July 6, 1965 H. L. COESENS 3,192,812

PUNCH PRESS WITH DUAL FEEDING DRIVE MEANS

Filed Feb. 6, 1964

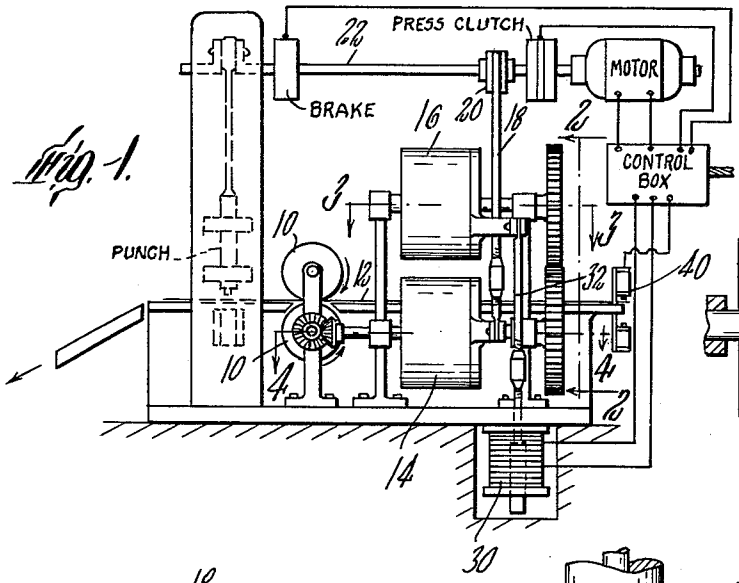


Fig. 1.

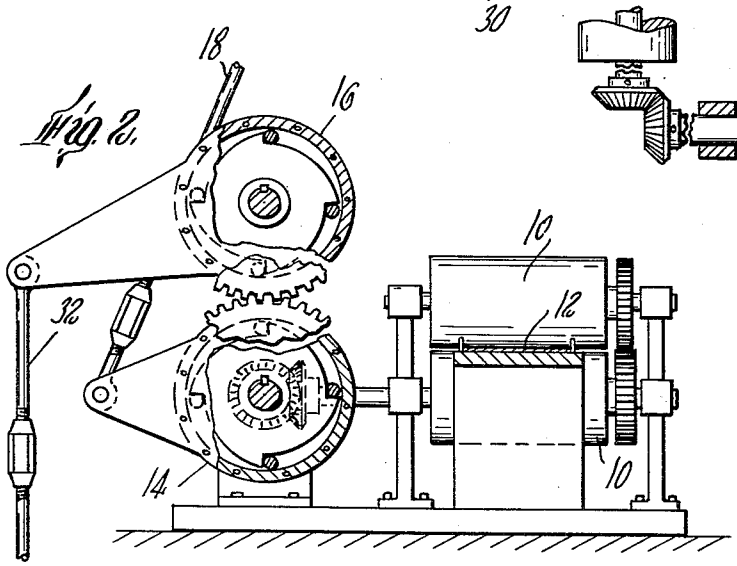


Fig. 2.

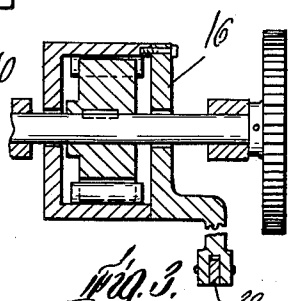


Fig. 3.

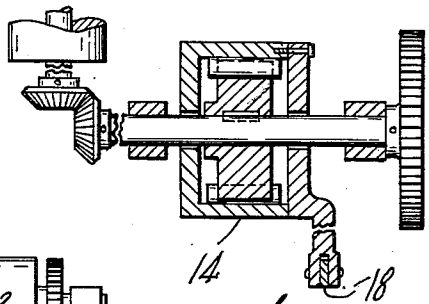


Fig. 4.

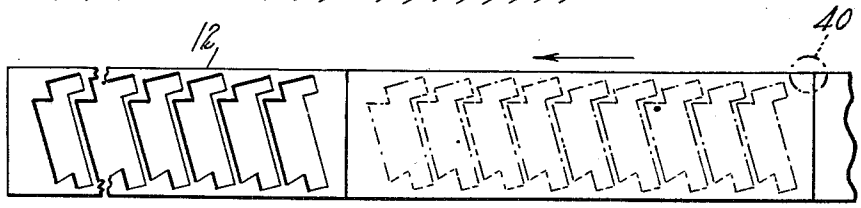


Fig. 5.

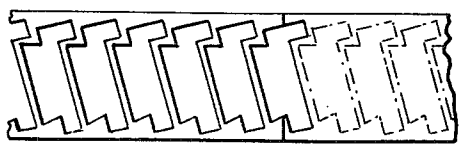


Fig. 6.

