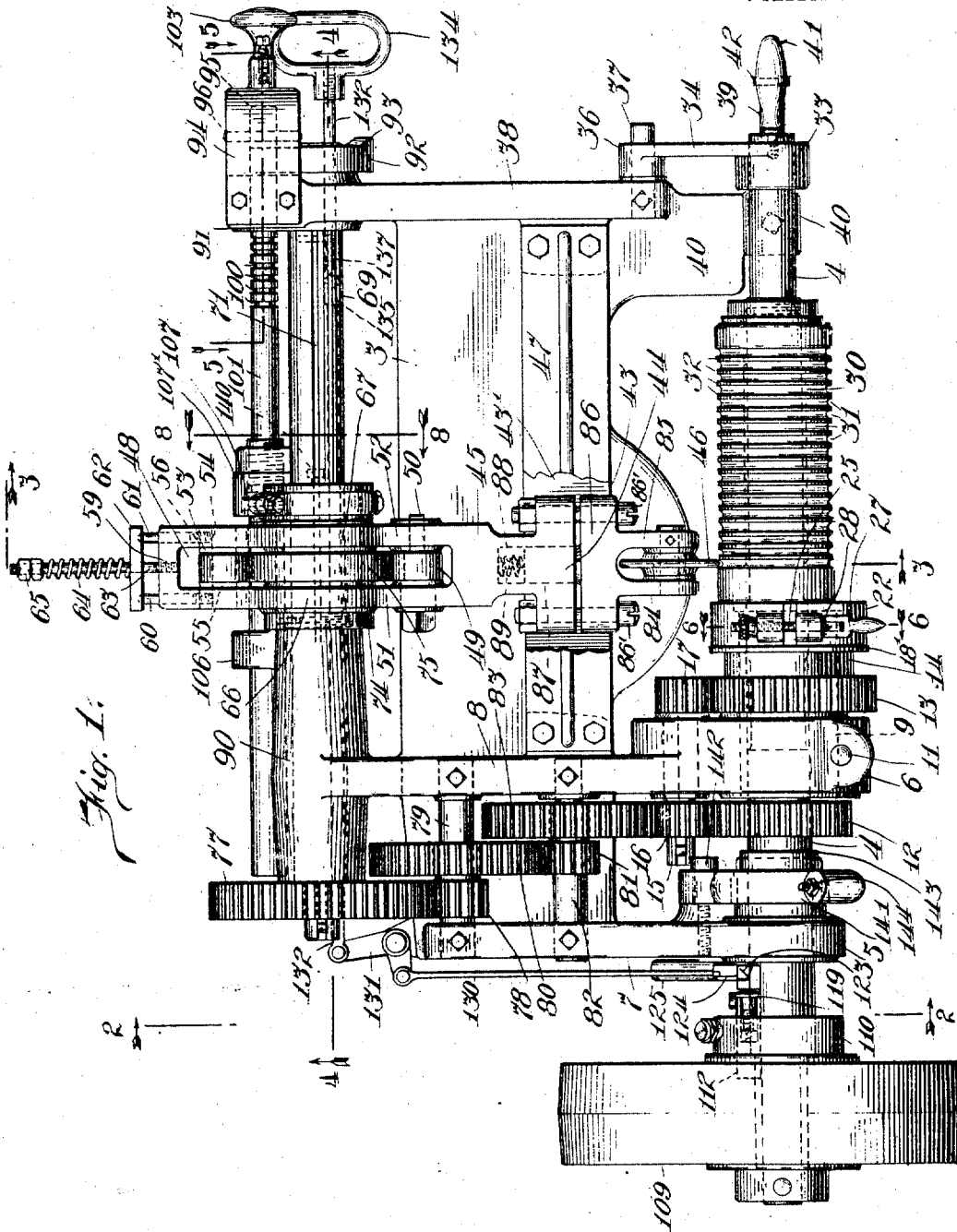


H. C. H. WALSH.
METAL CREASING MACHINE.
APPLICATION FILED OCT. 31, 1910.

1,002,342.

Patented Sept. 5, 1911.

