July 22, 1930. D. W. COY 1,770,973

SHEET COUNTING AND DELIVERING MECHANISM FOR PRESSES AND THE LIKE

Filed Sept. 15, 1928 4 Sheets-Sheet 1

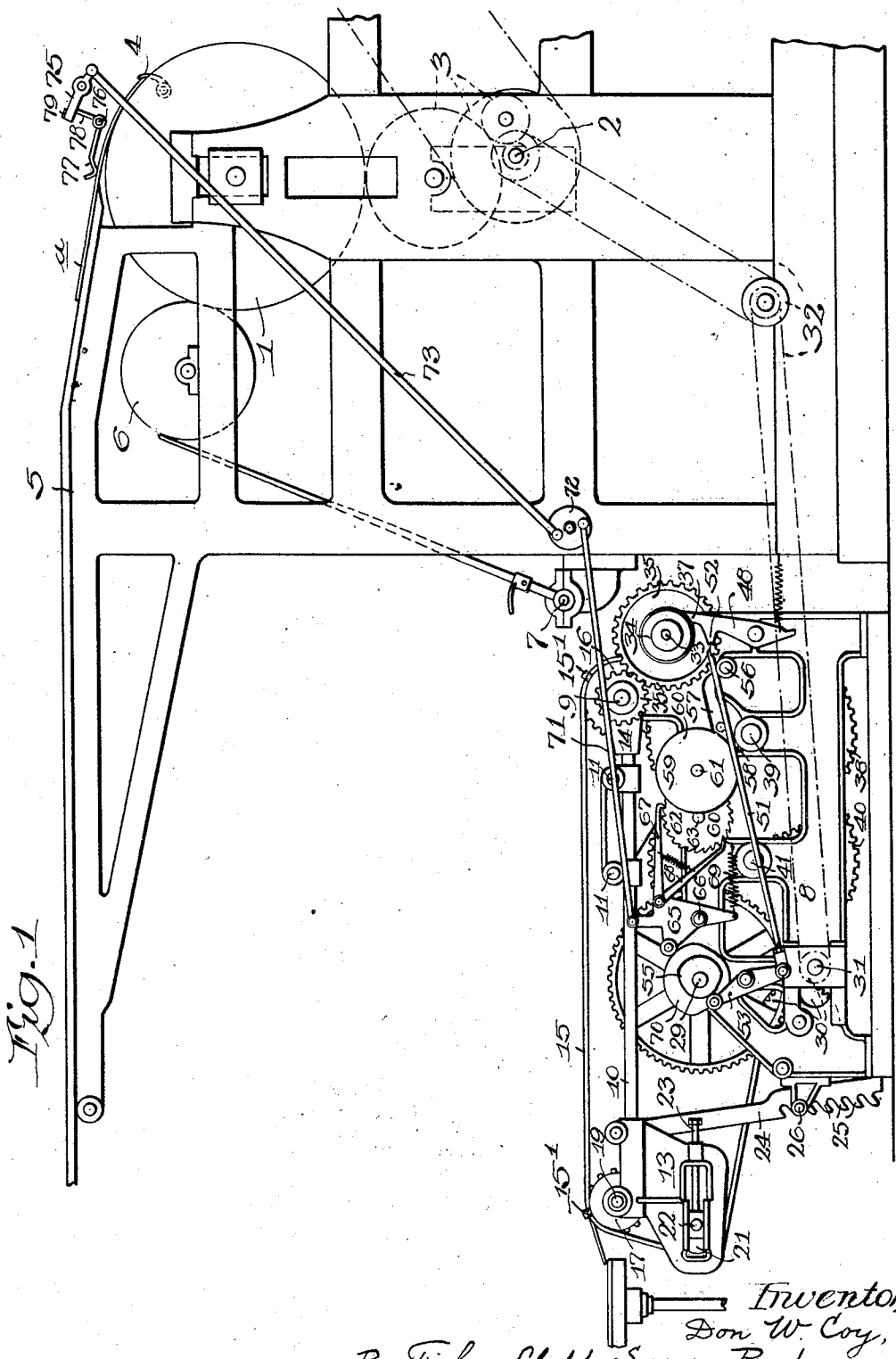


Fig. 1

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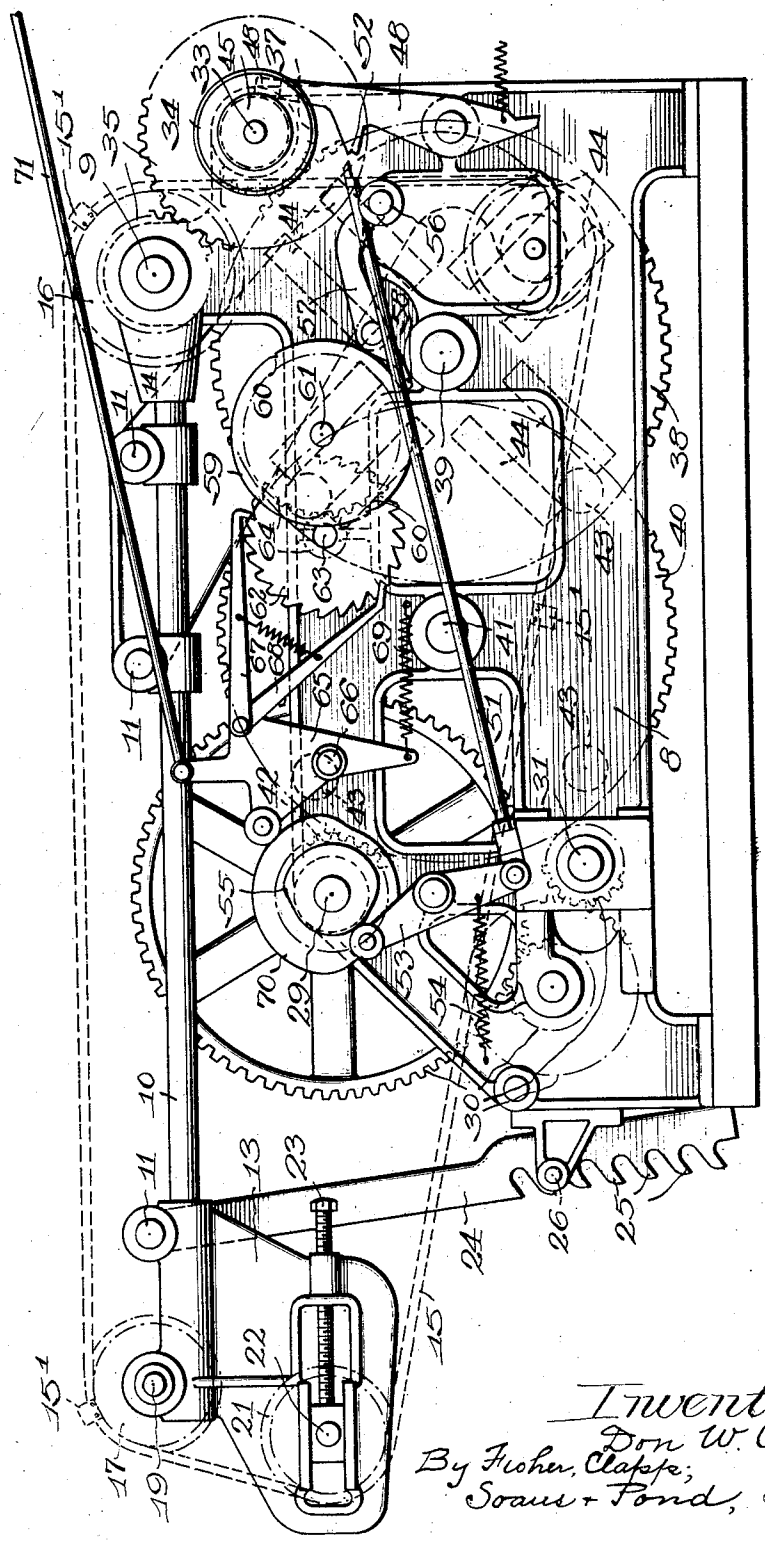


