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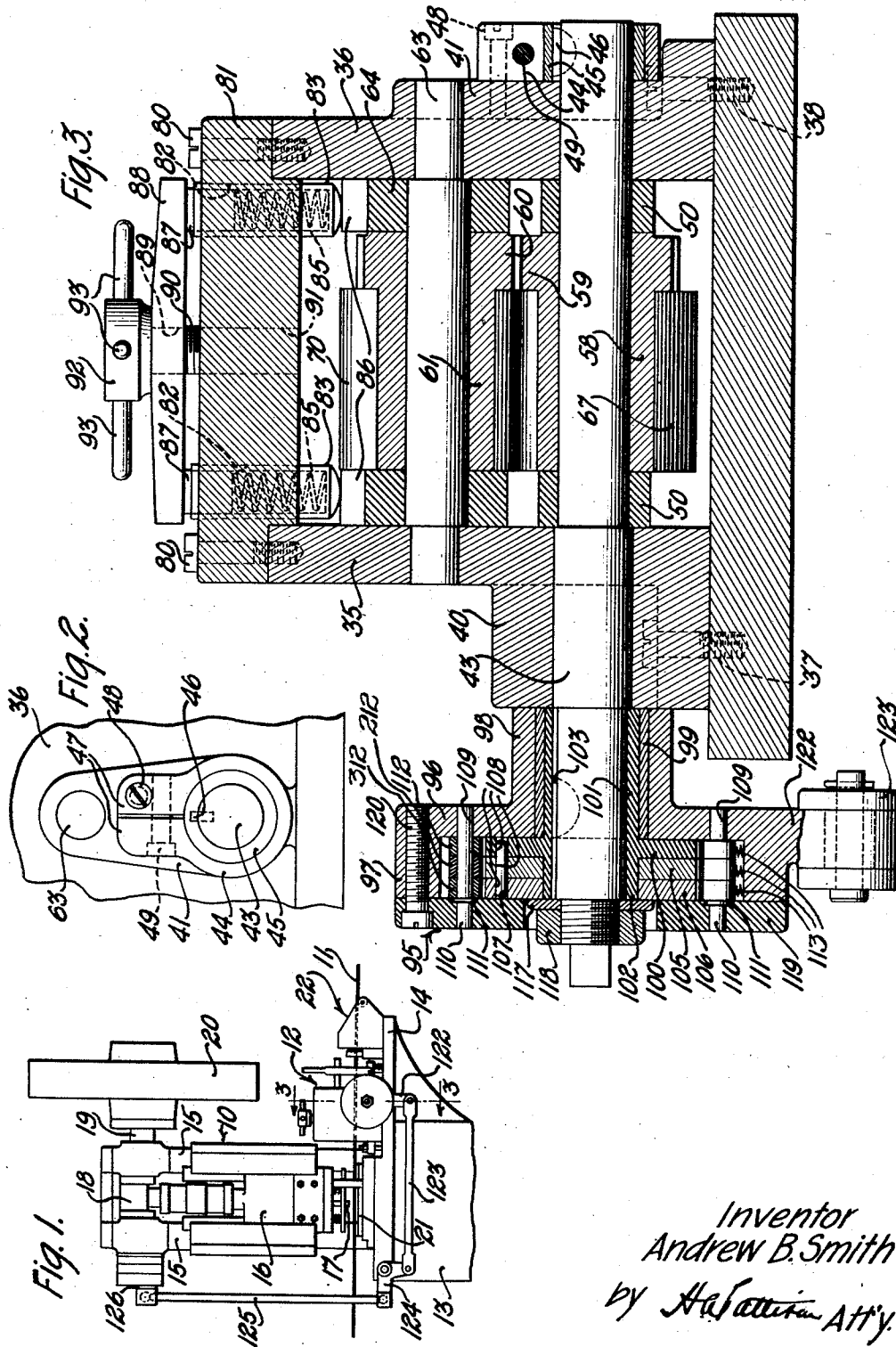
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MATERIAL FEEDING DEVICE