5 SHEETS—SHEET 1.



Witnesses
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C. J. Schinner

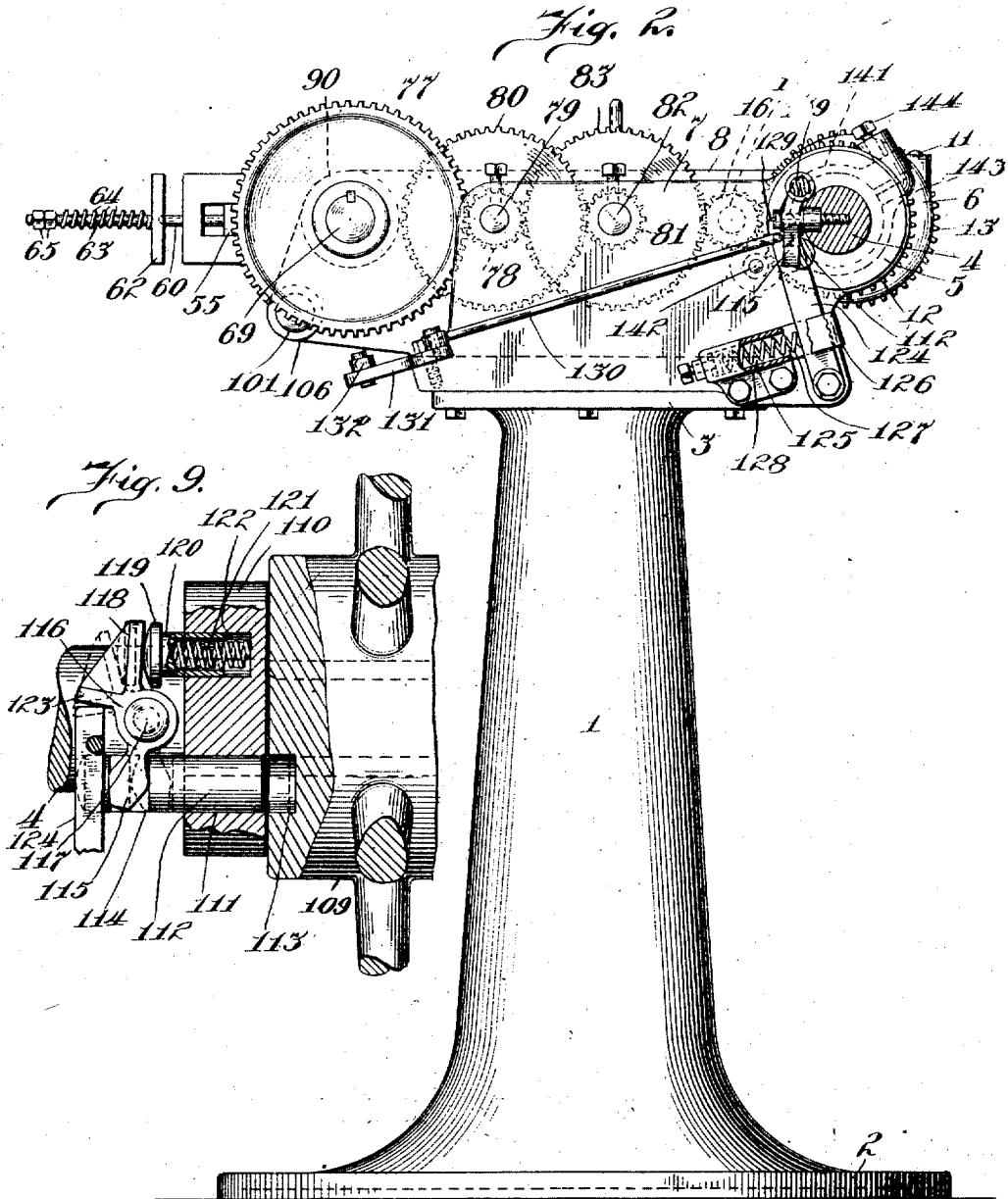
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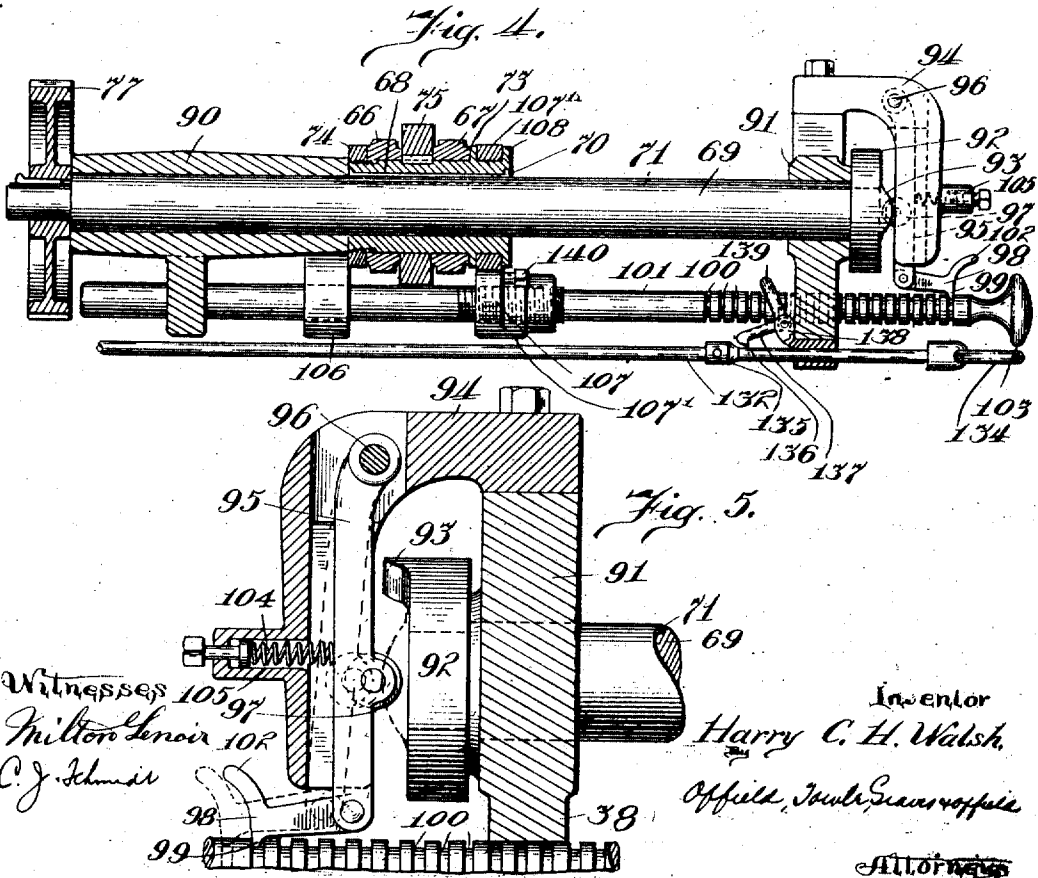
6 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