Fig. 2

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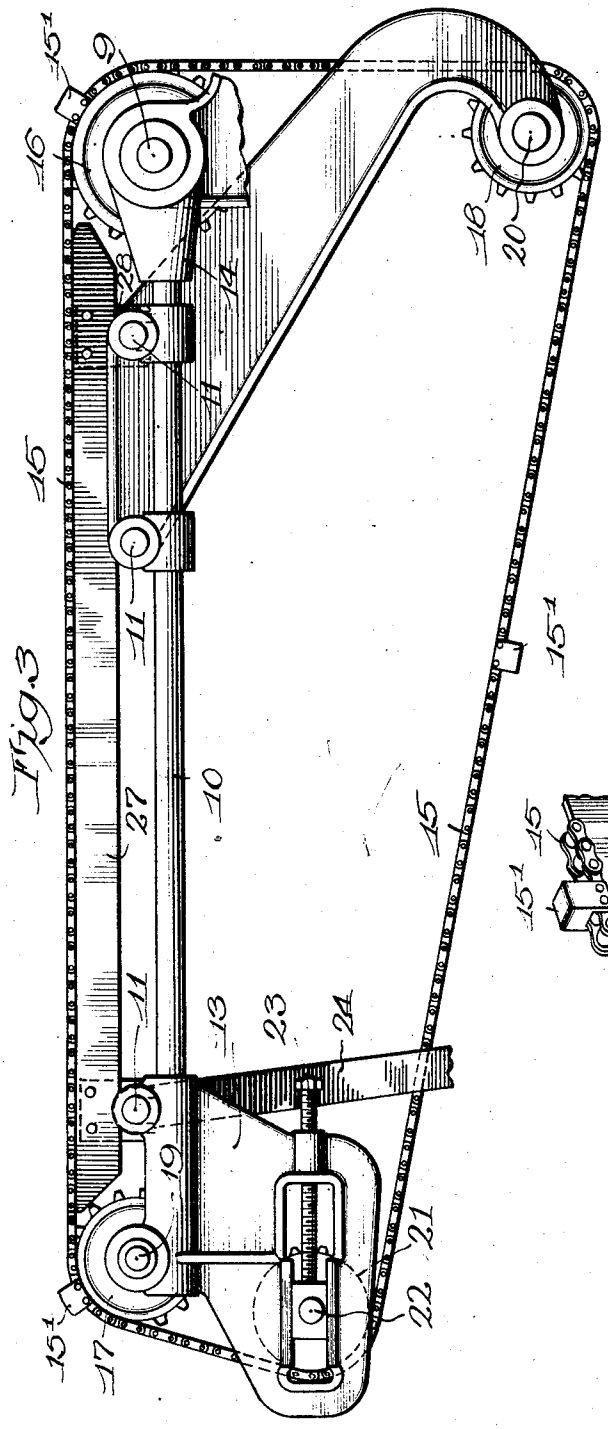


