

Dec. 24, 1929.

R. W. STROUT

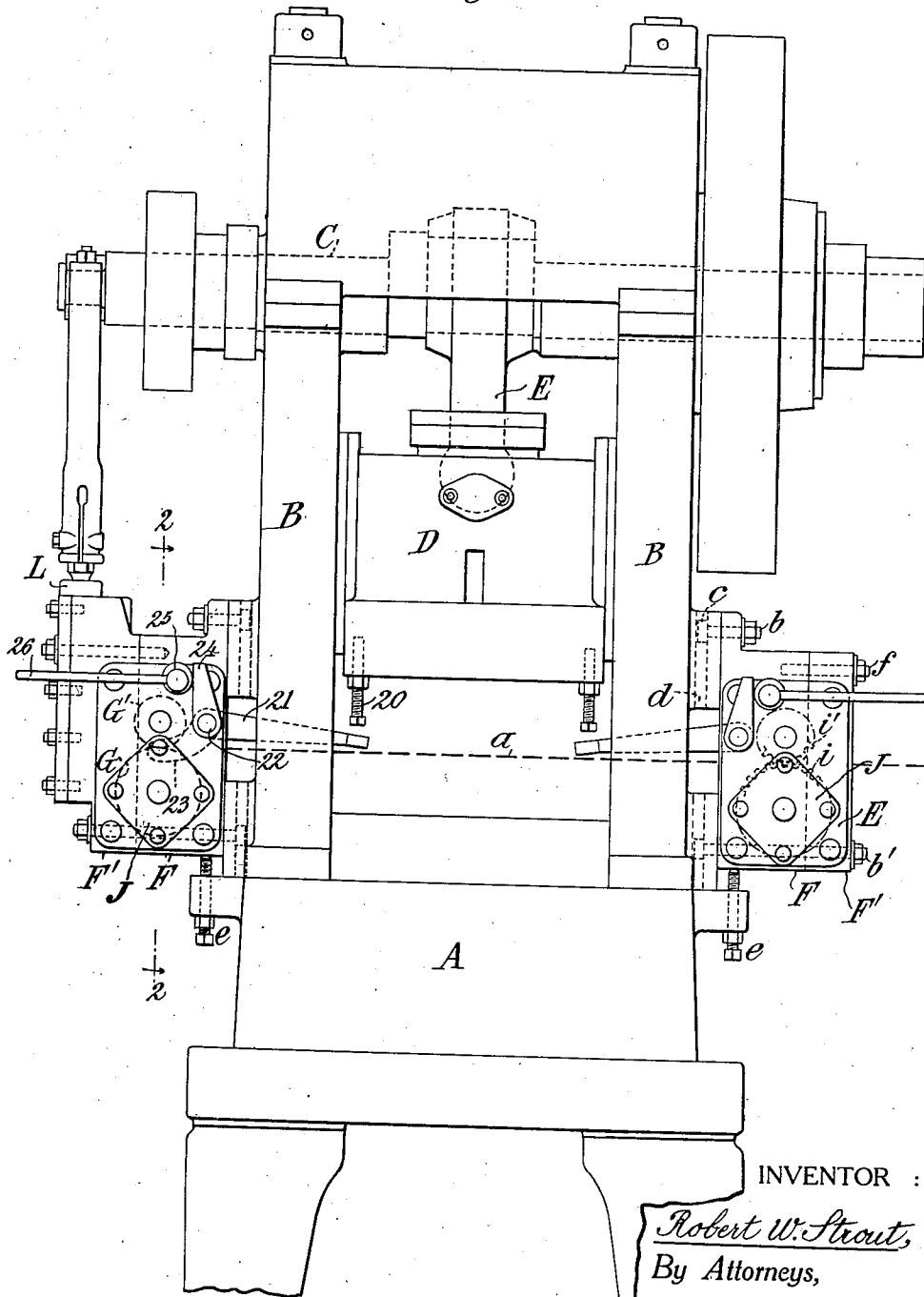
1,740,844

HIGH SPEED FEED FOR SHEET METAL

Filed May 19, 1928

3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

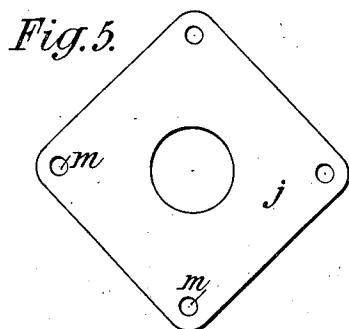
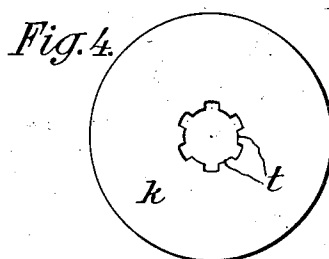


Fig. 3.