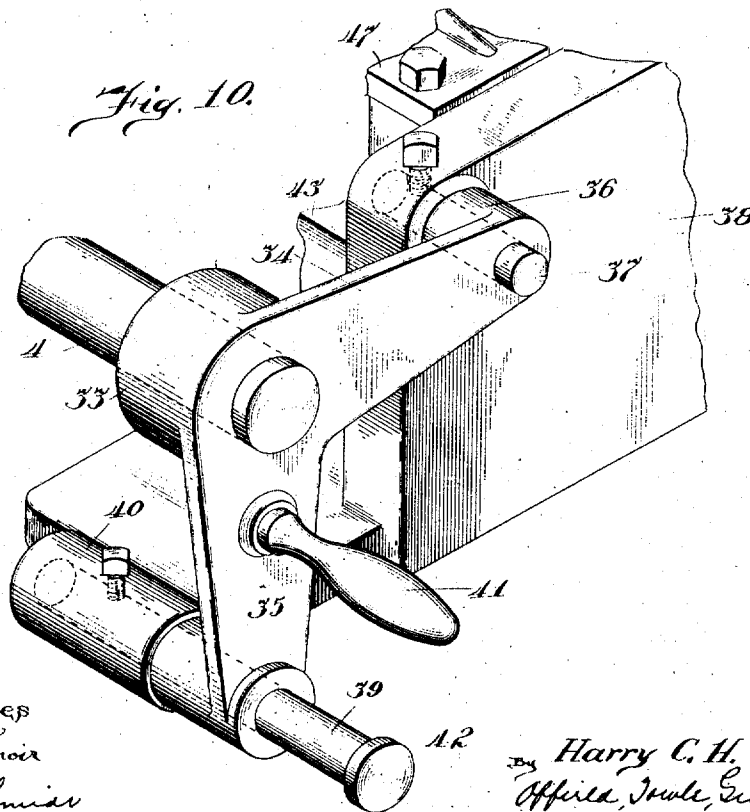
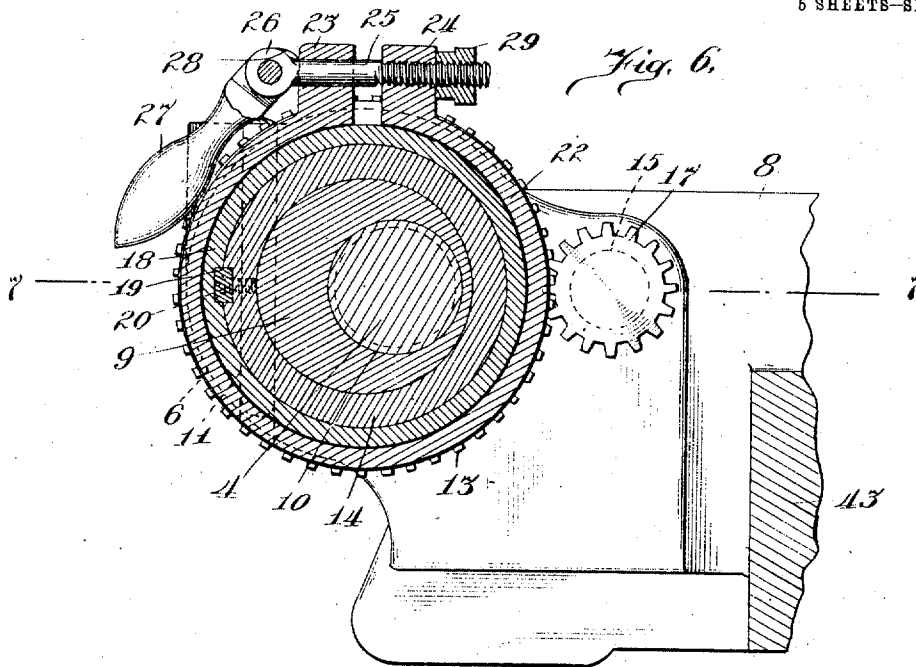


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5 SHEETS—SHEET 4.