Filed Nov. 30, 1926

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2 Sheets-Sheet 2

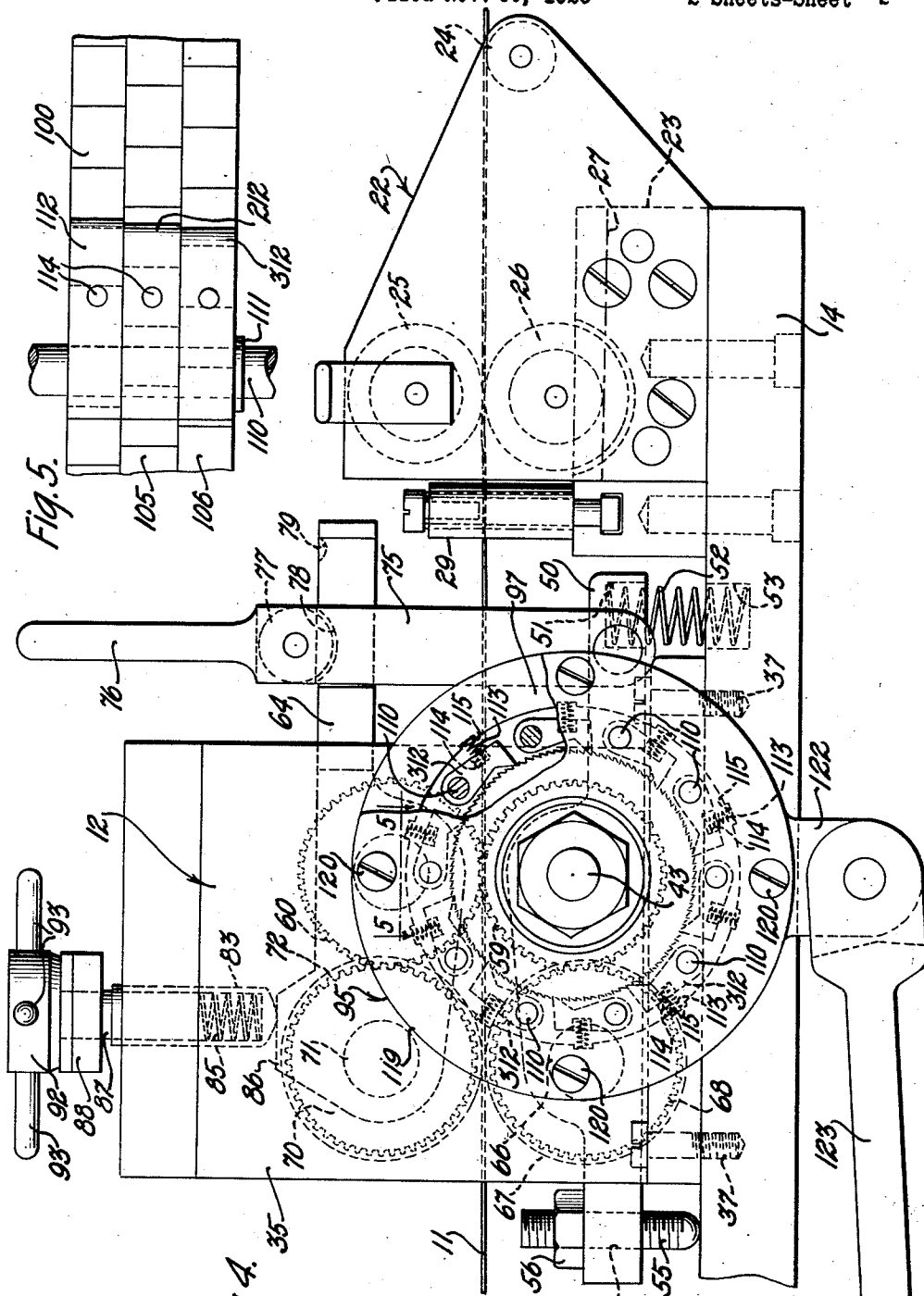


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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MATERIAL-FEEDING DEVICE.