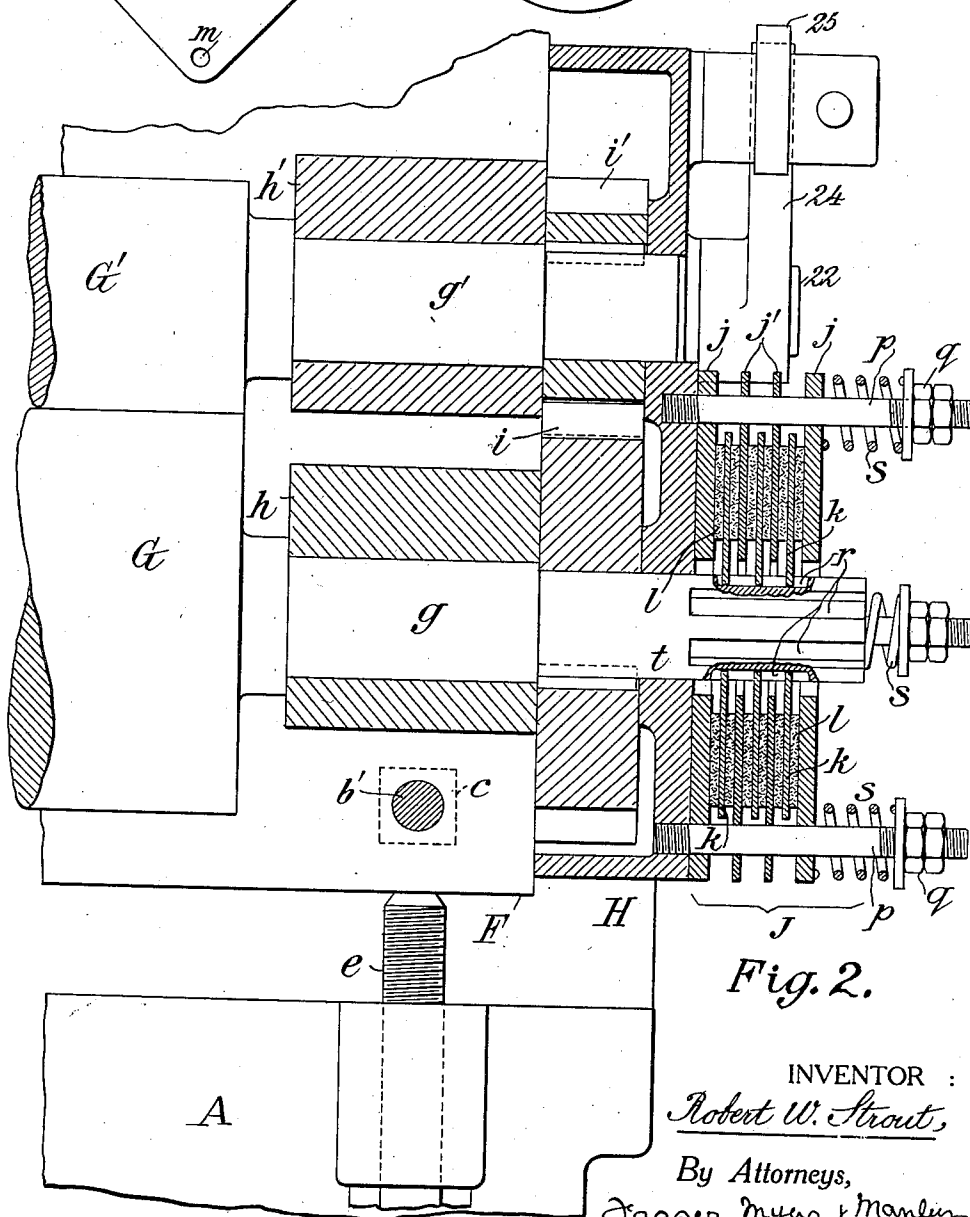


Fig. 2.

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3 Sheets-Sheet 3

Fig. 6.