Fig. 3

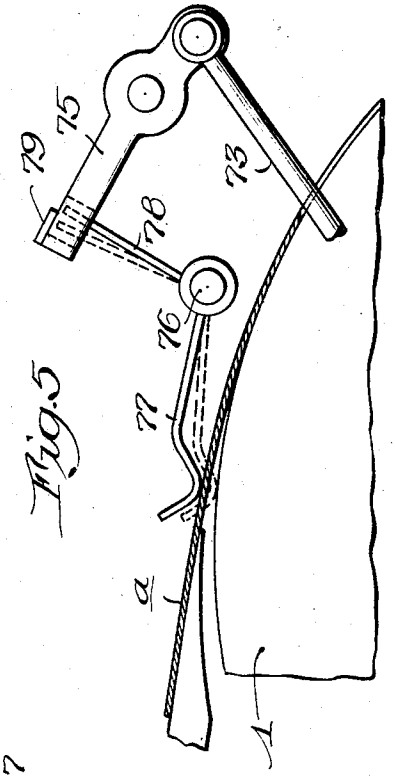


Fig. 5

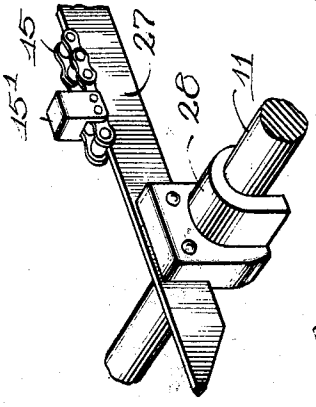


Fig. 4

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SHEET COUNTING AND DELIVERING MECHANISM FOR PRESSES AND THE LIKE

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Fig. 6

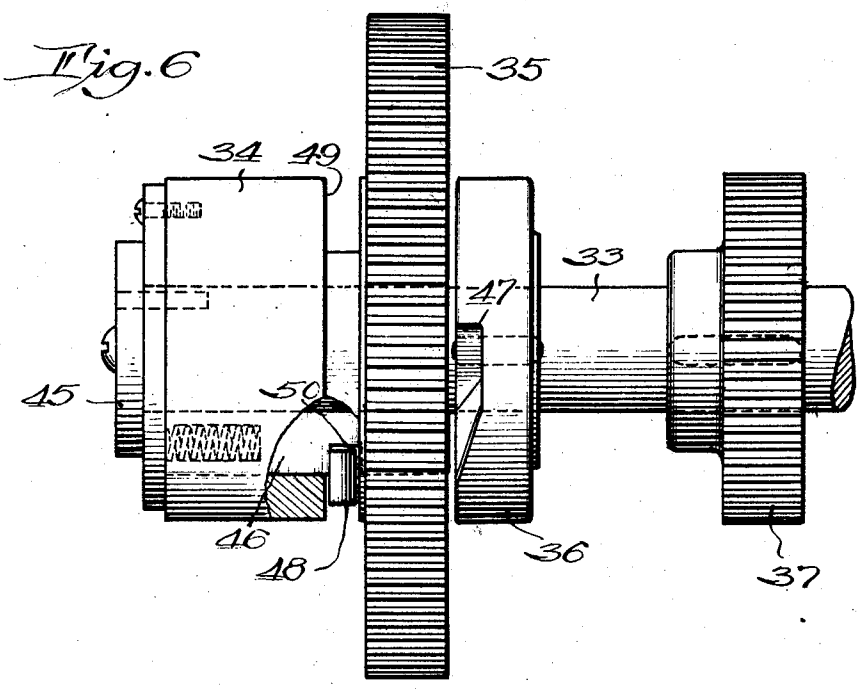
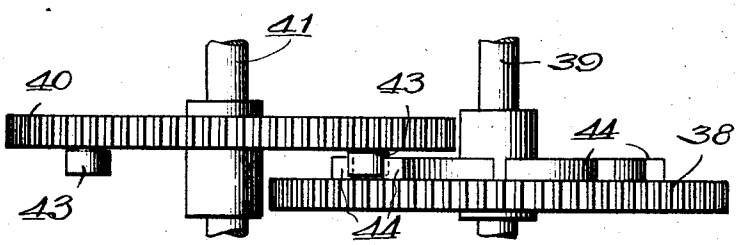


Fig. 7



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Patented July 22, 1930

1,770,973

UNITED STATES PATENT OFFICE

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SHEET COUNTING AND DELIVERING MECHANISM FOR PRESSES AND THE LIKE

Application filed September 15, 1928. Serial No. 306,160.

The present invention relates to a sheet counting and delivering mechanism for presses and more particularly for presses that are used for cutting, scoring and printing sheets of heavy paper or cardboard to form carton blanks. In presses of this type it is desirable to keep an accurate record of the output and also to deliver the output of the press in accurately counted piles. This invention seeks to provide means for counting the sheets as they are stacked or piled by the usual sheet delivery mechanism of the press and for delivering the sheets in accurately counted piles.

The invention comprises a conveyor above or upon which the sheets are piled by the press delivery mechanism, a sheet counter controlled by the passage of sheets through the press and means for intermittently actuating the conveyor controlled by the counter and operated in timed relation with the press for delivering the counted piles of sheets. These and other features and the details of the invention are hereinafter more fully set forth, are illustrated in preferred form in the accompanying drawings, and are particularly pointed out in the appended claims.

