Nov. 9, 1954

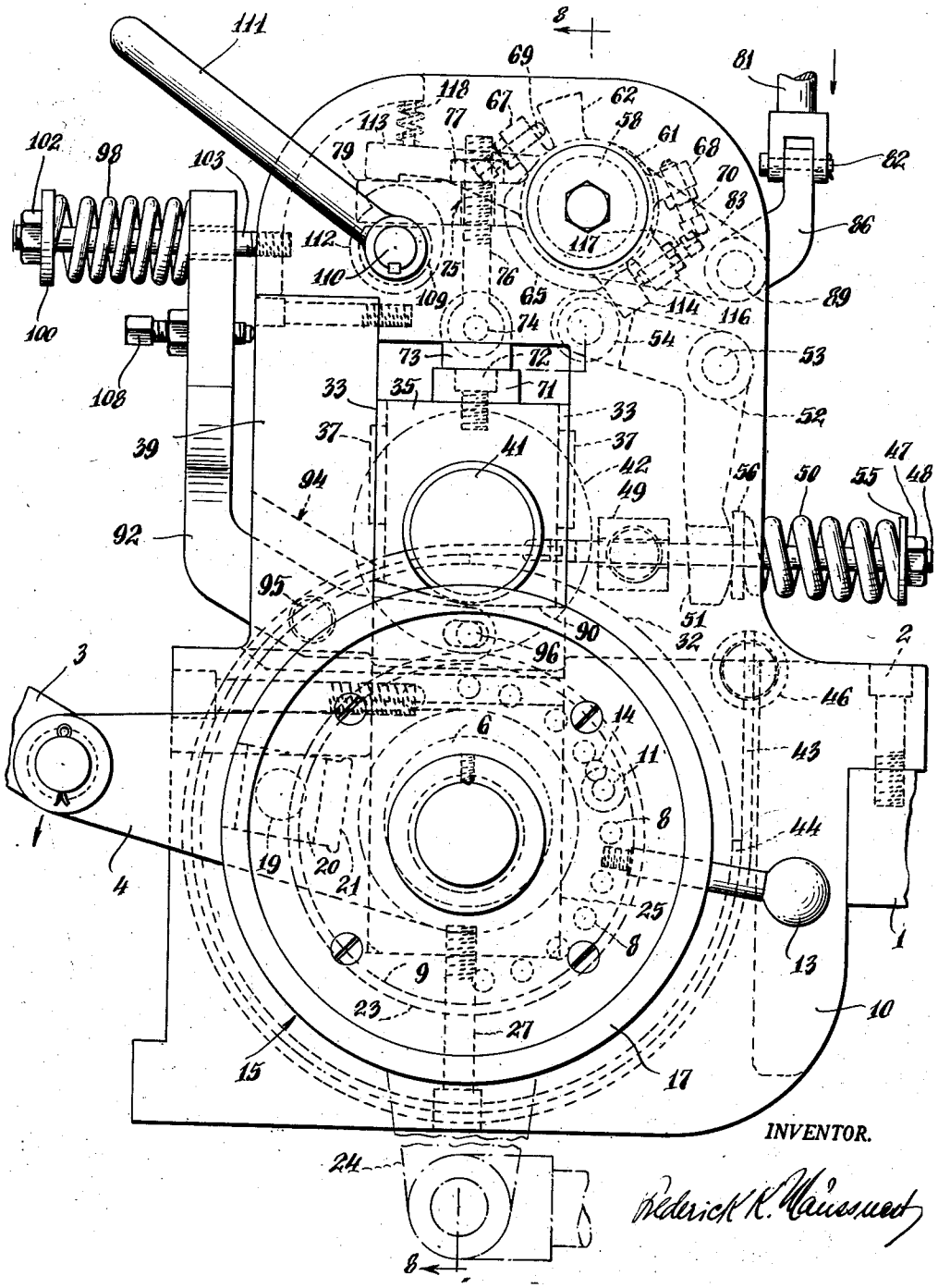
FREDERICK K. MAUSSNEST
NOW BY CHANGE OF NAME
FREDERICK K. MAUST
CONTROL UNIT FOR STOCK FEED

2,693,955

Filed March 12, 1949

5 Sheets-Sheet 1

Fig. 1.



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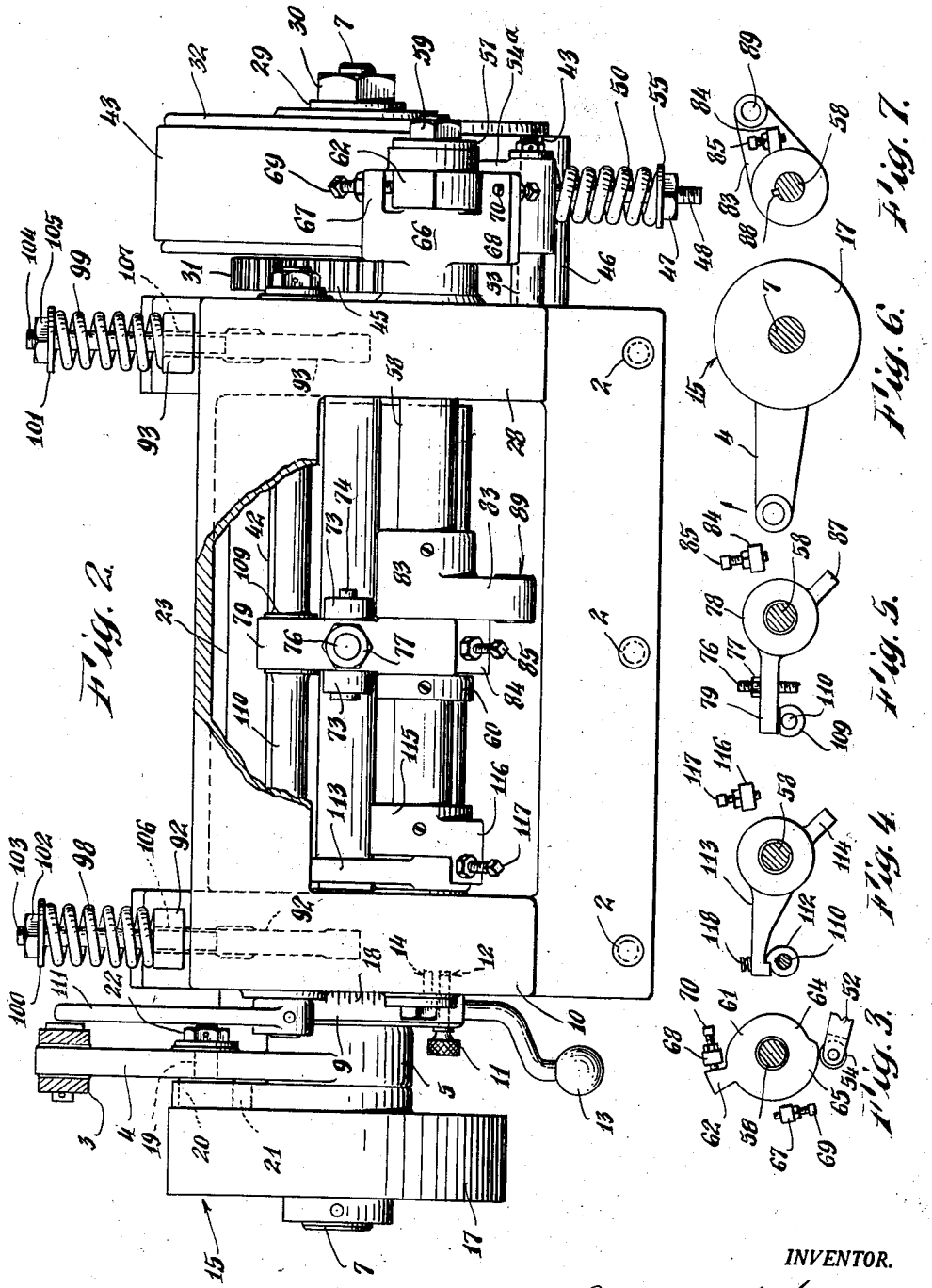


Fig. 2.

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 3.

Fig. 7.