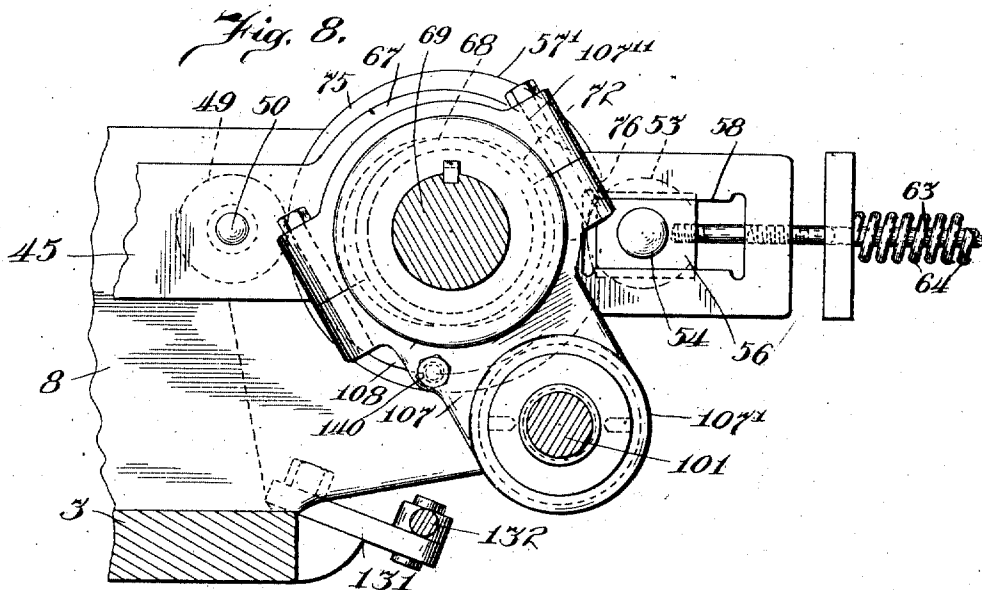


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1,002,342.

6 SHEETS--SHEET 5.



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UNITED STATES PATENT OFFICE.

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METAL-CREASING MACHINE.

1,002,342.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed October 31, 1910. Serial No. 589,850.

To all whom it may concern:

Be it known that I, HARRY C. H. WALSH, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Metal-Creasing Machines, of which the following is a full, true, and precise specification.

My invention relates to metal creasing machines, more particularly to machines for forming creases in primarily straight and cylindrical sheet metal pipe or tube sections to put them in condition to be readily bent into the form of elbows.

In my co-pending application, Serial No. 490,680, filed April 19, 1909, I disclose a machine for creasing sheet metal, but this machine is not entirely automatic, it being necessary to set the creasing rollers or disks after each operation of forming a crease, the machine thus constantly requiring an attendant.

One important object of my present invention is to provide a construction in which a creasing disk is automatically shifted from one creasing plane into another.

Another important object is to provide drive controlling mechanism which can be primarily set to start the machine, which is automatically held in adjustment to maintain driving of the machine until the creasing operation on a blank set into the machine has been completed, and which is automatically restored to cause stopping of the machine after such creasing operation.

In general, my invention has for its object to provide a machine of the class described, which is of simple construction and which will rapidly and efficiently crease a fed-in blank and which is entirely automatic in its operation from the time it is started at the beginning of the creasing operation up to the time when the creasing operation on a blank is finished.

In the accompanying drawings, which clearly illustrate my invention Figure 1 is a plan view of a machine, Fig. 2 is a side elevational view taken from plane 2—2, Fig. 1, Fig. 3 is a sectional view taken on plane 3—3, Fig. 1, Fig. 4 is a sectional view taken on plane 4—4, Fig. 1, Fig. 5 is an enlarged sectional view taken substantially on plane 5—5, Fig. 1, Fig. 6 is an enlarged sectional view taken on plane 6—6, Fig. 1, Fig. 7 is a sectional view taken on plane 7—7, Fig. 6, Fig. 8 is an enlarged sectional view taken on

plane 8—8, Fig. 1, Fig. 9 is an enlarged view partly sectional, showing the clutch mechanism for controlling the connection of the driving shaft with the driving pulley, and Fig. 10 is an enlarged perspective view of a removable bearing structure for the main shaft of the machine.

The supporting frame for the machinery parts comprises a tubular standard 1 rising from a base 2 and supporting at its top a bed plate or table 3. A main shaft 4 is journaled in main bearing heads 5 and 6 formed at the front upper ends of upright walls 7 and 8 extending from the bed plate 3, as best shown in Figs. 1 and 2. As best shown in Figs. 6 and 7, the bearing head 6 carries a bushing 9 having the eccentric bore 10, in which shaft 4 is directly journaled, this bushing being prevented from rotation within the bearing head by a key 11. Keyed to shaft 4 adjacent the outside of the bearing head 6 is a transmission gear 12, and rotatably mounted on the bushing 9 adjacent the inner side of the bearing head 6 is a gear 13, whose hub 14 extends inwardly a distance to the inner end of the bushing 9. Counter-shaft 15 is journaled in the wall 7 to the rear of the shaft 4 and mounts at its outer end a transmission pinion 16 and at its inner end a transmission pinion 17, pinion 16 meshing with transmission gear 12 and pinion 17 meshing with gear 13, so that the rotation of the shaft 4 will be transmitted through gears 12, 16 and 17 to gear 13 and its hub 14. Mounted on the inner end of hub 14 is a collar 18, which is secured to rotate with the hub by means of a key 19, this key being secured to the hub by set screw 20 and having an end projection 21, the collar having longitudinal movement on the hub limited by the key projection 21 and the gear 13.