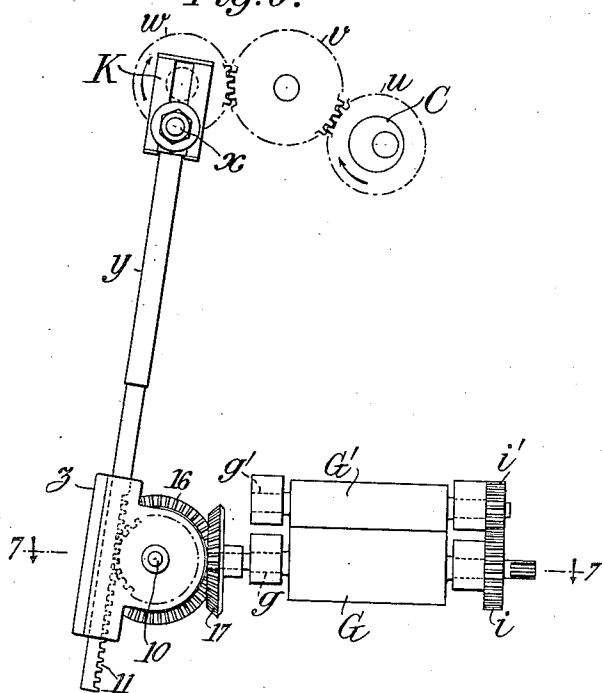


Fig. 8.

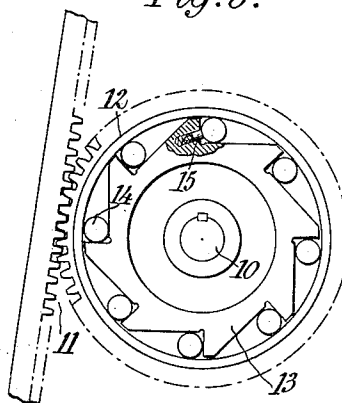
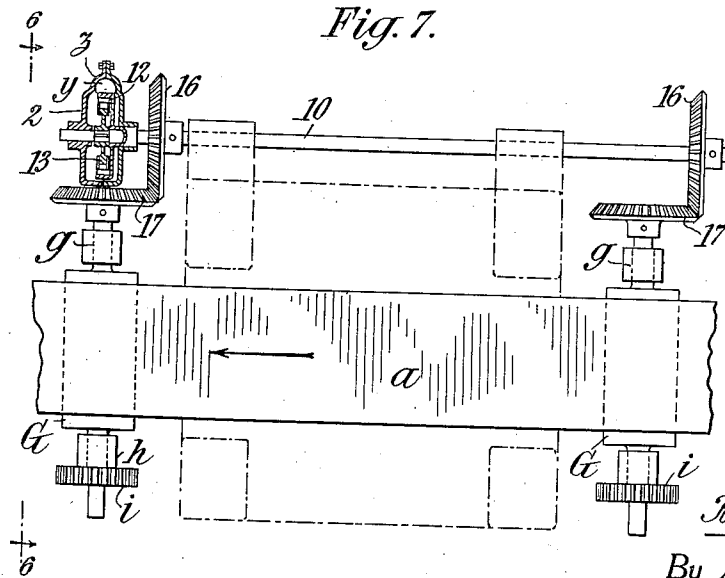


Fig. 7.



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UNITED STATES PATENT OFFICE

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HIGH-SPEED FEED FOR SHEET METAL

Application filed May 19, 1928. Serial No. 279,061.

This invention relates to feeding apparatus for feeding strips or sheets of metal through punching presses or other machinery acting intermittently upon the fed sheets or strips. It relates to roller feeds or those in which the strip is gripped between feed rollers which are rotated step by step to intermittently feed the sheet in the intervals between the punching or other strokes of the press or other machine. For high speed intermittent feeding it is necessary to overcome the effect of momentum which tends to carry the feed rolls too far; and for this purpose it is common to apply some form of brake, usually a band or strap brake, upon a hub on one or each of the feed roll shafts. The present invention provides an improved construction of disk brake especially applicable for such purposes.

Figure 1 of the accompanying drawings shows in front elevation a portion of a punching press to which the feed mechanism of the present invention is applied.

Fig. 2 is a vertical section on the line 2—2 in Fig. 1 and on a much larger scale.

Fig. 3 is a section on the plane of the line 3—3 of one of the roll shafts.

Fig. 4 is a view in the same plane of one of the revolving disks of the disk brake.

Fig. 5 is a similar view of one of the stationary disks thereof.

Fig. 6 is a diagrammatic view, showing the means for imparting intermittent rotation to the feed rolls, the parts shown being viewed from the left in Fig. 1.

Fig. 7 is a plan of the lower part of the mechanism shown in Fig. 6 partly in section in the plane of the line 7—7 in Fig. 6.

Fig. 8 is a sectional view of the ratchet mechanism on a larger scale than Figs. 6 and 7.