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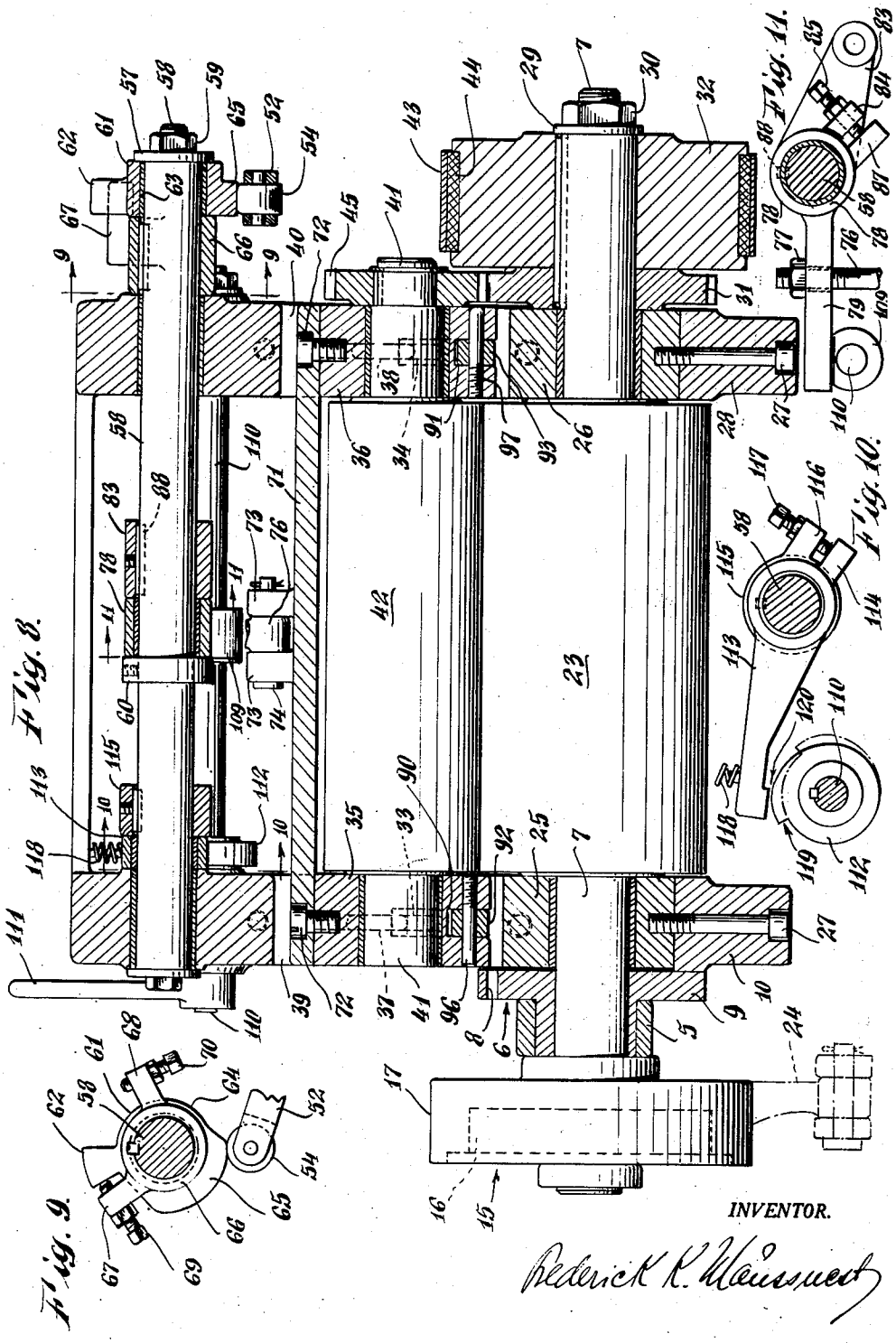


Fig. 8.

Fig. 9.

Fig. 11.

Fig. 10.

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Fig. 14.

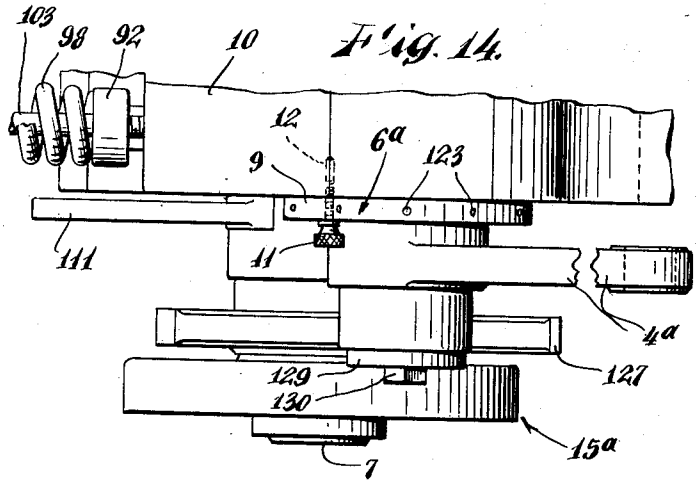


Fig. 12.

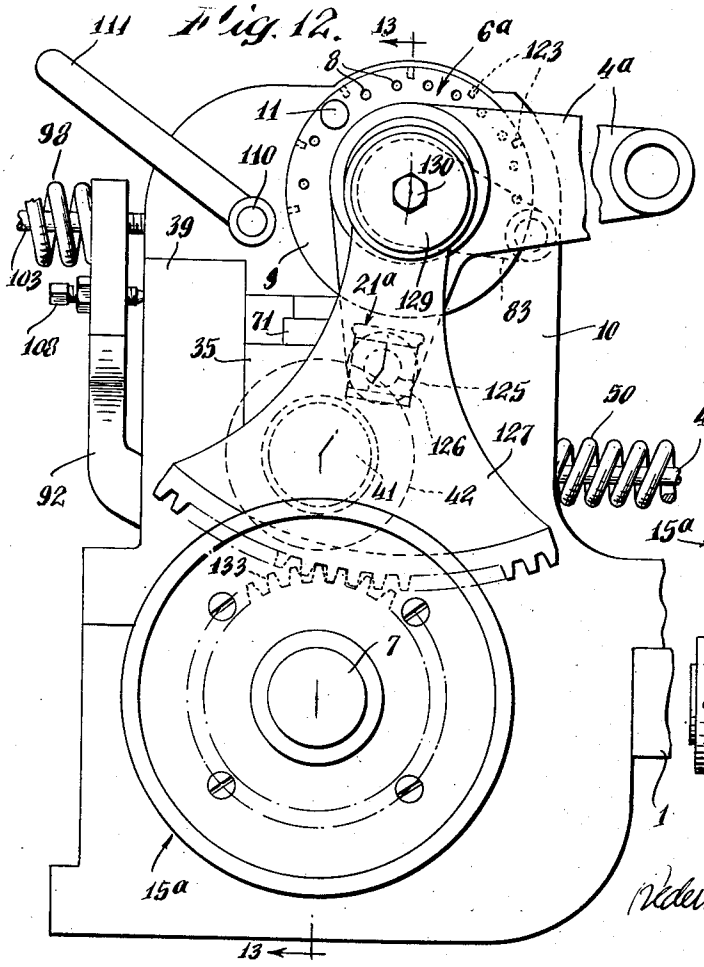
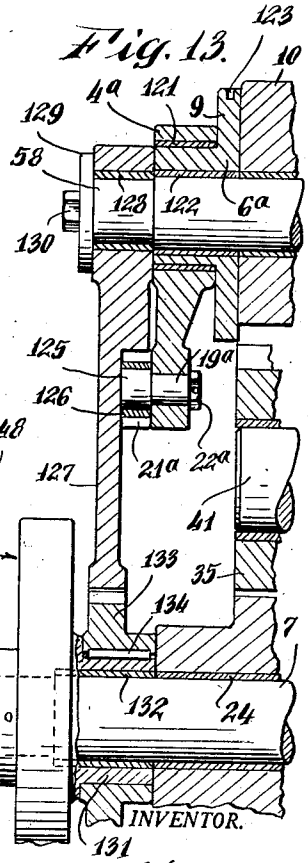


Fig. 13.



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Fig. 16.

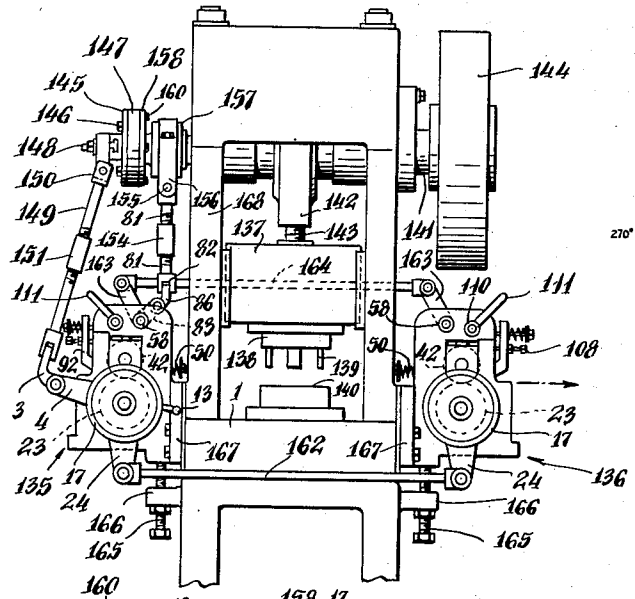
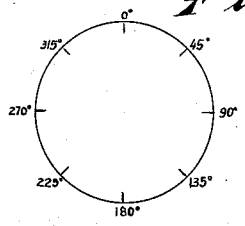


Fig. 19.



