam (not shown in the figure) is imparting the desired angular turn to the gripper shaft and thus the desired opening and closing motion to grippers 7.

The time, during which the opening and closing motion respectively shall occur at a printing speed of about 4000 prints per hour is about 0.01 or 0.02 second respectively. The size of the gripper gap when entirely open is about 15 mm. When the grippers have seized the sheet resting on the feed board, point A in Fig. 1, the sheet must be accelerated up to a speed of about 3.5 meters per second. The grippers have by that time reached point B. There they will open, delivering the sheet to the cylinder grippers on the impression cylinder. The swing gripper continues its motion to turning point C to swing from that point again down to a position corresponding point A, in order to grip a new sheet and in the same manner transfer it to the impression cylinder.

As it is evident that the whole swing gripper system, taking into consideration the required acceleration and retardation respectively and the forces resulting therefrom, must be made to weigh as little as possible, it is advisable also to make the gripper shaft 4 as light as possible or, which is the same, with the smallest possible diameter. But at the speedy action and the large forces of acceleration and retardation involved when one tries to increase the speed of the printing press above the conventional speed, the distortion of the shaft at the control end will become quite noticeable, and the grippers which in larger machines may be as many as about 15 will not open or close simultaneously, but with a certain delay. This will result in faulty register so that good prints cannot be obtained. Attention is called to the fact that in point B, Fig. 1, the sheet is being held for a short moment by both swing gripper and cylinder gripper. A faultiness at the former in regard to the position of the sheet will therefore also remain on the impression cylinder. If the print is to be acceptable in regard to quality, and obliquity is to be avoided, there is no other possibility in conventional designs to resort to than a considerable reduction of speed of the press.

The present invention, by means of which extraordinarily high speed can be attained and economic advantages resulting therefrom can be fully utilized, is based on the principle that the gripper shaft 4 of present design is replaced by a push rod 9 sliding in a tubular sleeve 10. On this sleeve, a plurality of gripper housings 11 are arranged so as to be movable and in a cylindrical part 12 provided with an insert 13, containing a piston 15 pressed by a spring 14 and a two-armed swingable arm 16. If the housing 11 is placed exactly over a hole 17 in the sleeve 10, arm 16 will, by a piston 15 arranged in the insert and acted upon by spring 14, be held with one arm 19 normally swung into the path of motion of the push rod. If to push rod 9, which at suitably adjustable points is provided with abutment piston 18, is imparted a motion passing by arm 19, that is, to the left in Fig. 3, the swingable arm 16 will be swung around its pivot 20, and its other arm 21 will, against the action of spring 14, impart to piston 15, a motion in a direction outwardly of the housing 11. The lower end of this piston is provided with a pin 22 which, practically

without any play, is moving in a groove in a lever attached to a gripper shaft 24, around which grippers are placed, preferably in springy position. By the action of the gripper shaft, the grippers can be made to rest against stop 25.

In this way all torsional flexure of the gripper shaft 24 is avoided.

Push rod 9 gets its motion from a cam 26 attached to a gear wheel 27 arranged on the impression cylinder shaft. To the press stand is attached a holder 28 provided with a pivot 29. Around this pivot an angular lever 30 can be swung, one lever 31 of which for regulating the motion of the angular arm in a clockwise direction, in Fig. 3, is so arranged that when the gripper is open it will rest against an adjustable stop 32. Push rod 9 is acted upon by a spring 33 which normally keeps the rod in its non-operative position. In the present example, the spring is shown resting against a guiding plunger 34 on the outer end of the push rod, the plunger in turn is in contact with a roller 35 attached to the other end of swingable arm 30. Swingable arm 30 is further provided with a roller 36, and the above-mentioned spring 33 should be so dimensioned that it is capable of pressing roller 36 against cam 26, not only during the period of ascent and the horizontal part of the cam, but also during the period of descent following same. By means of the adjustable stop 32 it is possible to adjust the position of roller 36 so that blows against the cam 26 will not occur.

The shape of cam 26, of which a type of design is shown flattened out in Fig. 6, where the direction of motion of gear wheel 27 is shown by an arrow, its height and length as well as the dimensions of the ascending and descending periods must be determined, among other things in consideration of the fact that opening of the grippers must be so quick that the grippers at point B, where the sheet is gripped, manage to open fully and to get out of the way, during continued motion, of the sheet in its new motion with the impression cylinder. At that moment, the grippers must be entirely clear of the front edge of the sheet. The swinging motion of the swingable gripper system is obtained from a lever 37 attached to a pivot 38 on sleeve 10, by means of a link system or other similar system, for instance, by a cam driven by the impression cylinder shaft.

I claim:

1. In control mechanism for swing grippers in printing presses having an impression cylinder shaft, a press frame, a tubular shaft mounted on said frame, said tubular shaft being provided with a plurality of radial openings spaced longitudinally of said shaft, a set of gripper housings adjustably and fixably mounted on said tubular shaft in longitudinally spaced relation, one adjacent each of said openings of said tubular shaft, said housings each being provided with gripper mechanism control mechanism, said control mechanism comprising double armed levers pivotally mounted in said housings, respectively, a push rod longitudinally slidably mounted in said tubular shaft, a spring urging said rod in one direction, cam means for operating said push rod from said impression cylinder shaft to perform periodic longitudinal reciprocatory movements in said tubular shaft, said rod having individual means supported by said housings, respectively, in cooperative relationship with one arm of each of said double armed levers, respectively, for operating one arm of each of said double-armed levers, and each of said gripper housings being provided with a movable part of a gripper operator actuated by the other arm of said two-armed gripper operating lever to perform periodic gripping and releasing movements.

2. A control mechanism for swing grippers for printing presses according to claim 1, and in which sets of grippers are provided at longitudinally spaced locations along said tubular shaft adjacent said housings, said grippers being supported by said tubular shaft.

3. A control mechanism for swing grippers for printing presses according to claim 1, and in which said double armed levers of said gripper control mechanism are disposed in inserts removably secured in said housings, said inserts being provided with pistons, springs bearing against one arm of each of said double armed levers, respectively, and each of the other arms of said levers is located in the path of movement of said push rod.

4. A control mechanism for swing grippers for printing presses according to claim 3 and in which a gripper mounting shaft is provided extending parallel with said tubular shaft and on which one part of each of said grippers are pivotally mounted adjacent said housings, respectively, said pistons protruding from said inserts and each being provided with a transversely extending pin, said one part of each of said grippers comprising two arms, one of which is provided with a slot in which said pins of said piston are accommodated and adapted to slide without play.

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