United States Patent Office 3,192,812 Patented July 6, 1965

3,192,812

PUNCH PRESS WITH DUAL FEEDING DRIVE MEANS

Henry L. Coesens, Newmarket, N.H., assignor to The Macallen Company, Inc., Newmarket, N.H., a corporation of New Hampshire

Filed Feb. 6, 1964, Ser. No. 342,982
7 Claims. (Cl. 83—209)

This invention relates to a device for use on and in connection with a mechanical press (punch, forming, printing, or the like) equipped with feed rolls for normally advancing step-by-step strips of workpiece material, usually of given uniform lengths, under a vertical reciprocating tool (die or the like) in precise predetermined increments as required by the size and shape of the desired workpieces. The device (herein, for convenience, described as a punch press) automatically advances each strip a predetermined distance beyond its normally indexed position when the tool or die might otherwise cut into the terminal end of the strip resulting in an imperfectly or incomplete unit or punched piece which it is an object of the invention to eliminate.

On high speed punch presses for punching, say, mica segments, the procedure has been for the operator to feed uniform lengths of workpiece material, one strip after another, into feed rolls and thence under the punch. As the trailing edge of each strip leaves the feed rolls, it is then pushed under the punch by the leading end edge of the following strip being fed by the feed rolls. As the strips are automatically indexed and moved forward at predetermined increments when the two abutted ends of the strips are adjacent the punch, they are usually or frequently punched the same as any other part of the strip without regard to their size. Not only does this result in waste material at both strip ends but also results in defective pieces that have to be removed from among good pieces, and it is difficult to keep pace with the machine. For small pieces, it is not economical for the operator to stop the press, separate the feed rolls, and advance the strip manually past thhe abutted strip joints so as to separate imperfect pieces.

The present device eliminates the forming of incomplete units by not pressing or punching while an inadequate length of the rear end of a strip (or an inadequate length of leading end of the immediately following strip) is under the tool, thus the object of this device (and which it attains) is to both reduce stamped material waste and increase the output of the machine, and of the operator, at reduced effort, with consequent savings. With proper set-up adjustment, the optimum number of complete work units is obtained from each strip of material, and by so eliminating incomplete or defective units the operator is able to operate at high production rates and still have time properly to inspect and pack the finished complete unit workpieces. Presses of this type may run at speeds as high as 500 strokes per minute or more and, without the use of this device, the operator needs more assistance in packing, even at speeds below these now possible.

Referring to the drawings, partly diagrammatic, which show a preferred type of structure that may be employed in the practice of the invention,

FIG. 1 is a side elevation of the complete device;

FIG. 2 is an end elevation, partly in cross-section with respect to over-running feeding clutches, of a portion of the device of FIG. 1 taken looking with the arrows 2—2;

FIG. 3 is a horizontal cross-sectional view, taken on line 3—3 of FIG. 1, illustrating the auxiliary feeding clutch;

FIG. 4 is a plan view, partly in cross-section, taken on line 4—4 of FIG. 1, illustrating the primary feeding clutch;

FIG. 5 illustrates the punching of abutting adjacent strips of workpiece material being punched in accordance with this invention, and

FIG. 6 illustrates portions of adjacent strips as typical of a prior art undesirable practice of punching showing that the segment punched across the butt joint of two adjacent strips comes out in two separate incomplete pieces which have to be sorted, rejected, and thrown away.

Referring to the drawing, in the preferred device of this invention as illustrated by the drawings, feed rolls **10**, **10**, geared together as shown, are at all times in contact with intermittently fed workpiece strip material **12**. The feed rolls are driven by two gear-coupled over-running work-feeding clutches, primary feeding clutch **14** and auxiliary feeding clutch **16**, the former being driven through reciprocating pushrod **18** through a eccentric **20** from the main crankshaft **22** of the press, as shown. Such press is equipped with conventional brake, press driving clutch, motor, and control for electric motor-driven drive thereof. There also is electrical control for the solenoid **30** with its pushrod **32** for actuating the auxiliary clutch **16**, as hereinafter described. For fast operation, it is preferable that a pneumatic or magnetic clutch be employed.

In the operation of the device, the primary work-feeding clutch **14** drives the feed rolls for normal operation, step by step, so that each required section of the workpiece material is under the punch and static as it contacts and presses, cuts or forms, as required, on its down-stroke. As the trailing end of the strip being punched approaches the punching position, a sensing device, such as an electric eye **40**, preferably located at the rear end of the following strip, controls the press clutch and brake assembly of the press, causing the punch and the pushrod **18** driving the clutch **14** to stop as a workpiece strip is about to be exhausted and as the final possible complete unit is punched from the strip. At this point of time, the main crankshaft of the punch press is stopped and, while the punch press and primary feeding clutch **14** are in fixed position and without changing their position, the electric control sends a signal to an actuator including the solenoid **30** connected to and driving the auxiliary over-running feeding clutch **16** through the pushrod **32**. As the solenoid is energized, it turns the auxiliary feeding clutch **16** through a predetermined arc which, in turn, driving through the normally driven internal control member of said primary clutch, rotates the feed rolls and, already in contact with the following strip and by reason of its abutting contact with the rear end edge of the spent strip, advances it past the die as well as moves the forward end of the following strip into its first possible complete unit punching position, all while the punch is stopped. By means of a timing cycle through the electrical control the actuator is de-energized and the main drive clutch and brake assembly actuated so that the press then resumes its normal punching and work feeding by clutch **14** as before.