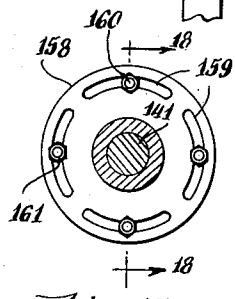


Fig. 17.

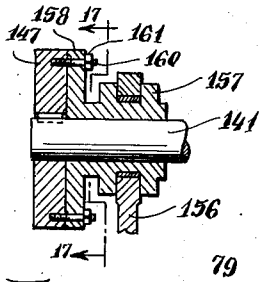


Fig. 18.

Fig. 15.

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2,693,955

CONTROL UNIT FOR STOCK FEED

Frederick K. Maussnest, now by change of name Frederick K. Maust, Queens Village, N. Y.

Application March 12, 1949, Serial No. 81,140

24 Claims. (Cl. 271—2.4)

This invention relates to intermittent stock feeding devices, and more particularly to automatic roll feeds for metal-working machines, such as punch presses and analogous equipment.

The general object of the present invention is to improve and simplify the construction and operation of the several parts of roll feeds, such as: automatic roll-lifting mechanism for separating the feed rolls during each operating cycle to permit commonly used pilot-pins associated with the dies to accurately locate the stock prior to each working operation; strip-starting mechanism to avoid cutting of fractional blanks; automatic brake-operating mechanism to prevent overtravel of the intermittently rotating feed rolls; flying adjustment mechanism for regulating the feeding length or feed stroke while the equipment is in operation to compensate for the varying inertia effects of the mass of the feed rolls and other intermittently moving parts at different operating speeds or feeding lengths. It is obviously desirable to obtain these interrelated functions of a roll feed by simple and inexpensive means which are adapted to be conveniently and quickly adjusted by the average die-setter or even press-operator in contrast to the rather complicated and expensive devices heretofore employed.

The present invention provides improvements and simplifications in the construction and operation of the several parts of roll feed mechanisms alluded to, with respect to their individual functions and their relations one to another, so that any combination of these desirable features may be provided at minimum expense.

To attain these ends, it is one object of my invention to provide novel automatic roll-lifting mechanism, novel automatic brake-operating mechanism, novel strip-starting mechanism and to teach the principle of providing a common control unit for integrating the interrelated motions of these mechanisms.

Another object is to incorporate in said common control unit in addition intermediate gearing for increasing the feeding range.

A still other object is the provision of a novel precision flying adjustment mechanism which may also be incorporated in said control unit and comprises adjusting and transmitting means adapted to modify the magnitude of the angular feeding impulses to the stock feeding device while the latter is in operation.

These and other specific objects and advantages will become apparent during the course of the following description of the accompanying drawings wherein:

Fig. 1 is a front elevation of a roll feed embodying one form of the control unit.

Fig. 2 is a plan view, partly broken away, of the roll feed shown in Fig. 1 to a somewhat smaller scale.

Fig. 3 shows diagrammatically the brake-operating mechanism with the punch press slide substantially in top dead center or 0 degree position.

Fig. 4 shows diagrammatically the automatic strip-starting mechanism with the press slide also in 0 degree position.

Fig. 5 illustrates diagrammatically the automatic roll-lifting mechanism with the press slide also in 0 degree position.

Fig. 6 shows diagrammatically the friction drive for the feed rolls when the press slide is in 0 degree position.

Fig. 7 depicts diagramatically the position of the driving rocker-arm for actuating the control unit when the press slide is in 0 degree position.

Fig. 8 is a section to a smaller scale along line 8—8 in Fig. 1.

Fig. 9 shows the cam control for the automatic brake along line 9—9 in Fig. 8.

Fig. 10 illustrates the automatic strip-starting mechanism along line 10—10 in Fig. 8.

Fig. 11 shows the automatic roll-lifting mechanism along line 11—11 in Fig. 8.

Fig. 12 is a front elevation of a similar roll feed as shown in Fig. 1, however, with gear-segment drive combined with the control unit for obtaining increased feeding lengths.

Fig. 13 is a fragmentary section along line 13—13 in Fig. 12 showing the drive of the roll feed in greater detail.

Fig. 14 is a fragmentary plan view of the structure shown in Figs. 12 and 13.

Fig. 15 is a somewhat diagrammatic perspective view of the control unit employed in Figs. 12, 13, 14.

Fig. 16 shows the application of a double roll feed, of the type shown in Fig. 1, to a straight-sided punch press.

Fig. 17 is a sectional view of the angularly adjustable eccentric for actuating the control unit as seen in the direction of arrows 17—17 in Fig. 18.

Fig. 18 is a sectional view along line 18—18 in Fig. 17.

Fig. 19 is a reference circle to assist in describing the functions of the several mechanisms in relation to the position of the crankshaft of a press.

In the drawings, wherein for the purpose of illustrating the invention, like reference characters will be employed to designate like parts throughout, Figs. 1, 2, 8, 9, 10, and 11 illustrate the embodiment of a relatively simple control unit in an automatic roll feed adapted to stepwise advance the stock or work material into a machine from left to right as viewed in Fig. 1.

Precision flying adjustment mechanism

Certain feed adjusting devices have been proposed in the past for the fine adjustment of the feeding length while the machine is in operation, such as a manual screw adjustment of the driving rocker-arm, or the eccentric displacement of a driving gear, but these solutions have certain serious shortcomings in as much as the first-mentioned method necessitates handling a rapidly oscillating adjusting member, while the second one is only adapted to a gear drive and has the additional disadvantage of disturbing the correct mesh of the driving gears. My flying adjustment overcomes these shortcomings.

Reference character 1 indicates part of a bolster-plate or press-bed to which the roll feed is attached in any suitable manner such as by means of bolts 2. As will be described later in greater detail, the feed rolls usually receive intermittent driving impulses from a rotating drive shaft, at the end of which a crank-disc is mounted which is adjustable for obtaining the desired feeding length approximately by varying the throw of a connecting rod. At its lower end, said connecting rod may be pivotally attached by means of an intermediate link 3 to a rocker-arm or oscillatable lever 4, whose hub 5 is freely rotatable on an eccentric bushing 6 supported by, and angularly displaceable on, lower feed roll shaft 7. Flange 9 of bushing 6 has a plurality of indexing perforations 8 and abuts housing 10 of the roll feed. A removable indexing pin 11 extends through one of the perforations or holes 8 into a suitable bore 12 in housing 10 for maintaining eccentric bushing 6 in any desired angular position. After pulling indexing pin 11 out, the eccentric bushing may be turned and angularly displaced, while the roll feed is in operation, by means of handle 13, threaded into or otherwise fastened to flange 9. The periphery of flange 9 may be provided for convenience with graduations as shown at 18, Fig. 2.

When the adjustment has been completed, eccentric bushing 6 may be locked again in its new position by bringing the nearest perforation 8 into registry with bore 12 and inserting pin 11. A plurality of bores may be provided in housing 10 and spaced at fractional distances of the hole-spacing in flange 9 for obtaining in-

crement adjustments of eccentric bushing 6 as small as desired. For example, a second bore 14 is shown in Figs. 1 and 2 spaced from bore 12 at one-half the hole-spacing in flange 9, thus permitting adjusting increments equal to one-half of hole-spacings 8.

Adjacent to hub 5 of rocker-arm 4, the driver 16 of a ratchet device in the form of a one-way clutch or friction drive 15 of conventional design is secured to shaft 7, while its outside housing 17 is rotatably supported on shaft 7. As viewed in Fig. 1, friction drive 15 is adapted to rotate shaft 7 in clockwise direction. Novel self-aligning transmitting means operatively connect rocker-arm 4 with friction drive 15 as best seen in Figs. 1 and 2. A pin 19 is journaled in rocker 4 and provided at one end with a substantially square or rectagular head or connector element 20 which is slidably guided in a matching, radially extending, aperture 21 of outside housing 17 of the friction drive. Threaded nut 22 serves to locate pin 19. Thus rocker-arm 4 is capable of transferring its oscillating motion to friction drive 15. However, the effective length of rocker-arm 4 may be increased or decreased and the angular feeding impulses to the friction drive 15 varied accordingly, by turning eccentric bushing 6 in counterclockwise or clockwise direction, respectively, from the median or normal position shown in Fig. 1. This median position allows substantially equal adjustments for lengthening or shortening the effective length of rocker-arm 4.

If a double roll feed is used, ratchet-housing 17 may be provided with a secondary driving-arm 24 to act as the driver for the second roll feed unit as indicated in dash-dot lines in Figs. 1 and 8.