Fig. 1 is a side elevation of the improved sheet counter and delivery mechanism and also of a suitable press, the showing of the latter being diagrammatic;

Fig. 2 is an enlarged side elevation of the sheet counting and delivering mechanism;

Fig. 3 is a side elevation of the conveyor;

Fig. 4 is a detail view of a portion of the conveyor;

Fig. 5 is a detail view in side elevation of the counter controlling device;

Fig. 6 is an enlarged plan view of the clutch which forms a part of the conveyor actuating mechanism;

Fig. 7 is a detail plan view of the variable speed, slow start and stop gearing which forms part of the actuating mechanism for the conveyor.

The improved sheet counting and delivering mechanism may be used with presses of many different types. The press diagrammatically shown in Fig. 1 is of the well-known bed and cylinder type and has a main cylinder 1 which is driven from a main shaft 2 through a gear train 3 and is provided with the usual grippers 4 for engaging the sheets of paper stock that are delivered to it from a table or platform 5. The cylinder cooperates in the usual way with a reciprocating bed carrying the dies and type and a cylinder 6 cooperates with a fly 7 to deliver the finished sheets in a stack or pile.

Usually the finished sheets are piled by the press delivery mechanism on a table or platform. In accordance with the present invention they are placed upon a conveyor forming part of the improved sheet counting and delivering mechanism. This mechanism is carried upon a frame comprising suitably connected side members 8, on which the shafts and other parts of the mechanism are mounted. A horizontal shaft 9 at the upper forward end of the frame forms a pivotal support for one end of the conveyor frame. This frame, as most clearly shown in Fig. 3, comprises side bars 10 connected by cross-bars 11 and depending end brackets 12 and 13 connected respectively to the side bars. Members 14 fixed to the forward ends of the side bars 10 pivotally engage the shaft 9 or the bearings in which the shaft is journaled. Shaft 9 forms the drive shaft for a series of conveyor chains 15 which pass over drive sprockets 16 on this shaft and also over guide sprockets 17 and 18 carried by shafts 19 and 20 that are mounted respectively at the rear end of the conveyor frame and on the lower ends of the forward side brackets 12. The chains also pass over a series of tightening sprockets 21 carried by a cross-shaft 22, the bearings for which are adjustably mounted in guides in the lower portion of the side brackets 13 and can be

adjusted to properly tension the conveyor chains by screws 23.

The construction of the conveyor permits of its adjustment about the drive shaft 9 as a center so that the vertical position of its rear or delivery end can be positioned as desired. As shown, the delivery end of the conveyor is carried by supports 24, the lower ends of which are notched to provide lugs 25 which can be adjustably engaged with pins 26 fixed to the main frame.

A series of guides or supporting strips 27 are provided for the upper horizontal reaches of the conveyor chains 15 upon or above which the sheets are stacked or piled by the press delivery mechanism. These supporting strips are fixed at their ends to saddles 28 which are carried by the cross-bars 11 and the chains are provided at intervals with projections or abutments 15′ which are arranged to engage and advance the piles or stacks of sheets. If desired, the conveyor may be provided with filling strips or boards interposed between and filling the gaps between the conveyor chains. Such strips or boards may have their upper surfaces slightly above the conveyor chains with the abutments 15′ on the chains projecting upwardly through the spaces between the boards. With such an arrangement the piles of sheets will be stacked upon the boards and not directly on the conveyor chains.

The conveyor chains are provided with a plurality of sets of abutments 15′, three in the particular form shown, and the operating mechanism of the conveyor, which is intermittently operated, is arranged to arrest the conveyor chains with sets of abutments at the opposite ends of the upper reach of the conveyor. Also, at each operation the conveyor is advanced to such an extent as to move one set of abutments from its forward or receiving end to its rear or delivering end, and, preferably, each such operation of the conveyor is effected during a single working cycle of the press.