Referring to Fig. 1, the press is shown as having a base A and side frames B B carrying a main shaft C which has an eccentric (or crank) for reciprocating the punch-carrying slide D which is driven from the shaft through a connecting rod E in any usual manner. The press shown may be taken as typical of a punching press or other ma-

chine to which the present invention may be applied.

On the side frames of the press or any other convenient locations are attached frames F F, carrying or supporting the feed mechanism. These feed mechanisms on opposite sides of the press are essentially duplicates, and a description of one will suffice for both.

The frame F is provided with bearings for the shafts of feed rolls G G' which rolls are shown in dotted lines at the left in Fig. 1, and in fragmentary side elevation in Fig. 2. The journals g g' of these roll shafts are carried in bearings h h' conveniently constructed as bearing blocks suitably held in recesses in the frame F in any customary manner and pressed together in any suitable way for giving the feed rollers the necessary grip upon the sheet or strip of metal being fed. The rollers are geared together to turn in unison by means of intermeshing gears i i', shown in dotted lines at the right in Fig. 1 and in section in Fig. 2, which gears are keyed to the shafts in the usual way. To the frame F is bolted a frame H which is hollow and serves as a housing for the gears i i' and also serves as a base support for the friction brake which as a whole is lettered J.

The friction brake is constructed in general after the customary construction of friction brakes in that it has alternating stationary and revolving disks. The stationary disks comprise end disks j j, between which all the other disks are confined, and intervening disks j'; the disks j j' are alike except that the outer disks are thicker; Fig. 5 shows the contour of these disks. The rotary disks shown in Fig. 6 are lettered k k and are alternated between the stationary disks. Between the successive stationary and rotary disks are facings l l of any suitable frictional material, such as asbestos fabric commonly applied as brake linings. These facings may be fastened to the rotary disks or to the stationary disks or to both, as desired, and by any suitable attaching means, such as cement.

The stationary disks j j' are conveniently made square and have adjacent their corners holes m m (Fig. 5) which have a free or sliding fit with pins or bolts p p which are

screwed fixedly into the plate H and serve for holding the stationary disks in their non-rotative position. For pressing the disks yielding together springs *s s* are provided which are conveniently made as helical springs applied on the respective bolts *p* and tightened adjustably thereon by means of nuts *q q*.

The rotary disks *k k* have an essentially splined engagement with the shaft of one of the feed rollers; this is best accomplished by forming the end portion of the shaft with grooves *r*, shown in Figs. 2 and 3, and making the disks *k* with a central opening having inward projections *t* which make a loose or free fit with the grooves *r*, thus forming a multiple key-way or splined connection whereby the torque is uniformly distributed. The rotary disks are preferably circular, and turn within the stationary pins *p p*.

The entire feed mechanism carried by the frame F is adjustable up or down with respect to the framing of the press or other machine in order to bring the fed strip of metal (denoted by the dotted line *a* in Fig. 1) to any desired level with respect to the dies of the press. For this purpose the frame F is provided with attaching bolts *b b'* having heads *c* which engage within undercut slots *d* formed in the sides of the frames B B in well understood manner; so that the frame can be set to any desired height and then fastened in such position by tightening the nuts on the bolts *b b'*. To facilitate the vertical adjustment of these frames the base A is provided with adjusting screws *e e* passing through lugs cast on the base and engaging the under side of the respective frames F. The frame F is conveniently constructed with an outer section or cap F' (Fig. 1) by removing which the bearing blocks *h h'* are rendered accessible and the feed rolls may be taken out, these caps are held by any convenient fastening, such as bolts *b'* at the bottom and tap screws or bolts *f* at the top. At the left in Fig. 1 the frame F' is modified to serve also as the slideway for a slide L, which in the press shown carries a shear blade for chopping up the scrap left after the punchings have been cut from it.

The intermittent feed movements are imparted to the feed rollers G G' in any suitable way, as for example by any known ratchet mechanism. The mechanism for this purpose adopted in the particular machine illustrated is best shown in Figs. 6, 7 and 8. The shaft K is driven in unison with the main shaft C, as for example by intermeshing gears of like pitch *u v w*, and the shaft K carries an adjustable-throw crank *x* which drives a rack bar *y* having sliding movement in a rocker guide *z* oscillating freely on a shaft 10. The rack bar *y* has a rack of gear teeth 11 meshing with external gear teeth on a drum 12 which oscillates freely around the

shaft 10. Thus the reciprocation imparted to the rack bar by the crank *x* oscillates the drum 12 in forward and backward directions. On each forward stroke the drum 12 carries with it a disk 13 which is keyed to the shaft 10; the ratchet connection between 12 and 13 is such that on each rearward or return oscillation of the drum it frees itself and leaves the disk 13 stationary. This ratchet connection is preferably a friction ratchet of the well-known type, as shown in Fig. 8, the disk 13 being notched and carrying rollers 14 in the notches, which rollers are pressed out by spring plungers 15 to force them into wedging frictional engagement between the tangential faces of the notches and the inner face of the drum, so that on the forward stroke of the drum they lock and on the rearward stroke they are released and roll back idly against the radial faces of the notches. The shaft 10, which is thus driven intermittently, drives the shafts *g g* of the rollers G G through miter gears 16—17, as best shown in Fig. 7.