A lower feed roll 23 is fast to shaft 7 which is journaled in bearing blocks 25 and 26 secured by bolts 27 to housings 10 and 28 which will be referred to as left and right hand housings, respectively. A gear 31 and brake drum 32 are keyed to shaft 7 and positioned by washer 29 and threaded nut 30.

An upper feed roll 42 is fast to a shaft 41 which is journaled in adjustable bearing blocks 35 and 36. The latter are provided with vertically disposed key-ways 33 and 34 and are guided on keys 37 and 38, fast to left and right hand housings 10 and 28 and to removable housing elements 39 and 40, respectively. A gear 45, in mesh with gear 31, is keyed to the right hand end of upper feed roll shaft 41. Upper and lower feed rolls 42 and 23 are shown to be of different diameters. As these feed rolls are intermittently rotated in unison by one-way clutch 15 for intermittently feeding the work material therebetween, the pitch diameters of gears 45 and 31 are shown to be the same as their respective feed roll diameters.

Automatic brake-operating mechanism

As the feeding and operating speeds increase, it becomes increasingly difficult to control the overriding or overtravel of the intermittently rotated feed rolls with the usually employed constantly applied brakes. Attempts have been made in the past to overcome this inherent disadvantage of roll feeds, but the complicated and expensive expedients previously proposed do not satisfactorily solve the problem for high speed operation. In contrast thereto, my novel brake-operating mechanism employs few elements and is inherently unaffected in its exact action by inertia effects due to different operating speeds.

A brake-band 43 with a suitable lining 44 is wrapped around brake-drum 32. One end of brake-band 43 is suitably fastened in a slot of pin 46, threaded or otherwise attached to the right hand housing 28. Rod 48 extends between bifurcated arm 51 of a link or bell-crank 52 which is pivoted at 53 and carries a cam-roller 54 on its other arm. Suitable resilient means such as a spring 50 is placed in compression between washer 56 at the forked end 51 and spring-seat 55, backed by adjustable threaded nut 47 at the end of rod 48 for preloading spring 50 to exert any desired nominal braking pressure.

A common control unit is employed for automatically actuating the different mechanisms of the roll feed including the brake mechanism in timed relation and comprises a control 58 which extends between housings 10 and 28 and is journaled therein and which supports several actuating and actuated elements to be described in connection with the several mechanisms operated thereby. For automatically operating the brake, a cam 61 is provided having a radially projecting actuated member or driving tail 62 and being rotatably mounted in bushing 63 at the right end of control-shaft 58, Fig. 8, and located by means of washer 57 and threaded nut 59. An actuating member or rocker-arm 66 is keyed to shaft 58 adjacent to cam 61 and includes overhanging, spaced apart actuators or driving lugs 67 and 68 which carry adjustable set-screws 69 and 70, respectively, as best shown in Figs. 8 and 9. Said driving lugs are in the same vertical plane as tail 62 of cam 61 and are thus operatively aligned with said tail 62. The cam-roller 54 is held in contact with the cam surface by spring 50 acting on bell-crank 52.

When control-shaft 58 is oscillated or rocked, said actuators, which comprise set-screws 69 and 70 protruding from respective lugs or driving dogs 67 and 68, will intermittently and alternately contact tail 62 and thus impart partial rotations in opposite directions, i. e. an intermittent rocking motion, to cam 61. As a consequence, cam roller 54 will travel from the high portion 65 of cam 61 to its low portion 64, and vice versa. Tail 62 of the brake-operating mechanism is consequently responsive to the lugs or driving means of the control unit whereby cam 61 is oscillated to displace bell-crank 52 intermittently which results in an intermittent additional compression and subsequent release of spring 50 so that the braking pressure exerted by the latter increases and decreases successively in alternation.

Fig. 1 depicts cam-roller 54 on the high part 65 of the cam. Forked end 51 of bell-crank 52 is displaced as a consequence into its extreme right hand position resulting in maximum compression of spring 50 and hence in maximum braking pressure. When cam roller 54 has descended unto the lower part 64 of the cam, lever arm 51 will come to rest against bracket 49. In this position, brake spring 50 is released and only under the initial, nominal compression which is adjustable in the usual manner by means of nut 47.

The respective high and low parts 65 and 64 of the cam are shown to be circular arcs with shaft 58 as center. The difference in their respective radii governs the magnitude of the predeterminable additional compression of spring 50, and, consequently, the increased braking pressure created by the compressing action of bell-crank 52 on spring 50. There will be no further displacement of the bell-crank 52 and no change in the braking pressure once cam-roller 54 has reached either the high or the low part of the cam, regardless of any overtravel of the oscillating cam in either direction. The precise action of the cam-operated brake is therefore not influenced by possible inertia effects at different operating speeds.

The cam surfaces 64 and 65 may be curvilinear surfaces of other configurations for varying the braking pressure in any other desired manner.

Automatic roll-lifting mechanism

In order to obtain optimum accuracy, an automatic roll-lifting mechanism is employed for separating the feed rolls during each operating cycle to permit commonly used pilot-pins in the dies to accurately locate the stock prior to each working operation. This function is attained in my design in addition to preventing an undesirable metal-to-metal contact between the feed rolls when the end of a strip of work material has passed therethrough.

A transverse bridge 71 connects bearing blocks 35 and 36 of the upper feed roll. This bridge may be secured to the bearing blocks by bolts 72 and may possess two lugs 73 between which an eye-bolt 76 is mounted on pin 74. Eye-bolt 76 extends through an enlarged opening 75 in lifter-arm 79, Fig. 1, and is adapted to be adjusted in height by means of threaded nut 77 which bears against the upper surface of arm 79. Hub 78 of lifter-arm 79 is oscillatably supported by control-shaft 58 of the control unit and laterally located between collar 60 and actuating rocker 83, keyed to shaft 58 as at 88 and carrying an overhanging, integral driving lug 84 with set-screw 85 for actuating lifter-arm 79 by contacting its protruding tail or actuated member 87 in a similar manner as previously described in connection with the automatic brake-operating mechanism. Rocker-arm 83 serves at the same time for oscillating control-shaft 58 in synchronism with the operation of the machine. For this purpose, rocker-arm 83 may be pin-connected

as at **89**, Fig. 1, with an intermediate link **86** which in turn is pivotally connected to the end of a rod **81** as indicated at **82**. Connecting rod **81** may be reciprocated in any desirable manner; for example, from the drive-shaft, or reciprocating slide, or the pitman of a press.

The upper feed roll bearing blocks **35** and **36** are slotted as at **90** and **91**, Fig. 8, for receiving constant lift-levers **92** and **93**, respectively, which also pass through openings **94** in the detachable housing elements **39** and **40**. Lift-levers **92** and **93** may be of the bell-crank type and are pivoted in elements **39** and **40** on pin **95**, Fig. 1. Other pins **96** and **97** extend through elongated slots in the horizontal arms of levers **92** and **93** into bearing blocks **35** and **36**, respectively. Resilient members such as compression springs **98** and **99** are placed between the vertical arms of levers **92** and **93** and spring-seats **100** and **101**. The load on springs **98** and **99** may be adjusted by threaded nuts **102** and **105** on studs **103** and **104**, respectively. The latter pass through openings **106** and **107** in levers **92** and **93** and are fast to the housings of the roll feed. These spring-loaded constant lift-levers **92** and **93** will urge the upper feed roll **42** into frictional contact with the work material. Set-screws **108** in the vertical arms of levers **92** and **93** adjustably limit the downward movement of the upper feed roll **42**. Any desired constant opening may be adjusted and maintained between rolls **42** and **23** at all times, thus preserving the finish of their gripping surfaces, because continuous collisions of the feed rolls when automatically lifted during each cycle are avoided when no work material passes between said rolls. Obviously the selected constant opening should always be less than the stock thickness. If conditions should require a metal-to-metal contact of the feeding rolls when no stock is passing therethrough, it is a simple matter to adjust set-screws **108** accordingly.

Assuming that control-shaft **58**, Fig. 1, is oscillating in clockwise direction, the lifter-arm **79** will be rotated in the same direction as soon as set-screw **85** of dog **84** contacts lifter-tail **87**. This will result in a separating movement of the feed rolls, because eye-bolt **76** will be lifted and will lift in turn the upper feed roll **42** against the pressure of springs **98** and **99**. As soon as set-screw **85** releases tail **87** (when rocker **83** and control-shaft **58** oscillate together in counterclockwise direction), the upper feed roll **42** will be lowered and will frictionally grip the stock again preparatory to the next feeding cycle under the urge of said springs **98** and **99**.