The main shaft 29 of the counting and delivering mechanism is journaled in the upper rear portion of the frame and is connected by a train of gears 30 to a drive shaft 31. The latter is connected by chain and sprocket gearing 32 to the drive shaft 2 of the press. This gearing is such that the working cycle of the sheet counting and delivering mechanism is the same as that of the press. That is to say, the main shaft 29 rotates at the same speed as the main drum 1 of the press. The conveyor is operated from the main shaft 29 by means of an interposed gear train which includes a clutch for starting and stopping the conveyor and also includes variable speed, slow start and stop gearing.

The start and stop clutch is mounted upon a shaft 33 at the upper forward portion of the frame and the driven clutch member 34, which is loosely mounted on this shaft, is connected to the main shaft 9 of the conveyor by a pair of intermeshing gears 35. The driven clutch member 36 (see Fig. 6) is keyed to the shaft 33 and a gear 37 also keyed to the shaft meshes with a large gear 38 carried on a cross-shaft 39. Gear 38 is driven by a large gear 40 mounted on a shaft 41 and which meshes with a gear 42 on the main shaft 29.

A series of four rolls 43 mounted on the side of the gear 40 adjacent its periphery and uniformly spaced are arranged to engage a corresponding series of guideways formed by pairs of projecting ribs 44 on the adjacent face of the gear 38. Gear 40 is continuously driven at uniform speed. As one of the rolls 43 enters one of the radial guideways in the gear 38 it will slowly start this gear and the clutch shaft 33; then it increases the speed of these parts as the roller moves toward the center of the gear 38, and then, as it moves away from the center it gradually reduces the speed of these parts and brings them to rest. As one of the rolls 43 on the gear 40 leaves one of the guideways on the gear 38 another roll enters the next guideway. In this way the clutch shaft 33 and the conveyor, when the clutch is closed, are driven at variable speed and with a slow start and stop. This properly effects a slow starting and stopping of a pile of sheets on the conveyor which is frequently quite heavy. Also, the variable speed operation of the conveyor affords ample time for the removal of a pile of sheets during a single working cycle of the press. Each operation of the conveyor is effected by a single revolution of the clutch shaft 33 and the gearing is such that this shaft rotates through one revolution during each working cycle of the press and during each revolution of the press drum and of the main shaft 29 of the sheet counting and delivering mechanism. That is to say, the variable speed, slow start and stop gearing 38 is rotated through one-quarter of a revolution and the clutch shaft and driving clutch member thereon are rotated through a complete revolution during each working cycle of the press. It is also noted that since one of the rolls of gear 40 leaves one of the guideways of the gear 38 another roll enters the next guideway, the dwell of the gear 38 and of the driving clutch member is very short and they are in motion substantially throughout the working cycle of the press. Hence, when the clutch is closed, substantially the entire period of a working cycle is utilized in effecting the operation of the conveyor and it is not necessary to operate it at excessive speeds in delivering a heavy pile of sheets.

The driven clutch member 34 which carries the gear 35 is, as stated, loosely mounted on the shaft 33, being held in position on the end of the shaft by a plate or collar 45. A clutch dog 46 is arranged to slide in a

guideway formed in the member 34. This dog is spring-pressed toward the driving clutch member 36 and is adapted to enter a recess therein and be engaged by a shoulder 47 to effect the rotation of the driven clutch member. Normally, however, the clutch dog is held in retracted position to disconnect the clutch members by a trip arm or lever 48 pivoted on the side of the main frame (see Fig. 2) and spring-held in position so that its upper end extends within a groove 49 in the clutch member 34 and into a notch 50 in the key 46. When the trip lever 48 is shifted against the tension of its spring the dog 46 is shifted by its spring to connect the clutch members. At the end of a single revolution of the driven clutch member, the beveled upper end of the trip arm will engage and retract the dog to open the clutch and arrest the operation of the driven clutch member and of the conveyor.

The arm 48 is moved to close the clutch by a shifter rod 51, the free end of which is arranged to engage a nose 52 formed on the trip arm. The shifter 51 is pivoted at its opposite end to the lower end of a lever 53. The latter is pivoted between its ends upon the frame and a spring 54 connected to the lever holds a roller on its upper end in engagement with an actuating cam 55 on the shaft 29.