As best shown in Fig. 6, a clamping strap or band 22 encircles the collar 18 and has lugs 23 and 24 for receiving the clamping screw 25. This clamping screw has a bifurcated head 26, to which is pivoted a hand lever 27 having an inner cam end 28 for coöperating with lug 23 to draw the lugs together. A thumb nut 29 engages the threaded end of the screw 25, so that the strap can be primarily adjusted for any desired clamping action. When the lever 27 is raised, lugs 23 may be spread apart, so that the end of tubular blank B (Fig. 7)

may be inserted between the collar 18 and the strap to abut against the flange 18' at the inner end of the collar. Lever 27 is then swung downwardly to draw the strap 22 firmly against the collar and thus to clamp the blank securely in place to rotate upon rotation of shaft 4. Rigidly mounted on the inner end of shaft 4 adjacent collar 18 is a die-roller 30 having the peripheral 10 grooves 31 formed between peripheral ridges 32, these grooves and ridges being in planes at right angles to the roller axis. The eccentric position of the shaft 4 within bushing 9 is such that the horizontal distance inwardly from the center of shaft 4 to the 15 outer periphery of the collar 18 is equal to the external radius of the roller, so that the blank will be parallel with and against the roller along its inner side. Furthermore, 20 the gearing adjustment between the shaft and the collar 18 is such that the collar will have the same peripheral speed as that of the roller.

Referring particularly to Figs. 1, 3 and 25 10, the inner end of the shaft 4 is supported in a removable bearing frame 33, this frame having horizontal and vertical arms 34 and 35, the arm 34 terminating at its inner end in a sleeve 36 adapted for sliding engagement with a stud 37 extending from the wall 38 projecting upwardly from the bed plate 3. The arm 35 extends downwardly and has sliding engagement with a stud 39 extending horizontally from the end of the forwardly 30 projecting part 40 of the bed plate 3. When it is desired to apply a tubular blank to the die roller, the bearing frame is by means of a handle 41 slid outwardly on its supporting studs until sleeve 36 of arm 34 leaves 40 stud 37, and the bearing head 33 leaves the end of the shaft 4, whereupon the bearing frame can be swung downwardly away from the end of shaft 4, so that the blank can be slipped over the die roller and into the 45 clamping mechanism. The stud 39 is longer than stud 37, and a flange 42 at the outer end thereof will prevent arm 35 on the bearing frame from leaving the stud, this stud acting as a bearing pivot for the bearing frame, 50 when this frame is swung away from the shaft 4. When the tubular blank is inserted the bearing frame is again swung back and its ends slid along the studs to carry the bearing head 33 to again receive the end of shaft 4 55 to assist in supporting the shaft during the creasing operation. Extending upwardly from the bed plate 3 is a wall 43 whose upper surface forms a slide-way 43' parallel with shaft 4 for supporting the head 44 of the traveling carriage 45 for the creasing disk 46. A beam 47 secured at the ends of the wall 43 bridges over the surface 43' and forms the upper guide surface for the carriage 45. The rear end of frame 45 has 60 a longitudinal vertical compartment 48.

Within the front end of this compartment a cam roller 49 is pivoted to a pin 50 extending through the side walls 51 and 52 adjacent the compartment. Within the compartment at its rear end is the roller 53 70 mounted on the shaft 54 journaled in slide blocks 55 and 56 confined within the longitudinal recesses 57 and 58 formed in the walls 51 and 52. Extending rearwardly from the blocks and through the rear wall 59 75 of the carrier frame are guide pins 60 and 61 respectively, whose outer ends abut against a plate 62 slidable on a rod 63 secured to and extending rearwardly from the wall 59 of the carrier frame, a spring 64 encircling this 80 rod between the plate 62 and nuts 65 engaging the end of the rod, the pressure of the spring tending to force forwardly the bearing blocks of the roller 53. The intermediate sections 66 and 67 of walls 51 and 52 of 85 the carrier frame are expanded to receive a sleeve 68, which sleeve is mounted on shaft 69 by means of a key 70 operating in keyway 71, so that the sleeve may have longitudinal movement of shaft 69 but must rotate 90 therewith. The openings 72 through the expanded sections 66 and 67 are elliptical, the vertical diameter being the same as the outer diameter of sleeve 68, but the longitudinal diameter being somewhat longer, so that the 95 carrier frame 45 may have forward and back reciprocal movement to carry the creasing disk 46 toward and away from the die roller, the carrier frame 45 being supported in its forward and back reciprocal movement by the surface 43' and the sleeve 68. 100 The walls 51 and 52 are confined on the sleeve 68 between an intermediate flange 73 on said sleeve and a collar 74 having threaded engagement with the end of the sleeve, as best shown in Fig. 4. Keyed to the sleeve 105 between the expanded sections 66 and 67 of the carrier frame is a cam disk 75 whose cylindric cam surface 57' is broken by a notch 76. This cam disk is between the cam roller 49 and the roller 53. In the position shown in Fig. 3 the notch 76 receives the cam roller 49, and the carrier frame is in its rear position to hold the creasing disk 46 110 away from the die roll, the spring 64 acting to draw the carrier frame rearwardly when the notch comes in position to receive the cam roller. When the cam disk is now rotated the cam roller will engage the outer cylindric cam surface, and the carrier frame 120 will be shifted forwardly to carry the creasing disk to the die roll, and this position is maintained through a complete rotation of the cam disk.