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This invention relates generally to material feeding devices and particularly to devices for feeding continuous strips of material into material working apparatus.

5 The object of the invention is to provide an apparatus for intermittently feeding material with great precision and rapidity.

In accordance with the general features of the invention, in one embodiment thereof, adjustable spring pressed feed rolls are provided which press against and act upon opposing surfaces of a strip of material. The rolls are intermittently rotated through a series of gears which are driven from a shaft upon 10 which are mounted a plurality of staggered ratchet wheels. Coacting with the ratchet wheels are a plurality of spaced and staggered pawls carried by a disk which is oscillated in timed relation to the operation of the apparatus which performs work upon the material fed therein by the feeding device. When the disk is oscillated the pawls engage the teeth of the ratchet wheels and rotate them, thereby rotating the shaft upon which 25 the ratchet wheels are mounted to drive the feed rolls through the gears associated therewith.

Other objects and features of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings illustrating one embodiment of the invention, and in which 30

Fig. 1 is a fragmentary front elevational view of a material working apparatus with a material feeding device embodying the invention associated therewith; 35

Fig. 2 is an enlarged fragmentary side elevational view of a material feeding device embodying the invention;

40 Fig. 3 is an enlarged transverse sectional view of the material feeding device taken on line 3—3 of Fig. 1;

Fig. 4 is an enlarged side elevational view thereof looking at the side opposite that shown in Fig. 2, and 45

Fig. 5 is a fragmentary sectional view thereof taken on line 5—5 of Fig. 4.

Referring now in detail to the drawings, in which like numerals indicate the same parts throughout the several views, the numeral 10 (Fig. 1) denotes generally a material working apparatus of any suitable type designed to perform punching or forming operations upon a strip of material 11 fed there- 50

through by means of the improved material feeding device 12 which is the subject of this invention. It suffices to say that the material working apparatus 10 comprises a frame 13 on which are mounted a bed 14 and uprights 15—15, which uprights guide and support a reciprocating ram 16 upon the lower end of which is secured a tool 17 of any suitable type. The ram 16 is actuated through a crank 18 formed on a shaft 19 which is driven in any suitable manner, a fly wheel 20 secured thereon insuring regularity of operation. Mounted upon the bed 14 is a die block 21 across which the material 11 is fed by the improved material feeding device 12 and which cooperates with the tool 17 to perform work upon 70 the material 11.

Also mounted upon the bed 14 by means of bolts is a lubricating device 22 (Figs. 1 and 4) for applying a lubricant to the material 11 which in turn carries the lubricant to the working surfaces of the tool 17 and the die block 21. The lubricating device comprises a container 23 adjacent which are mounted a supporting roll 24 and adjustable lubricating rolls 25 and 26, the roll 26 being partially immersed in a lubricating liquid 27 contained in the bottom of the container 23. Secured adjacent the material lubricating device 22 are a plurality of vertical guide rolls 29—29 of any suitable type which may be adjusted to come into close proximity to the edges of the strip of material 11 to prevent lateral movement thereof after the material passes through the rolls 25 and 26. 85

A pair of uprights 35 and 36 (Fig. 3) are rigidly secured upon the bed 14 by means of bolts 37—37 and 38—38 and are provided with enlarged bearing portions 40 and 41 in which is mounted a shaft 43. Surrounding one end of the shaft 43 is a split braking collar 44 (Figs. 2 and 3) in which is mounted a bushing 45 which is secured to the shaft 43 by means of a key 46. The braking collar 44 is provided with arms 47—47 protruding from the collar portion proper, one of which arms is secured to the bearing portion 41 of the upright 36 by a bolt 48, and the two arms may be forced together by means of a bolt 49 to cause the collar 44 to grip the bushing 45, thereby exerting a braking action on the shaft 43. 95