It is contemplated that a counter may be employed in lieu of an electric eye and that non-uniform length pieces may be used by additional and/or differently placed electrice eye or counter devices as will be appreciated by those skilled in the control art. Accordingly, no description of such controls is necessary any more than it is herein necessary to supply wiring or black-box details for the controls above referred to.

Having described my invention, what I claim is:

1. In a punch press or the like, including a main driving clutch and brake, adapted to operate on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed successively to the press strips of said workpiece material,

a primary feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the press,

an auxiliary feeding drive for said feed rolls operative when said primary feeding drive is temporarily inoperative and mounted and driven separately to feed the forward end of a strip of said workpiece material,

control means connected to the main driving clutch to stop and brake the press and also stop the primary feeding drive while the trailing end of a preceding strip is in a final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into an initial complete unit punching position.

2. In a punch press or the like, including a main driving clutch and brake, adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed successively strips of said workpiece material,

a primary feeding over-running clutch drive for said feed rolls connected to and normally mechanically driven step-by-step from the press,

an auxiliary feeding over-running clutch drive for said feed rolls operative when said primary feeding drive is temporarily inoperative and mounted and driven separately to feed the forward end of a strip of said workpiece material,

control means connected to the main driving clutch to stop and brake the press and also stop the primary feeding drive while the trailing end of a preceding strip is in a final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into an initial complete unit punching position.

3. In a punch press or the like, including a main driving clutch and brake adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed successively strips of said workpiece material,

a primary over-running clutch feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the press,

an auxiliary feeding over-running clutch drive for said feed rolls driving through the normally driven member of said primary clutch operative when said primary feeding drive is temporarily inoperative and mounted and driven separately to feed the forward end of a strip of said workpiece material,

control means connected to stop the press and with it stop the primary feeding drive while the trailing end of a preceding strip is in a final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into an initial complete unit punching position.

4. In a punch press or the like, including a main driving pneumatic clutch and brake, adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed end-abutted strips of said workpiece material,

a primary over-running clutch feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the punch press,

an auxiliary over-running clutch feeding drive for said feed rolls operative when said primary feeding drive is temporarily inoperative and mounted and separately driven to feed the forward end of a strip of said workpiece material into an initial complete unit punching position and by abutting contact with the trailing end of an immediately preceding strip and move the latter a given distance,

control means responsive to the position of the end of one of said strips connected to stop the main feeding drive and operative when the trailing end of said preceding strip reaches its final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into a complete unit punching position.

5. In a punch press or the like, including a main driving pneumatic clutch and brake, adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed end-abutted strips of said workpiece material,

a primary over-running clutch feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the punch press,

an auxiliary over-running clutch feeding drive for said feed rolls operative when said primary feeding drive is temporarily inoperative and mounted and separately driven to feed the forward end of a strip of said workpiece material into an initial complete unit punching position and by abutting contact with the trailing end of an immediately preceding strip and move the latter a given distance,

control means responsive to the position of the end of one of said strips including an electric eye connected to stop the main feeding drive responsive while the trailing end of said preceding strip is in its final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into a complete unit punching position and to discharge the preceding spent strip.

6. In a punch press or the like, including a main driving pneumatic clutch and brake adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed end-abutted strips of said workpiece material,

a primary over-running clutch feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the punch press,

an auxiliary over-running clutch feeding drive for said feed rolls operative through the driven member of the primary clutch drive when said primary feeding over-running clutch drive is temporarily inoperative and mounted and separately driven to feed the forward end of a strip of said workpiece material into an initial complete unit punching position and by abutting contact with the trailing end of an immediately preceding strip and move the latter a given distance,

control means including an electric eye mounted to stop the punch press and the main feeding drive while the trailing end of said preceding strip is in its final complete unit punching position, and to then cause the auxiliary feeding drive to move said forward end of the following strip into a complete unit punching position while it discharges the preceding spent strip.

7. In a punch press or the like, including a main driving magnetic clutch and brake, adapted to operate successively on intermittently moved strips of workpiece material,

a pair of feed rolls rotatably mounted to grip therebetween and feed end-abutted strips of said workpiece material,

a primary feeding drive for said feed rolls connected to and normally mechanically driven step-by-step from the punch press,

an auxiliary feeding drive for said feed rolls operative when said primary feeding drive is temporarily inoperative and mounted and separately driven to feed the forward end of a strip of said workpiece material

into an initial complete unit punching position and by abutting contact with the trailing end of an immediately preceding strip and move the latter a given distance,

control means including an electric eye connected to stop the punch press and the main feeding drive responsive while the trailing end of said preceding

strip is in its final complete unit punching position, and then to cause the auxiliary feeding drive to move said forward end of the following strip into a complete unit punching position.

No references cited.

WILLIAM W. DYER, JR., *Primary Examiner.*