Hand-lift and strip-starting mechanism

To avoid fractional blanks, waste, and possible harm to the sensitive dies, a new strip of work material should always be advanced full feeding lengths. When a new strip is to be threaded into the roll feed while the press is in operation, the feed rolls are opened and to avoid fractional feeds, the feed rolls must be closed again while the latter are at rest. This is obviously practically impossible with any certainty at high operating speeds without mechanical help as disclosed, for instance, in my strip-starting mechanism, which is also automatically operated by the control unit.

It should be noted that the end of lifter-lever **79** of the automatic roll-lift mechanism rests on a cam **109** which may be secured to, or be an integral part of, auxiliary hand-lift shaft **110**, rotatably journaled in housings **10** and **28** and capable of being manually actuated by means of handle **111**. To open the feed rolls, handle **111** is moved in clockwise direction, thus lifting the end of lift-lever **79** by the action of cam **109**. By turning handle **111** sufficiently, the upper feed roll **42** will remain in open position until handle **111** is restored voluntarily into its normal or inoperative position as shown, for instance, in Fig. 1. An automatic blocking device for preventing the closing of the upper feed roll during its rotational periods consists in a catch **112** keyed or otherwise secured to shaft **110**. This catch therefore participates in any rotation of shaft **110**. A latch **113** with actuating tail **114** is freely mounted on control-shaft **58** in operative alignment with catch **112**, and it is urged towards catch **112** by spring **118**. A driving rocker-arm or actuating member **115** with overhanging dog **116** and set-screw **117** is keyed adjacent to latch **113** on control-shaft **58** of the control unit and will lift latch-arm **113** during a predetermined portion of the rest period of the feed rolls. Figs. 1 and 10 show this lifted condition. When not acted upon by driving element **115**, however, the end of latch-arm **113** will rest on top of catch **112** biased by spring **118**. When the upper feed roll **42** has been fully opened, shoulder **119** of catch **112** will be to the right of shoulder **120** of latch **113** as shown in dotted lines in Fig. 10. A new strip may now be inserted between the open feed rolls. To close the feed rolls, handle **111** must be manually and voluntarily turned counterclockwise. Shaft **110**, however, will be stopped from further counterclockwise rotation in case shoulder **119** encounters hook **120** of latch **113**. Then the complete closing of the feed rolls must wait for the action of driving lug **116** on tail **114** to lift latch **113** off catch **112** as shown in Fig. 10. Only then is the lift-shaft **110** free to return into its inoperative position and upper feed roll **42** will simultaneously return into feeding relationship with the lower roll **23** under the bias of springs **98** and **99**.

This independently controllable roll-opening mechanism includes therefore a blocking device (latch **113** and catch **112**) responsive to the common control unit for intermittently rendering said blocking device ineffective. Set-screw **117** represents a simple means for varying the beginning as well as the duration of the lifting period of latch **113**. But it will be realized that the feed rolls may be opened at any time by means of this independently controllable mechanism. They can be closed only between feed advances, i. e. during that period of the operating cycle when the feed rolls are at rest.

Geared automatic roll feed

A similar roll feed as previously described is shown in Figs. 12, 13, and 14, however, with the difference that the friction drive is not actuated directly but by means of intermediate gearing in order to subject the friction drive to feeding impulses of larger angular magnitude than possible by direct drive, thus obtaining longer feeding lengths. The common control unit of this geared roll feed incorporates, in addition to the functions previously described, the precision flying adjustment as well as the intermediate gearing. To make it more convenient to follow the interrelated motions, this complete control unit with its several mechanisms is shown somewhat diagrammatically in the perspective view of Fig. 15.

To simplify the description, identical parts have received the same numerals as before; parts which are somewhat different in design, but serve similar functions as before, have received the same numerals with the subscript *a*.

Precision flying adjustment mechanism

The driving rocker-arm **4***a*, which is actuated from a crank-disc or the like, has the shape of a bell-crank and is oscillatably supported in bushing **121** on eccentric sleeve **6***a* which in turn is journaled in bushing **122** of control-shaft **58** adjacent to left hand housing **10**. Flange **9** of sleeve **6***a* is again provided with a plurality of indexing holes **8** through any one of which index-pin **11** may be inserted into bore **12** of housing **10** for maintaining sleeve **6***a* in any desired position. Instead of a handle, a plurality of radial holes **123** are provided on the periphery of flange **9** for angularly displacing eccentric sleeve **6***a* by means of a suitable wrench or rod. A stationary pin **19***a* is secured to one arm of a bell-crank **4***a* by means of threaded nut **22***a* as shown and the enlarged portion **125** of said pin or connector element **19***a* is oscillatably carried in a square or rectangularly shaped pillow-block **126** which is slidably guided in a radially extending, matching aperture **21***a* of gear-segment **127**. The latter is rotatable on control-shaft **58** in bushing **128** and located in position by washer **129** and screw **130**.

The extended hub **131** of friction drive **15***a* is mounted in bushing **132** on lower feed roll shaft **7** and carries a gear **133** secured thereto by any suitable means such as a key **134**. Gear **133** is in mesh with gear-segment **127**.

The effective length of the driving rocker-arm **4***a* may be decreased or increased similarly as before by angularly turning eccentric bushing **6***a*, as a result of which the pillow-block **126** will be displaced in aperture **21***a*. The perfect mesh between gear-segment **127** and gear **133** will be in no way disturbed by any such displacement of the eccentric bushing **6***a*; hence, the feeding accuracy will not be detrimentally affected.

The driving connection between rocker-arm 4*a* and gear-segment 127 is positive and the cooperating pin and pillow-block elements 19*a*, 126 slidable in aperture 21*a* create a yielding transmitting connection which allows a relative movement between rocker-arm 4*a* and gear-segment 127 when the effective length of driving arm 4*a* needs to be changed for the fine adjustment of the feeding stroke.

The oscillation of the control-shaft 58, which may be actuated as before from any suitable source by means of rocker 83, is not affected in any way by the just described gear-segment drive of the one-way clutch 15*a*, because the several elements of said rocker and gear-segment are merely pivoted on shaft 58. The important advantage derived by incorporating this gear-drive in the control unit is, however, the elimination of a separate shaft for supporting the intermediate gearing, and the further advantage of a most compact and inexpensive design.

Application to a punch press

Fig. 16 shows one intake unit 135 and one discharge unit 136 of the type described in Fig. 1, for instance, applied to a straight-sided punch press. This tandem arrangement is called a "double roll feed" in the trade.

The press may be of any appropriate known construction and may comprise a reciprocating member or slide 137 for carrying the upper part of the die 138 with pilot-pin 139, a bed 1 for supporting the cooperating lower part 140 of the die, a main crank-shaft or drive shaft 141 for reciprocating slide 137 by means of a pitman 142 and screw-connection 143, and a driving pulley or flywheel 144.

A crank-disc 145 is angularly adjustable by means of bolts 146 relative to backing-disc 147 fast to crankshaft 141. Crank-disc 145 supports an adjustable crank-pin 148 connected to rod 149 by means of wrist-bearing 150. A turnbuckle 151 in connecting rod 149 permits length adjustment for the appropriate actuation of rocker-arm 4 by means of pivoted intermediate links as at 3. Thus the feed rolls 23 and 42 are adapted to stepwise advance the work material between them in timed relation to the operation of the press.

Driving rocker-arm 83 of control-shaft 58 is shown pivotally connected by intermediate link 86 as at 82 to connecting-rod 81 with turnbuckle adjustment 154. A pivot-connection 155 is also provided between said connecting-rod 81 and strap 156 of an eccentric 157 on crank-shaft 141, Figs. 16, 17, 18. Said eccentric is adapted to be angularly adjusted with respect to crank-shaft 141 by means of its flange 158 which has concentric slots 159 and may be secured in any desired angular position to the fixed backing-disc 147 by means of studs 160 and threaded nuts 161 as shown. Connecting-rod 136 is thus reciprocally operable by said eccentric to rock or oscillate rocker-arm 83 and hence control-shaft 58.

The two feed units are similar with the exception that the discharge unit 136 has usually no driving rocker-arm 4 and a flying adjustment is ordinarily not necessary. Instead, the housings 17 of both friction drives 15 are provided with auxiliary arms 24, interconnected by actuating rod 162 so that the friction drive of the discharge unit 136 will be operated in synchronism with the intake unit 135. The control-shaft 58 of each feeding unit 135 and 136 has keyed to it a rocker-arm 163 interconnected by rod 164 so that the control-shafts of both units will also be oscillated in unison. This rocker-arm 163 is only required when a "double roll feed" is employed and is therefore shown in dotted lines in Fig. 15.

Fig. 16 shows the two feeding units 135 and 136 adjustable in height by screws 165 supported in brackets 166 and guides 167 on press-frame 168 for the convenient change of the feeding height of the work material. This type of height adjustment is well known in the art.