Situated between the uprights 35 and 36 and surrounding the shaft 43 is a yoke 50 100

(Fig. 4) which is provided at one end with a socket 51 in which is inserted one end of a coil spring 52, the other end of which spring is inserted in a corresponding socket 53 in the bed 14. The opposite end of the yoke 50 is provided with a threaded opening 54 for receiving a bolt 55 locked in position by means of a nut 56, which bolt acts as a stop to limit the rotation of the yoke 50 by the spring 52.

The shaft 43 is inserted through a sleeve 58 (Fig. 3) which is located between the arms of the yoke 50, the sleeve 58 having a gear 59 formed on one end thereof, which gear meshes with a similar gear 60 formed upon a sleeve 61, similar to the aforementioned sleeve 58, which surrounds a shaft 63 mounted in the uprights 35 and 36. The shaft 63 is inserted through a yoke 64 and the sleeve 61 is mounted upon the shaft between the arms of the yoke 64. Also secured within the yoke 50 is a shaft 66 (Fig. 4) upon which is mounted a feed roll 67 and which is provided at one end with a gear 68 which meshes with the gear 59 formed on the sleeve 58. A similar feed roll 70 is mounted adjacent the feed roll 67 upon a shaft 71 which is mounted in the yoke 64 and the feed roll 70 is provided at one end with a gear 72 which meshes with the gear 60 formed upon the sleeve 61.

Pivotally mounted near one end of the yoke 50 is a roll releasing lever 75 provided at its upper end with a handle 76 and to which is secured a roller 77 which extends into a depression 78 in the yoke 64 and which may be rocked from the position shown in Fig. 3 to coact with a shallower depression 79 in the yoke 64 to raise the opposite end of the yoke 64 to separate the feed rolls 67 and 70. Secured to the uprights 35 and 36 by means of bolts 80—80 is a cover plate 81 which is provided with openings 82—82 in which are inserted cartridge-like pressure members 83—83 containing coil springs 85—85. The members 83—83 are pressed against raised portions 86—86 on the yoke 64 by the coil springs 85—85 which are forced against the bottoms of the pressure members 83—83 by plungers 87—87 carried by a cross bar 88 provided with a central aperture 89 through which protrudes a bolt 90 which engages a threaded opening 91 in the cover plate 81 and which is provided at its upper end with a head 92 from which spokes 93—93 for rotating the bolt protrude. The purpose of the above described arrangement is to force the feed roll 70 toward the roll 67 so as to insure engagement of the material 11 by the feed rolls.

Loosely secured upon the end of the shaft 43 opposite the end upon which the bushing 44 is mounted, is a propelling device designated generally by the numeral 95, which comprises a cup-shaped housing plate 96 (Fig. 3) having a circumferential flange 97 thereon, and which is provided with a central hollow hub 98 positioned over the end of the

shaft 43 and within which a bushing 99 is inserted. A ratchet wheel 100 provided with an odd number of teeth and having an inner hub 101 and a shorter outer hub 102 formed thereon is secured to the shaft 43 by means of a key 103 with the inner hub 101 extending within the bushing 99 in the position shown in Fig. 3. Additional ratchet wheels 105 and 106 which have the same diameter and the same number of teeth as the ratchet wheel 100 are slipped over the outer hub 102 and these wheels are so positioned with respect to each other that the ratchet teeth formed on the adjacent wheels are progressively staggered one-third of a tooth. The wheels are held in this relative position by means of pins 107—107 extending through openings 108—108 as shown in Fig. 3.