Referring particularly to Figs. 1 and 4, 125 shaft 69 at its left end carries a gear 77 which meshes with a pinion 78 mounted on arbor 79 mounted between the walls 7 and 8 extending from the bed plate 3. This arbor also mounts a gear 80 secured to ro- 130

tate with pinion 78, and this gear meshes with a pinion 81 mounted on arbor 82 also supported by the walls 7 and 8, a gear 83 mounted on this arbor being secured to rotate with pinion 81, this gear 83 meshing with the pinion 16 meshing with gear 12 on main shaft 4. The transmission train between shafts 4 and 69 is such as will reduce the rate of rotation of the shaft 69 so that the main shaft and the die roll thereon will rotate a number of times for one rotation of shaft 69 and the cam disk 75. The creasing disk 46 is pivoted between the bifurcate ends 84 and 85 extending from the head 86, which head is slidably supported on bolts 86' extending forwardly from the head 44 of the carrier 45. A plunger extension 87 extends rearwardly from the head 86 and into a pocket 88 formed in head 44, a spring 89 being inserted in the pocket to abut against the plunger, this spring tending to hold the head 86 outwardly against the heads of the bolts 86'. Therefore, when the carrier frame 45 is shifted forwardly upon engagement of the cam roller with the cylindrical surface of the cam disk the creasing disk will yieldably force its way into the corresponding groove of the die roll, and as the die roll is given a number of rotations for each rotation of the cam disk, the metal of the blank will be gradually deflected and worked into the groove with which the creasing disk is associated. This gradual working of the metal into form will eliminate cracking or breaking thereof and the formation of weak spots.

Referring now to Figs. 1, 4 and 5, the shaft 69 is journaled in a bearing sleeve 90 supported from the rear end of wall 8 and in a bearing head 91 at the rear end of wall 38, the right end of the shaft carrying a cam disk 92 having the axially extending cam ridge 93 formed on its outer face. The L-shaped frame 94 is secured to the top of the bearing head 91 and depends in front of the cam disk. A cam lever 95 is pivoted at its upper end 96 to the frame 94, and at an intermediate point pivots a cam roller 97 in the path of the cam ridge 93, the lower end of the lever 95 pivoting a pawl arm 98 whose pawl tooth or point 99 cooperates with notches 100 formed in the rod 101. The pawl arm has the extension 102 whereby it may be readily lifted from the notches 100, and the rod 101 at its outer end has the manipulating head 103. The cam roller 97 is held in the path of the cam ridge 93 by a spring 104 abutting against lever 95 and accommodated in the pocketed lug 105 extending from frame 94. Shaft 101 is slidably supported in the wall 38 and in a lug 106 extending from the bearing sleeve 90, and upon each rotation of shaft 69 and the cam disk 92 the pawl supporting lever

95 will be swung outwardly whereby the rod 101 is shifted outwardly a distance by the pawl, the pawl upon return of the lever gliding back over the rod to carry its tooth into engagement with the next notch, and so on. This step by step movement of the rod 101 is communicated to the sleeve 68 by the connecting frame 107 (Figs. 4 and 8), the lower head 107' of this frame being secured to the rod, and the upper head 107'' being clamped about the sleeve to allow rotation of the sleeve therein, but being confined against lateral displacement by the intermediate flange 73 on said sleeve and the end flange 108 thereon. Thus, for each rotation of the shaft 69 and sleeve 68 thereon the sleeve will be shifted laterally a distance with the rod 101, the shifting distances being equal to the distances between the creasing grooves on the die roll, so that after the creasing disk has cooperated with one creasing groove, the carrier frame will be automatically shifted to carry the disk into position before the next groove, and so on until the creasing operation on the blank is completed.