While the shifter 51 is oscillated by the cam 55 once during each working cycle, its free end is normally held out of line with the nose 52 on the clutch trip arm 48 by a supporting pin or roller 56 on the end of an arm or lever 57. The latter is pivoted between its ends on the frame and a nose 58 on one of its arms is held by gravity in engagement with the periphery of a disc 59. Normally, these parts hold the free end of the shifter rod 51 out of line with the nose 52 on the clutch trip arm but, when the nose on the lever 57 drops into one of the notches 60 in the periphery of the disc 59, the free end of the shifter rod is lowered so that during its next operative movement it will engage and shift the trip arm 48 to close the conveyor clutch. It is noted that cam 55 effects the forward actuating movement of the clutch trip shifter 51 as one of the rolls of the gear 40 enters one of the guideways of the gear 38, so that, when the shifter rod is lowered, the clutch is engaged to effect the operation of the conveyor at the beginning of one of the slow start and stop, variable speed movements of the gear 38 and of the driven clutch member actuated by this gear.

The disc 59 is mounted on a shaft 61 and is operated by a sheet counting mechanism. This mechanism comprises a ratchet wheel 62 mounted on a shaft 63 and connected to the disc 59 by a pair of intermeshing gears 64, and an actuating arm or lever 65 pivoted at 66 on the main frame and having operating pawls 67 and 68 engaging the ratchet wheel 62. A spring 69 connected to the arm 65 holds a roller thereon in engagement with an actuating cam 70 on the main shaft 29. The parts are so arranged that the arm 65 is oscillated once during each working cycle to thereby advance the counting ratchet wheel step by step. The to and fro oscillation of the arm 65 through the pull and push pawls 67 and 68 effect two steps of the ratchet wheel 62 and the counting disk 59. Hence, a notch on the disk is brought both into and out of line with the nose of the lever 57 during a single working cycle of the press, and the clutch can be closed and the conveyor operated substantially throughout a complete working cycle without danger of again closing the clutch and operating the conveyor during the next succeeding cycle.

Means are provided for preventing the complete operation of a counting mechanism in case a sheet is not passed through the press during any working cycle. To this end, the actuating arm 65 is connected by a link 71 to a crank disc 72 on the press frame and the latter is connected by a link 73 to an oscillating arm 75. An oscillating shaft 76 of light weight is provided with fingers 77 and 78 which cooperate respectively with the sheets *a* as they are fed to the press and with an abutment 79 on the arm 75. As a sheet *a* is fed to the press it holds the fingers 77 and 78 in the full line position shown in Fig. 5 so that it in no way interferes with the operation of the sheet counter. But, unless there is a sheet fed to the press during a given working cycle, the fingers will occupy the position shown in dotted lines in Fig. 5. Then the finger 78 will act as a stop and the engagement therewith of the abutment 79 on the arm 75 will interfere with the spring-actuated movement of the counter actuator and thus prevent one complete operation of the counter. It is noted that the sheet controlled stop finger 78 prevents any operative movement of the counter actuator 65 during a single working cycle of the press in case no sheet is fed.

In operation the shaft 29 is continuously driven at the same speed as the press drum and the parts actuated thereby are operated once during each working cycle of the press except, of course, that the conveyor is held stationary unless the clutch trip 48 is operated. Also, as stated, if there is no sheet passed through the press during a given working cycle the operation of the counting mechanism is not completed. During operation, the sheets delivered from the press are accurately piled or stacked upon or above the conveyor and are accurately counted. When the counting mechanism advances the disc 59 to such an extent that the controller 57 engages one of the notches in the disc the shifter 51 will move the clutch trip 48 so that the conveyor mechanism will operate to deliver the

counted pile of sheets. This operation of the conveyor occurs, as stated, during the single working cycle of the press and it is operated at variable speed with a slow start and stop so that the pile of sheets is not disturbed.

The mechanism affords means for keeping track of the operation of the press and for delivering its product in accurately counted piles. Changes may be made in the details set forth without departure from the scope of the appended claims.