The housing plate 96 is provided with a circular series of apertures 109—109 in which are inserted a plurality of pins 110—110 having shoulders 111—111 formed thereon and upon each of which pins are pivotally mounted three pawls 112, 212 and 312, each of which is pressed inwardly by means of a spring 113 positioned in sockets 114 and 115 formed in the pawls and the flange 97, respectively. It will be seen that by the above described arrangement, three circular series of pawls are provided, each series of which coacts with one of the ratchet wheels 100, 105 and 106. The pawls 112, 212 and 312 are made in three different lengths and are staggered with respect to each other, as shown in Fig. 5, in a direction opposite that in which the teeth upon the ratchet wheels are staggered. A washer 117 is inserted over and a nut 118 is placed upon the threaded end of the shaft 43 to secure the propelling means thereon while a plate 119 is secured against the flange 97 by means of bolts 120—120 to retain the pins 110—110 and the pawls 112—112 in the desired relation with respect to the plate 96.

A lug 122 is formed upon the lower side of the plate 96 to which is pivotally secured one end of a connecting rod 123, the other end of which is secured to one arm of a bell crank lever 124 (Fig. 1) which is rotatably mounted upon the bed 14 of the material working apparatus 10. Connected to the other arm of the bell crank lever 124 by means of a ball and socket joint is a connecting rod 125 which is connected at its opposite end by means of a ball and socket joint to an adjustable crank 126 carried by the end of the shaft 19 of the material working apparatus 10.

It is believed that the operation of the device will be clear from the following detailed description. The container 23 is filled to the desired level with a lubricating liquid, such as oil, and the roll releasing lever 75 is rotated to the right, as seen in Fig. 4, until the roll 77 carried thereby engages the depression 79 in the yoke 64. This operation causes the yoke 64 to rotate about the shaft 63 against

the force of the springs 85—85, thereby raising the feed roll 70 out of engagement with the feed roll 67. A strip of stock material 11 is then inserted over the roll 24, between the lubricating rolls 25 and 26, between the feed rolls 67 and 70 and onto the die block 21. The bolt 55 is turned to raise or lower the end of the yoke 50 which carries the feed roll 67 until the top of the roll 67 is level with the top of the die block 21 and the roll releasing lever 75 is then returned to the position shown in Fig. 3. The springs 85—85 acting through the members 83—83 will press the latter against the yoke 64 tending to cause the yoke to rotate to the left as seen in Fig. 4, and thereby causing the feed roll 70 to press tightly against the strip of material 11 inserted between the feed rolls 67 and 70.

The mechanism driving the shaft 19 is then put into operation when the ram 16 will be caused to reciprocate to force the tool 17 against the material 11 to perform work thereon. On the upward stroke of the crank 126, the connecting rod 125 will be raised to rotate the bell crank lever 124, thereby reciprocating the connecting rod 123 which in turn causes the propelling device 95 to oscillate about the axis of the shaft 43 in a clockwise direction as viewed in Fig. 4. When the propelling device 95 begins to oscillate, one of the pawls 112, 212 and 312 will engage a tooth upon one of the ratchet wheels 100, 105 and 106 to cause rotation of the latter, which rotation is transmitted through the key 103 to the shaft 43, which in turn transmits the motion through the gears 59, 60, 68 and 72 to the feed rolls 67 and 70, which upon rotation advance the strip of material 11 a predetermined distance across the face of the die block 21. Upon the down stroke of the crank 126, the reverse motion of the propelling means 95 takes place, when the pawls 112—112 carried thereby will slide over the teeth on the ratchet wheels, the braking sleeve 44 acting on the bushing 45 to prevent the shaft 43 from rotating in a reverse direction.

Due to the fact that there are an odd number of teeth upon each of the ratchet wheels 100, 105 and 106, that the ratchet wheels are uniformly staggered with respect to each other, that there are a number of groups of pawls circularly arranged around the axis of the ratchet wheels and that the pawls are of unequal length, there is one pawl closely adjacent one ratchet tooth at all times and little or no lost motion results between the pawls and the ratchet wheels when the propelling device is actuated in its advancing direction. By the elimination of lost motion between the propelling device and the shaft driving the feed rolls, substantially equal portions of the strip of material are fed into the material working apparatus upon successive actuations of the material feeding device and, in consequence, great accuracy may

be obtained in work produced in the material working apparatus.