Operation

The friction drive or roll feed drive 15 is usually actuated for advancing the stock between the 270 and 90 degree positions of the crank-shaft (see reference circle Fig. 19). In other words, crank-pin 148 of crank-disc 145 is 90 degrees behind, or late relative to, the crank-shaft 141. Consequently, the forward feed commonly takes place during the last half of the up-stroke and the first half of the down-stroke of crank-shaft 141 and slide 137. Crank-shaft 141 is normally rotated at approximate constant speed. Therefore, the velocity of the feed rolls increases during the first half of the feeding cycle during which period the feed rolls accelerate from zero to maximum, and their velocity decreases again to zero during the second half or decelerating period of the feeding cycle. If not expressly stated otherwise, this normal feeding timing will be assumed to exist in the description to follow.

Fig. 16 shows the slide 137 and crank-shaft 141 in top dead center positions, namely in positions corresponding to the 0 degree position in the crank-reference circle shown in Fig. 19, Figs. 3 through 7 exemplify the approximate positions of the several mechanisms for this crank-shaft position. Eccentric 157 for the oscillation of control-shaft 58 is shown in phase with crank-shaft 141, Figs. 16, 17, 18.

Rocker-arm 83 of the control-shaft 58 has just arrived at its highest position, Fig. 7. Driving lug 84 for the automatic roll-lifter-arm 79 is farthest away from its tail 87, Fig. 5. Driving lug 116, Fig. 4, is also farthest away from tail 114 of latch-arm 113; consequently, spring 118 keeps latch 113 in contact with catch 112; assuming that the operator previously opened the feed rolls with handle 111 and desires to close the feed rolls at this particular instant, shoulder 119 of catch 112 will be stopped by hook 120 of latch 113; the feed rolls can therefore not be restored into feeding relation during this period of the operating cycle. Driving lug 68 has just moved brake-cam 61 into its extreme counterclockwise position, Fig. 3, and cam-roller 54 has been lifted unto the high portion 65 of cam 61; thus forked end 51 of bell-crank 52 will have compressed spring 50 its maximum amount and brake-lining 44 will therefore also exert maximum braking action on brake-drum 32. The rocker-arm 4 for actuating the friction drive 15 will have finished approximately one-half of its upward feeding stroke, Fig. 6; the feed rolls will be operating near maximum feeding velocity.

Figs. 1, 2, 8, 9, 10 and 11 show the press and roll feed at a different period of the operating cycle, namely, during the second half of the downward stroke of slide 137, past the 90 but before the 180 degree position of the crank-shaft 141. Perspective view Fig. 15 also exemplifies this point in the operating cycle for the geared roll feed.

Driving rocker-arm 83 for actuating shaft 58 of the control unit, Fig. 1, is in the lower half of its downward stroke. Driving lug 84 is shown in Fig. 11 to contact tail 87 of lifter-arm 79, just beginning to lift the upper feed roll for allowing the pilot-pin (139) in the dies to locate the stock. Lug 116 in Fig. 10 has already lifted latch 113 off catch 112; the feed rolls, if previously manually opened, could therefore be closed at this point of the cycle without interference by catch 112. The feed rolls are at rest, as rocker-arm 4 of friction drive 15 is now oscillating in counterclockwise direction and performs its idling return stroke, Fig. 1. In Fig. 9 the driving lug or dog 67 is rotating cam 61 in clockwise direction and cam-roller 54 will presently leave the high part 65 of the cam, whereupon the additional load on brake-spring 50 will be released.

The phase relationship between crank-shaft 141 and control-shaft 58 may be changed by angularly displacing eccentric 157 as previously described in connection with Figs. 16, 17, 18, but in addition, the individual motions of the several mechanisms may be further synchronized with respect to each other by adjustment of set-screws 69, 70, 85, 117 in their respective lugs 67, 68, 84, 116. Because the oscillating drive of control-shaft 58 is derived directly from the crank-shaft 141, a height adjustment of slide 137 when setting dies 138 has no effect on the proper operation and synchronization of the intake and discharge units 135 and 136. The set-up time for the press and roll feed is therefore very appreciably shortened.

The adjustability of the phase relationship between crank-shaft and control-unit on account of the independent eccentric drive of the control-shaft is specially convenient for timing the automatic brake. Instead of applying the maximum braking effect before the feed rolls have reached their maximum velocities as described before, it might be desirable to change this timing so that the maximum braking effect occurs some time during the

deceleration period of the feed rolls. This or any other desired timing of the control unit may be easily effected by angularly displacing eccentric 157 relative to the crank-shaft.

The coarse adjustment of the feeding length is accomplished in the well known manner by changing the eccentric throw of crank-pin 148. While a graduated scale is commonly provided on crank-disc 145, the exact desired feeding stroke is usually only obtainable by the cut-and-try method, i. e. by repeatedly starting and stopping the press for readjustment of crank-pin 148. The flying adjustment as previously described in detail permits fine adjustment of the feeding stroke or feeding length by turning eccentric 6 with the aid of handle 13 for decreasing or increasing the effective length of rocker-arm 4, while the apparatus is in operation. The operator does not have to handle any moving element for accomplishing the desired fine adjustment, and when applied to a geared drive as shown in Figs. 12, 13, 14, the perfect mesh of the gear train remains undisturbed.

The roll feed unit shown in Figs. 12, 13, 14 may be employed singly or in tandem in a similar manner as described in connection with Fig. 16, however, with the difference that the rocking motion for actuating the one-way clutch drive of the discharge unit would be derived by interconnecting the gear-segments 127 of intake and discharge units similarly as shown in Fig. 16 for the friction drives 15. This and similar methods for driving geared double roll feeds are old and need no further explanation.

The type of ratchet drive for actuating the feed rolls is usually selected according to the particular requirements. While I have shown for illustrative purposes the well known one-way or overrunning clutch device (15), any other suitable mechanism may be employed instead, such as ratchet and pawl, a rack and pinion drive, etc.

It will be understood that the invention is not restricted to any particular construction, arrangement or form of the parts, and is capable of numerous modifications and changes; furthermore, the several features do not need to be employed conjointly, but may be used singly or in any combination dictated by existing requirements and conditions.

Having thus fully described the invention, what is claimed as new and for which it is desired to secure Letters Patent is:

1. In an automatic stock feed having a pair of intermittently rotatable rolls for stepwise advancing the stock into a press, a control unit comprising a control-shaft and means for oscillating said control-shaft in synchronism with the press; an automatic roll-lifting mechanism for raising the first one of said pair of rolls away from the second one between stock advances for momentarily freeing the stock, a first driving member on said control-shaft and oscillating therewith for automatically actuating said roll-lifting mechanism, pivotally mounted levers operatively connected to said first feed roll, resilient members acting on said levers to bias said first feed roll into stock-gripping relation upon release by said roll-lifting means in combination with adjustable means to limit the resiliently biased swing of said pivoted levers for maintaining a predetermined opening between said feed rolls when no stock is passing therethrough; auxiliary means for voluntarily lifting said first roll at any time during the operating cycle comprising a rotatable cam for effecting the lifting of said first roll and for retaining the same automatically in lifted position while the press is in operation until said cam is voluntarily returned into release position, a catch rotatable with said cam, a latch mounted on said control-shaft positioned to engage said catch to lock the rolls in open position during feed advances when previously so opened, and a second driving member on said control-shaft for then automatically disengaging said latch from said catch during the rest periods of said rolls for permitting voluntary rotation of said cam in roll-closing direction during said rest periods only.

2. In an intermittent roll feed for stepwise advancing the work-material into a machine having a drive-shaft, an automatic roll-lifting mechanism including a lifter arm for separating the rolls periodically to allow pilot-pin means to locate the work-material; a strip-starting mechanism having an independently controllable roll-opening means comprising a rotatable cam having a lifting slope for independently actuating said lifter arm, said lifting slope being followed by a cam surface for automatically retaining said lifter arm and consequently said rolls in open position while the press is in operation, a blocking device to prevent closing of the feed rolls during feed advances when previously opened by means of said independently controllable means, said blocking device consisting in a catch and a coactive latch for intermittently rendering said blocking device ineffective; brake means associated with a feed roll and including resilient means for subjecting said brake means to a nominal predetermined braking pressure, a brake-operating mechanism including an element acting on said resilient means for increasing said nominal braking pressure to a maximum and for then decreasing said braking pressure to said nominal value successively in alternation; a control unit comprising an oscillatable control-shaft having means for operating all three mechanisms and parts thereof in timed relation, a rocker-arm secured to said control-shaft, a rod connected to said rocker-arm, and eccentric means on the drive-shaft of said machine for reciprocally operating said rod, said eccentric means being adjustably secured to said drive-shaft for changing the timing of oscillation of said control-shaft with respect to the operation of the machine.