I clain as my invention:

1. The combination with a press having means for piling the sheets, of a conveyor, normally at rest, for delivering the piled sheets, intermittently acting drive mechanism for the conveyor geared to and having a working cycle corresponding to that of the press, said drive mechanism including start-stop means arranged to maintain the conveyor in operation substantially throughout such working cycle, a sheet counter, and means controlled thereby for initiating the operation of said start-stop means.

2. The combination with a press having means for piling the sheets, of a conveyor for delivering the piled sheets, intermittently acting drive mechanism for actuating the conveyor including variable speed, slow start and stop gearing, said drive mechanism being geared to the press to operate in timed relation therewith, a sheet counter, and means controlled thereby for initiating the operation of the conveyor at the beginning of a working cycle of said variable speed, slow start and stop gearing.

3. The combination with a press having means for piling the sheets, of a conveyor for delivering the piled sheets, intermittently acting drive mechanism for actuating the conveyor including variable speed, slow start and stop gearing and a start-stop clutch, said drive mechanism being geared to the press to effect the operation of said gearing and said clutch in timed relation therewith, a sheet counter, and means controlled thereby for closing said clutch to initiate the operation of the conveyor at the beginning of a working cycle for said variable speed, slow start and stop gearing.

4. The combination with a press having means for piling the sheets, of a conveyor for delivering the piled sheets, intermittently acting drive mechanism for actuating the conveyor including variable speed, slow start and stop gearing, and a start-stop clutch, a sheet counter, means controlled thereby for closing the clutch at the beginning of a working cycle of said gearing, a counter actuator, said counter actuator and said drive mechanism being geared to the press to operate in timed relation therewith, and means controlled by the passage of sheets through the press for controlling the operation of the counter actuator.

5. The combination with a press having means for piling the sheets, of conveyor chains, normally at rest, for delivering the piled sheets, a gear train for effecting the operation of said conveyor chains and for maintaining the same in operation substantially throughout a single working cycle of the press, and including variable speed, slow start and stop gears, a sheet counter, and means controlled thereby for initiating the operation of said conveyor chains at the beginning of a working cycle of said variable speed, slow start and stop gears.

6. In combination with a press having means for piling the sheets, of conveyor chains, normally at rest, for delivering the piled sheets, actuating means, including a start-stop clutch, for intermittently operating said conveyor, a trip for said clutch, a sheet counter, actuators for said counter and said clutch trip, gearing for operating the clutch and trip actuators and the conveyor actuating means in working cycles corresponding to those of the press and means controlled by the sheet counter for preventing or permitting the operation of the trip actuator.

7. In combination with a press having means for piling the sheets, of conveyor chains, normally at rest, for delivering the piled sheets, actuating means, including a start-stop clutch, for intermittently operating said conveyor, a trip for said clutch, a sheet counter, actuators for said counter and said clutch trip, gearing for operating the clutch and trip actuators and the conveyor-actuating means in timed relation with the press, means controlled by the passage of sheets through the press for controlling the operation of the counter actuator and means controlled by the counter for preventing or permitting the operation of the trip actuator.

8. In combination with a press having means for piling the sheets, a conveyor, normally at rest, for receiving the piled sheets, means for vertically adjusting the delivery end of the conveyor, drive mechanism geared to the press and to the receiving end of the conveyor for intermittently operating the latter, and a sheet counter for controlling the operation of said drive mechanism.

9. In combination with a press having means for piling the sheets, of a conveyor for receiving the sheets and delivering the same therefrom, drive mechanism for the conveyor geared to and having a working cycle corresponding to that of the press and including a start-stop clutch, means operated by said drive mechanism for closing the clutch, a sheet-controlled counter and means controlled thereby for preventing or permitting the operation of said clutch-closing means.

10. In combination with a press having means for piling the sheets, of a conveyor for receiving the sheets and delivering the same

therefrom, drive mechanism for the conveyor geared to and having a working cycle corresponding to that of the press and including variable speed, slow start and stop gearing and a start-stop clutch, means operated by said drive mechanism for closing the clutch at the beginning of a working cycle of said gearing, a sheet-controlled counter operated by said drive mechanism, and means controlled by said counter for permitting or preventing the operation of said clutch-closing means.

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