It is, of course, to be understood that the above adaptation of this embodiment of the invention to use with a punching or forming press is illustrative only and that the improved material feeding device may be used in conjunction with material working devices of various types.

What is claimed is:

1. In a material feeding apparatus, a plurality of feed rolls, a shaft, means for operatively connecting the rolls to the shaft, a plurality of ratchet wheels rigidly mounted in staggered relation upon the shaft, a plurality of ratchet-engaging means adjacent the ratchet wheels, and means for intermittently actuating the ratchet-engaging means for imparting rotary movement to the ratchet wheel and thereby advancing the feed rolls.

2. In a material feeding apparatus, a plurality of feed rolls, a shaft associated therewith, a plurality of ratchet wheels rigidly mounted in staggered relation upon the shaft, a plurality of spaced and staggered ratchet-engaging means adjacent the ratchet wheels, and means for intermittently actuating the ratchet-engaging means for imparting rotary movement to the ratchet wheel and thereby advancing the feed rolls.

3. In a material feeding apparatus, a plurality of adjustable feed rolls, a shaft, a plurality of constant-pitch gears connecting the feed rolls to the shaft, a plurality of ratchet wheels rigidly mounted adjacent one another in staggered relation upon the shaft, and intermittently operable propelling means adjacent the ratchet wheels including a plurality of groups of spring pressed pawls of different lengths, the groups spaced circumferentially about the axis of the shaft.

4. In a material feeding apparatus, means for engaging material to be fed, a shaft operatively connected thereto, a plurality of ratchet wheels rigidly mounted upon the shaft, and intermittently operable propelling means including a plurality of series of spaced pawls, the pawls in one series staggered with respect to the pawls in other series.

5. In a material feeding apparatus, means for engaging material to be fed, a shaft operatively connected thereto, a plurality of ratchet wheels rigidly mounted upon the shaft, each ratchet wheel staggered with respect to adjacent wheels a distance proportionate to the number of ratchet wheels, and propelling means including a plurality of pawls for engaging the ratchet wheels.

6. In a material feeding apparatus, means for engaging material to be fed, a shaft operatively connected thereto, a plurality of ratchet wheels mounted upon the shaft in staggered relation, and a propelling means including a plurality of series of spaced

pawls, the pawls of one series staggered with respect to and of different length than the pawls in adjacent series.

7. In a material feeding apparatus, means
5 for engaging material to be fed, a shaft operatively connected thereto, a plurality of similar ratchet wheels rigidly mounted upon the shaft, each ratchet wheel staggered with respect to adjacent wheels a distance proportionate to the number of wheels, and inter-
10 mittently operable propelling means adjacent the ratchet wheels including a plurality of series of circularly spaced pawls, one series for each ratchet wheel, the pawls in one
15 series being staggered with respect to and of different length than the pawls in adjacent series.

8. In a material feeding apparatus, a plurality of feed rolls, means for independently
20 adjusting said rolls with respect to each other, additional means for shifting one of

said rolls, means for imparting rotary movement to said rolls including a plurality of ratchet wheels, a ratchet-engaging means for each of the wheels, and means for inter-
25 mittently actuating said ratchet-engaging means for causing the advancement of the ratchet wheels.

9. In a material feeding apparatus, a plurality of feed rolls, means for imparting rotary movement to said rolls including a plurality of ratchet wheels provided with an odd number of teeth and staggered with respect to each other, a plurality of pawls associated with said wheels, and means for inter-
30 mittently actuating said pawls for causing the advancement of the ratchet wheels.
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In witness whereof, I hereunto subscribe my name this 20th day of November A. D., 1926.

ANDREW BENJAMIN SMITH.