3. A control unit for an automatic work-piece feeding means of a machine comprising a control-shaft, means for oscillating said control-shaft in synchronism with the operation of the machine, a second shaft located in spaced apart relation to said control-shaft and being manually operable, means associated with said control-shaft to automatically lift said feeding means during each operating cycle for releasing the work-piece momentarily, other means associated with said second shaft for voluntarily opening said feeding means and for keeping them open when said second shaft is turned from inoperative position to operative position, a locking device for blocking the return of said second shaft from operating position during the feeding cycle of said feeding means comprising a catch secured to said second shaft, a latch rotatably mounted on said control-shaft, said latch being located in operative alignment with said catch and being automatically actuated by said control-shaft for engaging said catch during the feeding cycle and for freeing the same during the rest periods of said feeding means to avoid fractional feeds when a new work-piece is started in the feeding means while in operation.

4. In a control unit for an automatic roll feed having a pair of cooperating feed rolls for stepwise advancing a work-piece therebetween, manually controllable roll-opening means for opening said feed rolls at any time during the operating cycle to insert a new work-piece comprising a control-shaft, means for oscillating said control-shaft in timed relation with said feed rolls, a lifter arm pivotally mounted on said control-shaft, a connecting member between said lifter arm and one of said feed rolls for opening said feed rolls when said lifter arm is actuated, a rotatable cam having a cam slope in engagement with said lifter arm to independently actuate said lifter arm and open the feed rolls when said cam is rotated, said slope being followed by a substantially concentric portion on said cam to automatically maintain the rolls in open position while the feed rolls continue to perform their feeding motions, until said cam is voluntarily returned into its original position, in combination with a starting mechanism comprising blocking means adapted to prevent the closing of previously opened feed rolls during feed advances, said blocking means including a catch rotatable with said cam and a coacting latch element pivotally mounted on said control-shaft, said latch element being responsive to said oscillating shaft to free said catch automatically between stock advances, whereby fractional feeds are avoided when starting a new work-piece.

5. In an automatic roll feed having a pair of feed rolls for intermittently advancing the stock therebetween, manually controllable roll-opening means for opening said feed rolls at any time during the operating cycle to insert a new strip of stock comprising a rotatable cam having a lifting slope followed by a substantially concentric portion to first open said rolls by the action of said lifting slope and to then maintain the rolls automatically open on said concentric portion while the roll feed is in operation when said cam is rotated in roll-opening direction, until said cam is voluntarily returned

into its original position, including a strip-starting mechanism comprising means for blocking the closing of previously opened feed rolls between stock advances; a friction brake to prevent overtravel of said roll feed, resilient means for exerting a predetermined braking force on said friction brake, a brake-operating mechanism including a member in engagement with said resilient means to effect intermittent auxiliary compression of said resilient means when actuated; in combination with a common control unit comprising an oscillatable shaft and driving means secured thereto to automatically cause intermittent actuation of both said mechanisms in predetermined timed relation.

6. In a stock feeding device having a pair of cooperating feed rolls actuated by ratchet means for stepwise advancing the stock, an automatic roll-lifting mechanism for raising one of said feed rolls momentarily between stock advances to release the stock; brake means for said feed rolls to prevent overtravel, a brake-operating mechanism including means for intermittently varying the braking effect of said brake means; a strip-starting device including means for manually opening the feed rolls to insert a new strip of stock and a mechanism for blocking the closing of previously opened feed rolls during the advancing stroke of the ratchet to avoid fractional feeds; a control unit comprising an oscillatable shaft and driving means secured thereto for the automatic intermittent actuation of all said mechanisms and parts thereof in predetermined timed relation, said control unit including also a flying adjustment having an eccentric supported on said control-shaft, a rocker-arm oscillatably mounted on said eccentric, means for displacing said eccentric with respect to said rocker-arm to change the effective length of the latter, and means operatively connecting said rocker-arm and said ratchet means including a radially slidable connector element.

7. In an automatic roll feed having a pair of coacting feed rolls for stepwise advancing the stock into a machine, a control unit comprising a control-shaft, a plurality of driving lugs secured to said control-shaft, means for oscillating said control-shaft with said driving lugs in a circular arc through a predetermined angle in step with the operation of the machine; an automatic roll-lifting device including a lifter lever pivotally mounted on said control-shaft for lifting one of said feed rolls, said lifting lever being responsive to one of said driving lugs for separating the feed rolls between stock advances; independently controllable roll-opening means including a rotatable shaft, a cam secured to said shaft and in contact with said lifting lever to effect an independent lifting movement of the latter, said cam having a concentric portion to automatically retain the rolls in open position when said shaft is rotated from neutral position into roll-opening position while machine and roll feed may continue in operation, a latch pivotally mounted on said control-shaft and responsive to another one of said driving lugs for intermittently lifting said latch, a catch secured to said camshaft, said catch having a shoulder positioned for intermittent engagement by said oscillating latch when the camshaft is in roll-opening position to intermittently lock said camshaft against return to neutral position and to thus prevent voluntary closing of the rolls during feed advances; a friction brake to prevent overtravel of the feed rolls, resilient means for exerting a normal braking force on said friction brake, a member acting intermittently on said resilient means in response to still others of said driving lugs for intermittently increasing said normal braking force.

8. In an automatic roll feed for intermittently advancing a work-piece into a machine, a pair of cooperating feed rolls, one of said rolls being liftably mounted with respect to the other roll, an automatic roll-lifting mechanism comprising a shaft, means for imparting oscillatory motion to said shaft in step with the operation of the machine, a lifter arm pivotally mounted on said shaft and operatively connected with said liftable roll, a driving element secured to said shaft and oscillating therewith, said driving element being positioned to intermittently oscillate said lifter arm to impart a lifting motion to said liftable roll, pivotally mounted levers operatively connected to said liftable roll, resilient means acting on said levers to bias said roll into frictional engagement with the work-piece, and adjustable means to limit the movement of said levers in roll engagement direction for maintaining a predetermined opening between said feed rolls when no work-piece is passing therethrough.

9. In a control unit for an automatic roll feed for a machine, a pair of cooperating feed rolls, an automatic roll-lifting mechanism comprising a control-shaft, means for automatically oscillating said control-shaft through a predetermined angle in timed relation to the operation of the machine, a lifter arm having a projection and being pivoted on said control-shaft, a connecting member between said lifter arm and one of the feed rolls for separating the feed rolls when said lifter arm is actuated, a driving element fast to said control-shaft and oscillating therewith, said driving element having a contact surface positioned to act on said projection during predetermined periods of its oscillating swing to periodically separate the feed rolls during each operating cycle, means for adjusting said contact surface of said driving element with respect to said projection to change the timing of said lifter arm relative to the oscillating movement of said control-shaft; independently controllable roll opening means for opening the rolls at any time during the operating cycle comprising a rotatable cam in engagement with said lifter arm, said cam having a lifting slope followed by a substantially concentric portion to first swing said lifter arm and its projection beyond reach of said oscillating driving element and open the rolls by the action of said lifting slope and to then maintain the rolls automatically in open position on said concentric portion while the machine is in operation and said control-shaft is oscillating, until said cam is voluntarily returned into its original position.

10. A brake control for an automatic feed of a machine comprising a friction brake, resilient means for exerting a predetermined braking force on said friction brake, a shaft continuously oscillatable in synchronism with the machine, a cam freely supported on said shaft, a pivotally mounted bell-crank, one arm of said bell-crank contacting said cam and serving as a cam follower, the other arm of said bell-crank acting on said resilient means for compressing said resilient means to increase the braking force when said bell-crank is actuated by said cam, a projection on said cam, an actuator fast to said shaft and oscillatable therewith, said actuator having two spaced apart driving lugs one on each side of and in operative alignment with said cam projection and a predetermined distance away therefrom to effect an intermittent oscillation of said cam for actuating said bell-crank when said shaft is continuously oscillated.

11. In a double roll feed, two pairs of spaced apart and cooperating feed rolls for stepwise advancing a work-piece into a machine; a separate work-piece starting mechanism for each of said pairs of feed rolls comprising manually rotatable cam means for voluntarily opening said feed rolls at any point of the operating cycle and for automatically retaining the same in open position until voluntarily closed again, an automatic blocking device for preventing the closing of the manually opened feed rolls during feed advances to prevent fractional feeds when starting a new work-piece in either or both of said pairs of feed rolls, said automatic blocking device including a control-shaft, a latch pivoted on said control-shaft, a driving member secured to said control-shaft for actuating said latch, a catch rotatable with said cam and in operative alignment with said latch; in combination with means for oscillating the control-shaft of one of said automatic blocking devices in timed relation to said feed advance, and a rocker-arm driving connection from said last mentioned control-shaft to the other control-shaft to effect synchronism of the blocking devices of both pairs of said feed rolls.