The described feed mechanism operates by the simultaneous rotation of the two pairs of feed rollers so as to feed the sheet or strip of metal equally and in the same direction at opposite sides of the machine. The feeding movements are preferably performed on the return movement of the punch slide, the downward movement while the punch is entering the metal being utilized for the return oscillation of the ratchet drum 12. The entire feed mechanism adapts itself readily to presses running at extremely high speed, the feed rollers being stopped at the end of each advance movement imparted to them by the ratchet by the efficient action of the disk brakes. These brakes are capable of precise adjustment to give just the necessary retarding effect without imposing any unnecessary drag upon the machine. This adjustment, being once accomplished by adjusting the stress of the springs *s s* by means of the adjusting nuts *q q*, remains constant notwithstanding the slight wear which in course of time occurs upon the surfaces of the respective stationary and rotary disks of the brake and their intervening facing fabrics. In its application to such presses the disk brake thus provided has a great advantage over the band brakes heretofore generally used which are subject to such wear that they soon get out of adjustment, and which are irregular in their action, being liable to be adjusted too tightly and quickly wearing or polishing their braking surfaces so that the retarding effect of the brake rapidly diminishes. The improved brake is applied upon the front of the press, as shown in Fig. 1, and is readily accessible for adjustment, or for disconnection when after long service its disks or facing fabrics require inspection or renewal.

In connection with this frictional ratchet type of feed motion the improved disk brake already described has the advantage of imparting to the rolls G G, shaft 10 and ratchet disk 13 such resistance to backward motion as to insure the positive unlocking of the ratchet rollers at the beginning of the backward rotation of the drum 12. Fig. 1 shows an accessory of a roller feed of the character described which has no necessary relation to the present invention. The punch slide D has tappet screws 20 which on the down stroke of the slide strike tappet levers 21 projecting from rock shafts 22, each of which carries a lifting arm 23, shown in dotted lines, and a stop arm 24. The lifting arms take under the boxes of the upper feed rolls G' and lift these to separate the rolls and free the scrap shortly before the punch (or punches) enters the metal so as to enable the sheet metal to be brought to register by the use of pins engaging the previous punching or other gauge openings in the strip of metal whereby to gauge the location of the punches more accurately than can be accomplished by an intermittent feed alone. The extent of separation of the rolls is determined by the abutment of the stop arm 24 against an eccentric 25 which is adjustable to positions of varying throw by a rocker arm 26. This mechanism (20 to 26) may be omitted in case the use of accurate gauging pins is not required.

The construction illustrated is the preferable one, but may be varied within the skill of mechanics or designers according to the desired location for the feed mechanism and other local requirements.

What I claim is:

1. A high speed feed mechanism for a punching press or similar machine, comprising feed rolls, means for intermittently rotating them, and a disk brake applied upon the shaft of a feed roll, such brake comprising alternating stationary and rotatable disks and adjustable yielding means for pressing them together, the rotatable disks having a non-rotative connection with the shaft of said roll.

2. A feed mechanism according to claim 1, having a frame carrying the bearings for the roll shafts and a face plate fastened thereto for carrying the friction brake, and a stationary mounting fastened thereto for the stationary disks of the brake.

3. A feed mechanism according to claim 1, the stationary disks of the brake having recesses, fixed studs engaging said recesses, a base plate for the brake to which said studs are attached, and adjusting springs and nuts applied to said studs.

4. A feed mechanism according to claim 1, the rotative disks of the brake having a multiple splined engagement with the roll shaft, and the stationary disks of the brake engaged

by non-rotative means exterior to the rotative disks.

5. A feed mechanism according to claim 1, having a frame carrying the bearings for the roll shafts, a base plate fastened to said frame and forming a housing for the feed roll gears and the stationary disks of the brake having non-rotative connections and mounted fixedly on said base plate.

6. A feed mechanism according to claim 1, with an adjustable frame carrying such feed mechanism mounted on the frame of such machine, and movable bodily to vary the position of the feed rolls.

In witness whereof, I have hereunto signed my name.

ROBERT W. STROUT.