In order that the machine may be automatically stopped when the last crease has been formed in the blank I provide the following mechanism. Referring first to Fig. 9, the driving pulley 109 is loosely mounted on shaft 4, and adjacent the hub of this pulley a clutch collar 110 is keyed to the shaft. This clutch collar has the passageway 111 therethrough for receiving the clutch pin 112, the hub having the clutch pocket 113 in which the end of the pin may engage to clutch the pulley to the collar and thus to the shaft. The outer end of the clutch pin has a transverse slot 114 in which plays the arm 115 extending from the hub 116 pivoted to a pin 117 extending from the shaft 4 adjacent the clutch collar 110. An arm 118 extending in the opposite direction from hub 116 abuts against the head 119 at the end of a sleeve 120, which slides in pocket 121 formed in the clutch collar, a spring 122 being confined in this pocket and in the sleeve 120. The head 119 is thus urged outwardly by the spring against the arm 118 so that the arm 115 presses inwardly on the clutch pin ready to force the pin into the pocket 113 when this pocket comes into register with the passageway 111. The hub 116 has also a cam extension 123 for cooperating with the end of an arm 124 pivoted to the wall 7 below shaft 4. A frame 125 mounted on the wall 7 has an abutment extension 126 looping about the arm to form a slide-way therefor, and a spring 127 mounted in the pocket 128 in this frame abuts against the arm and tends to swing this arm against the abutment 126 and into position to hold its upper rounded end 129 in the path of the cam abutment 123 on hub 116, so that when

the arm is in this position and the cam abutment is carried against the end thereof with the rotating shaft, the hub 116 will be rotated against the compression of spring 122 to withdraw the clutch pin from the pulley hub, thus to release the pulley from the shaft. Pivoted to the arm 124 is a link 130 which pivots to one arm of a bell crank lever 131 pivoted at its elbow to the rear end of wall 7, the other arm of this lever being pivoted to the clutch rod 132, which slides through the wall 38 and which at its end has the handle 134. In normal position the spring 127 holds arm 124 in position to effect uncoupling of the driving pulley from shaft 4, and to effect coupling connection clutch rod 132 is drawn outwardly to rotate the arm 124 to carry its end away from the cam abutment 123 to allow the spring 122 to effect movement of the clutch pin 112 into clutching engagement within the pulley, so that the shaft 4 can be driven by the pulley. Referring particularly to Fig. 4, clutch rod 132 has a latch collar 135 secured thereon which receives in latching engagement the hooked end 136 of a latch arm 137 which is pivoted between lugs 138 extending from wall 38. Therefore, when the clutch lever 132 is pulled out it will be latched and held in this outer position. As shown in Figs. 3 and 4, the latch arm 137 has a trip arm 139 extending upwardly and then across the rod 101 and in the path of a trip extension 140 on the head 107' of the connecting frame 107. When the carrier frame 45 has been shifted to carry the creasing disk in position in front of the last creasing groove on the die roll the extension 140 will be just in front of the trip extension 139 of the latch arm, and when the rod 101 is shifted again by the next engagement of the cam roller with the cam disk 92 the extensions 140 and 139 will cooperate to raise the latch arm 137 to release the end 136 from the latch collar 135, so that the spring 127 may become effective to shift the clutch lever to its normal position and to swing the arm 124 to carry its end into the path of the cam abutment 123 of the clutch pin controlling mechanism, so that when the abutment strikes the end of the arm the hub 116 will be rotated and the lever 115 swung to carry the clutch pin out of clutch pocket 113 to thereby unclutch the driving pulley from the shaft. To more quickly stop the machine after such unclutching, a breaking strap 114 is pivoted to a stud 142 extending from wall 7 and embraces a sleeve 143 pinned to shaft 4 (Figs. 1 and 2). The frictional engagement is adjusted by a screw 144. This frictional engagement of the breaking strap quickly brings the machine parts to rest after uncoupling of the driving pulley, and it also serves to make the operation of the machine more steady and more uniform.

I claim—

1. In a machine of the class described, the combination of a main driving shaft, a die roll mounted on said shaft to rotate therewith, a counter shaft and a transmission train connecting said counter shaft with the main shaft, a cam carried on said counter shaft, a reciprocable carrier frame, a cam roller on said frame cooperating with said cam on the counter shaft to cause reciprocation of the carrier frame upon rotation of the counter shaft, a creasing disk pivoted on said carrier frame to be reciprocated into and out of cooperative association with said die roll, and means for shifting said carrier frame step by step in a direction parallel with the axis of the die roll.

2. In a machine of the class described, the combination of a main driving shaft, a die roll mounted on said shaft to rotate therewith, a counter shaft and a transmission train connecting said counter shaft with the main shaft, a cam carried on said counter shaft, a reciprocable carrier frame, a cam roller on said frame cooperating with said cam on the counter shaft to cause reciprocation of the carrier frame upon rotation of the counter shaft, a creasing disk pivoted on said carrier frame to be reciprocated into and out of cooperative association with said die roll, and means automatically controlled by the rotation of said counter shaft to shift the carrier step by step in a direction parallel with the axis of the die roll to carry the creasing disk successively from one position to another with reference to the die roll.

3. In a machine of the class described, the combination of a main driving shaft, a die roll mounted on said shaft to rotate therewith, a counter shaft and a transmission train connecting said counter shaft with the main shaft, a cam carried on said counter shaft, a reciprocable carrier frame, a cam roller on said frame cooperating with said cam on the counter shaft to cause reciprocation of the carrier frame upon rotation of the counter shaft, a creasing disk pivoted on said carrier frame to be reciprocated into and out of cooperative association with said die roll, and pawl and ratchet mechanism connected with said carrier frame and said counter shaft and controlled upon rotation of the counter shaft, to cause step by step bodily shifting of the carrier frame to carry the creasing disk from one position to another with reference to the die roll.