12. A starting mechanism for the synchronized operation of a double roll feed for a press to prevent fractional feeds comprising two spaced apart feeding units, each unit including a pair of cooperating feed rolls, one of said rolls being liftable with respect to the other roll, a continuously oscillatable control-shaft, a lifter arm on said control-shaft for lifting said liftable roll, actuating means secured to said control-shaft for automatically actuating said lifter arm for separating the rolls in step with the oscillation of said control-shaft, a manually rotatable shaft, a cam secured to said shaft and engaging said lifter arm for voluntarily lifting said liftable roll, said cam having a cam portion for first lifting said roll and another cam portion for then holding the lifted roll automatically open when said shaft is manually turned from neutral posi-

tion to roll-opening position until voluntarily returned into neutral position, a latch on said control-shaft, actuating means secured to said control-shaft for oscillating said latch in timed relation to said control-shaft, a catch secured to said manually operable shaft and rotatable therewith, said catch being positioned to be ineffective when said shaft is in neutral position and to be in locking alignment with said latch when said shaft is turned into roll-opening position to effect an alternate locking and releasing of said catch by said latch to prevent voluntary return of said shaft into neutral position during feed advances, driving means actuated by said press for oscillating the control-shafts of both said feed units in timed relation to the operation of said press.

13. An automatic roll feed having a pair of feed rolls for intermittently feeding a work-piece into a press comprising an automatic roll lifting mechanism for separating the feed rolls periodically between feed advances, an independently operable roll opening mechanism including means to retain the opened rolls automatically in open position while the press is in operation and auxiliary blocking means to permit closing of the previously opened feed rolls only during rest periods of the feed; a brake mechanism including a friction brake, resilient means for exerting a normal predetermined braking force on said friction brake, control means for said resilient means for intermittently increasing said predetermined braking force to a maximum to prevent overtravel of the feed rolls and to then return said braking force to said normal value; in combination with a common control unit for the timed operation of all said mechanisms and parts thereof comprising a control-shaft, separate driving members for actuating each of said mechanisms, said driving members being secured to said control-shaft, means for oscillating said control-shaft in step with the operation of the press, means for changing the phase relationship between the operation of said press and the oscillation of said control-shaft to similarly and simultaneously change the synchronism of all said mechanisms actuated by said driving members, and auxiliary means for changing the timing of said driving members individually with respect to one another and with respect to said control-shaft.

14. In an automatic feeding device having a pair of cooperating feeding means for stepwise advancing a work-piece into a machine having a rotatable drive shaft, a lifting mechanism for automatically lifting one of said feed means between feed advances; a work-piece starting device comprising manually actuated means for opening said feed means and an automatic blocking mechanism for preventing the closing of the manually opened feed means during feed advances; friction brake means for said feeding means, a mechanical brake-operating mechanism for automatically controlling said brake means to prevent overtravel; a single control-shaft for all of said mechanisms, means in operative engagewith said drive shaft for oscillating said control-shaft in synchronism therewith, a plurality of members fixed to said control-shaft adjacent said mechanisms for actuating and individually synchronizing the same with respect to said rotatable drive shaft.

15. In an automatic roll feed having a pair of cooperating feed rolls for stepwise advancing the work-material into a machine having a rotatable drive shaft, a roll-lifting mechanism for intermittently separating said feed rolls to release the work-material momentarily between feed advances; friction brake means for said feed rolls, a mechanical brake-operating mechanism for controlling said brake means to prevent overtravel, a control-shaft, means in operative engagement with said drive shaft for oscillating said control-shaft in synchronism therewith, a plurality of driving members fixed to said control-shaft adjacent said mechainsms for actuating the same, and adjustable means on said driving members for individually synchronizing each mechanism with respect to said rotating drive shaft.

16. A flying adjustment device for controlling the degree of oscillation of a friction ratchet mounted on a shaft to intermittently rotate the same, comprising an eccentric sleeve mounted on the shaft, an oscillatable rocker-arm carried on said sleeve, the friction ratchet having an aperture extending radially with respect to said shaft, a connector fast to said rocker-arm and slidingly interlocked with said aperture, means for angularly displacing said eccentric sleeve for varying the radial position of said connector in said aperture to change the effective length of said rocker-arm.

17. A flying adjustment device for controlling the degree of oscillation of a gear adapted to be oscillated, comprising a shaft for supporting said gear, an eccentric bushing on said shaft, an oscillatable driving element carried on said eccentric bushing, said gear having an aperture extending radially of said shaft, a connector fixed to said driving element and in operative engagement with said aperture, means for turning said eccentric bushing on said shaft to displace said connector element radially in said aperture while the gear is being oscillated, and means for maintaining said eccentric bushing in its turned position.

18. A flying adjustment for controlling the degree of oscillation of a driven member comprising an eccentric sleeve, a shaft for supporting said eccentric sleeve, bearing means on said shaft for supporting the same, an oscillatable driving lever freely mounted on said eccentric sleeve, said driven member having a radially extending aperture, a connector element fixed to said oscillatable lever and operatively engaging the aperture of said driven member, means for turning said eccentric sleeve on said shaft to move said connector element to and fro in said aperture while the driven member is oscillating, and means for locking said eccentric sleeve in its new position.

19. A device for regulating the degree of oscillation around a shaft of a driven member comprising a driving element adapted to be oscillated, an eccentric sleeve on the shaft for supporting said driving element, the driven member having an aperture extending radially of said shaft, a pillow-block fastened to said driving element and drivingly engaging the aperture of said driven member, means for angularly turning said eccentric sleeve on said shaft, whereby said driving element is displaced and its associated pillow-block moved to and fro in said aperture resulting in a change in the effective length of said driving element, and means for maintaining said eccentric sleeve in its turned position.

20. A flying adjustment device for controlling the degree of oscillation of a friction ratchet comprising a shaft, an eccentric bushing on said shaft, an oscillatable drive member supported by said eccentric bushing, a pillow-block fixed to said drive member, radially extending means on said friction ratchet adapted to slidingly receive said pillow-block, means for angularly actuating said eccentric bushing to displace said drive member and hence to vary the radial position of said pillow-block in controlling the effective oscillatory drive of said friction ratchet.

21. A flying adjustment for controlling the degree of oscillation of a one-way clutch mechanism mounted on a shaft to be intermittently rotated, comprising an eccentric bushing on said shaft, an element supported by said eccentric bushing and adapted to be oscillated, a member fast to said one-way clutch mechanism having an aperture extending radially of said shaft, a pillow-block fast to said element and aligned to engage the aperture of said member, means for angularly displacing said eccentric bushing on said shaft, whereby the radial position of said pillow-block along said aperture is varied to control the degree of oscillation of said one-way clutch mechanism.

22. A device for the automatic control of a brake for intermittent work feeding means comprising a brake for controlling the feeding means to prevent overtravel, spring means for exerting a predetermined nominal braking pressure on said brake, control means for said spring means for intermittently increasing said predetermined nominal braking pressure to a maximum and to then return said braking pressure automatically to said nominal value comprising a control-shaft, means for oscillating said control-shaft in synchronism with the operation of the feeding means, a cam having a cam slope and being rotatably mounted on said control-shaft, twin driving members fixed to said control-shaft for intermittently oscillating said cam, a bell-crank having one arm in engagement with said cam and being displaceable by said cam slope and having its other arm positioned to additionally compress said spring means when displaced, said bell-crank being automatically returned into its original position by said spring means when freed by said cam slope, adjusting means on each of said twin driving members for changing the phase relationship

between the oscillation of said cam to change the automatic braking cycle with respect to the operating cycle of the feeding means.

23. An intermittent oscillating movement in a control unit for an automatic feed of a machine having a drive shaft comprising a control-shaft, means for operatively connecting said drive shaft and said control-shaft for continuously oscillating said control-shaft through a predetermined angle, an actuated member to be intermittently oscillated, said actuated member having a projection and being journaled on said control-shaft, an actuator secured to said control-shaft and continuously oscillating therewith, said actuator having two spaced apart driving lugs one on each side of and in operative alignment with said projection and a predetermined distance away therefrom to effect an intermittent oscillation of said actuated member as said driving lugs impinge alternately upon opposite sides of said projection, adjustable means on said driving lugs for changing the timing between the rotation of said drive shaft and the intermittent oscillation of said actuated member.

24. In a press with a roll feed having a plurality of individually controlled mechanisms, a common control unit for the timed operation of all said mechanisms and parts thereof comprising a control-shaft, separate driving members for actuating each of said mechanisms, said driving members being secured to said control-shaft, means for oscillating said control-shaft in step with the operation of the press, means for changing the phase relationship between the operation of said press and the oscillation of said control-shaft to similarly and simultaneously change the synchronism of all said mechanisms actuated by said driving members, and auxiliary means for changing the timing of said driving members individually with respect to one another and with respect to said control-shaft.

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