4. In a machine of the class described, the combination of a main driving shaft, a die roll mounted on said shaft and having a plurality of forming grooves, means for supporting a blank to rotate with said roll, a counter shaft connected with the main

shaft, a carrier frame mounted to reciprocate at right angles to the axis of said roll and carrying a creasing disk for cooperating with the grooves of the die roll, cam mechanism connecting with said counter shaft and carrier frame for causing reciprocation of said frame upon rotating of said counter shaft, means adapting said carrier frame to move bodily in a direction parallel to the counter shaft, and pawl and ratchet mechanism controlled by the rotation of said counter shaft to cause step by step bodily shifting of said carrier frame alternately with its reciprocations by said cam mechanism.

5. In a machine of the class described, the combination of a main shaft, a die roll mounted on said shaft to rotate therewith and having a row of peripheral grooves, means for supporting a blank on said roll in position to be creased, a carrier frame adapted to reciprocate in a direction at right angles with the axis of said roll, a creasing disk pivoted on said carrier frame to cooperate with the grooves on said roll, a counter shaft connected with the main shaft, a cam train connecting said counter shaft with the carrier frame for causing reciprocation of said frame upon rotation of the counter shaft to carry the creasing disk to and from the roll, said carrier frame being adapted to move bodily in a direction parallel with the die roll, cam mechanism actuated by said counter shaft, and pawl and ratchet mechanism controlled by said cam mechanism to effect step by step bodily shifting of the carrier frame parallel with the die roll to carry the creasing disk successively into association with the grooves of said die roll.

6. In a machine of the class described, the combination of a main shaft, a die roll mounted on said shaft and having a plurality of creasing grooves in its surface, means for securing a blank to rotate with the shaft and with the die roll, a carrier frame, a creasing disk pivoted to said carrier frame, said carrier frame being mounted to be moved bodily in a direction parallel to the roll axis and to be reciprocated in a direction at right angles with the axis of said roll, cam mechanism connected to be driven upon rotation of the main shaft, means controlled by said cam mechanism for effecting step by step lateral shifting of said carrier frame parallel with the roll to carry the creasing disk successively into position before the grooves of said roll, and a cam train connected in driving relation with said main shaft and with said carrier frame to effect forward movement of said frame after each lateral shift thereof, thereby to move the creasing disk into operative association with the respective groove of the die roll.

7. In a machine of the class described, the

combination of a main shaft, a die roll mounted on said shaft, means for clamping a blank in position on the die roll, a companion die member, and means for automatically causing the companion die member to be alternately shifted bodily in a direction parallel with the die roll and in a direction at right angles with said die roll.

8. In a machine of the class described, the combination of a main shaft, a die roll mounted on said shaft and having a row of peripheral grooves, a carrier frame, a creasing disk pivoted on said carrier frame, said frame being adapted to reciprocate longitudinally at right angles with the roll and to be shifted laterally bodily parallel with the roll, cam mechanism connected in driving relation with the main shaft for controlling the longitudinal movement of said frame, cam mechanism connected in driving relation with the main shaft for controlling the lateral movement of said frame, and means for causing alternate operation of said cam mechanisms to cause alternate lateral and longitudinal movement of said frame whereby to carry said creasing disk successively into operative association with the grooves of said die roll.

9. In a machine of the class described, the combination of a main shaft, a die roll mounted on said shaft and having a row of peripheral circumferential grooves, a counter shaft, a transmission train connecting said counter shaft with the main shaft, a carrier frame pivoting a creasing disk, said frame being mounted to be moved laterally parallel with the die roll to shift the creasing disk bodily in axial direction and to be moved longitudinally in a direction perpendicular to the roll to carry the disk bodily in radial direction, a cam roller on said carrier frame, a cam disk on said counter shaft and cooperating with said cam roller to effect longitudinal movement of said frame, a ratchet bar connected with said frame, pawl mechanism for cooperating with said ratchet bar, and cam mechanism driven by said counter shaft to control the pawl mechanism to effect step by step shifting of said ratchet bar and of the carrier frame connected therewith.

10. In a machine of the class described, the combination of a main shaft, a die member mounted on said shaft, a carrier frame, a companion die member mounted on said carrier frame, means for bodily shifting said carrier frame to carry the companion die member in various positions with reference to the first die member, a main driving member, clutch mechanism for controlling the driving connection of said main driving member with the main shaft, a clutch lever for controlling said clutch mechanism, latch mechanism for locking said clutch lever in position after it has been adjusted to effect

operation of the clutch mechanism to connect the driving member with the driving shaft, means controlled upon bodily movement of said carrier frame to trip said
5 latch mechanism to release the clutch lever, and means for effecting unclutching of the clutch mechanism upon such release.

In witness whereof, I hereunto subscribe my name this 26th day of October, A. D., 1910.

HARRY C. H. WALSH.

Witnesses:

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