(No Model.) 2 Sheets—Sheet 1.

W. MASON.

MECHANICAL FEEDING DEVICE.

No. 301,736. Patented July 8, 1884.

Fig. 1

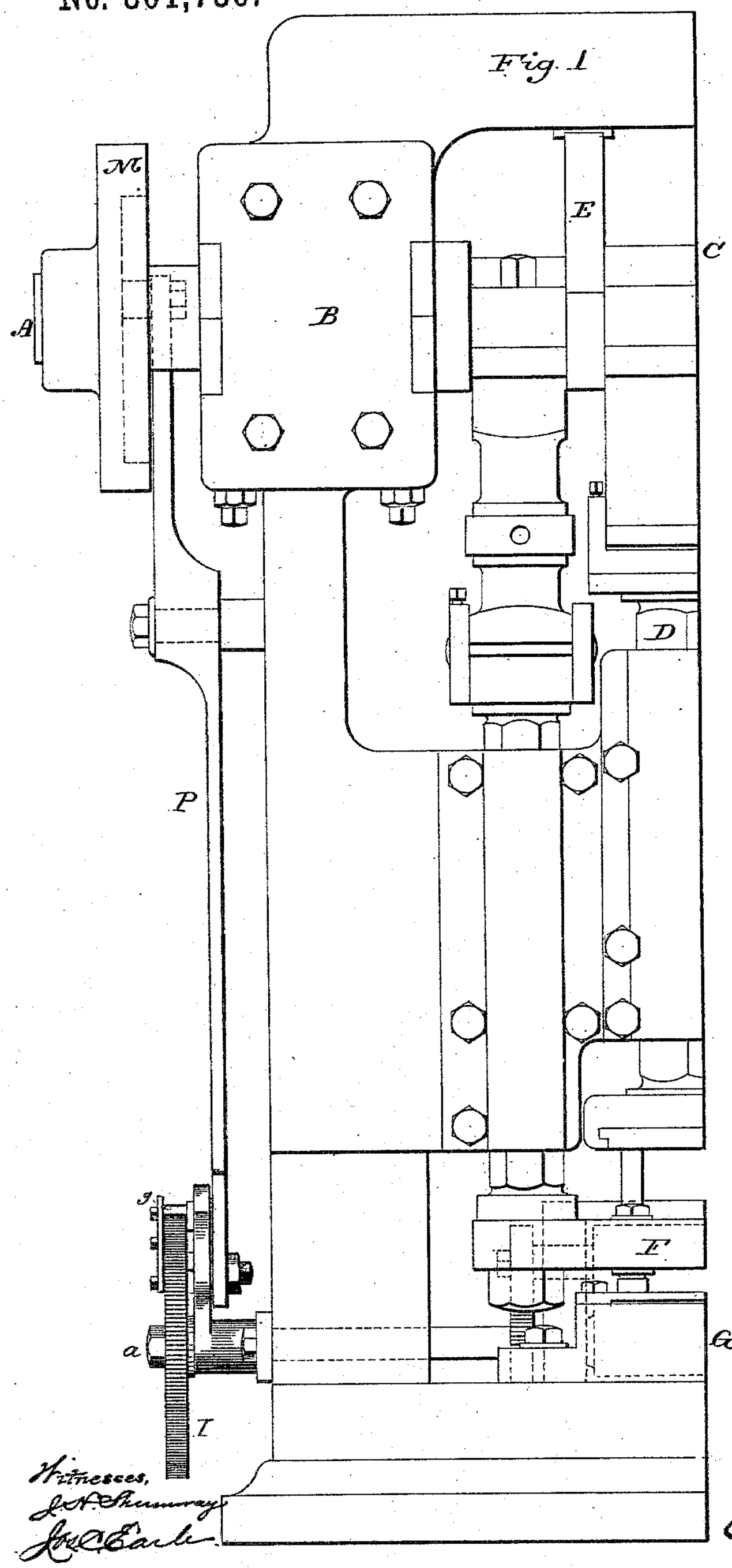
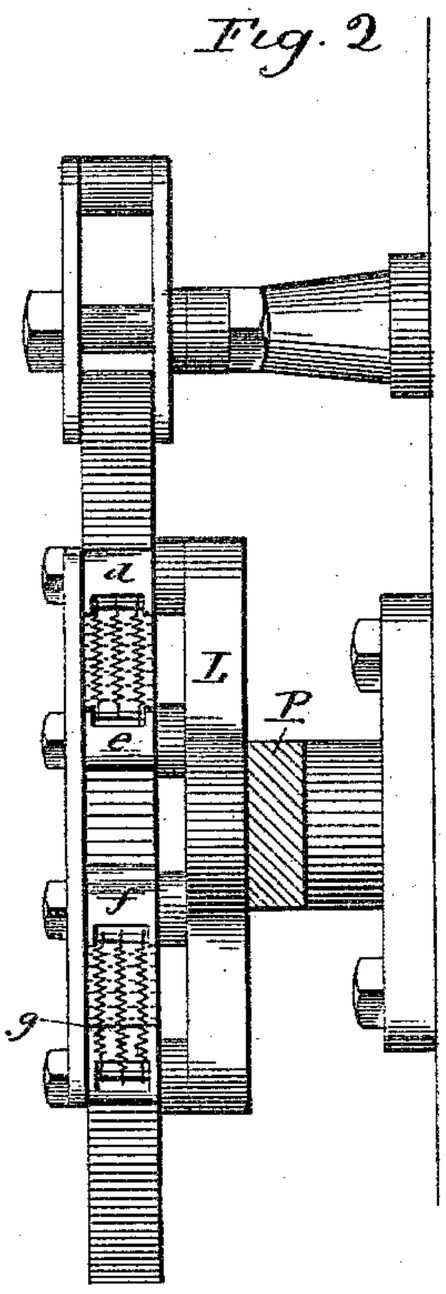


Fig. 2



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

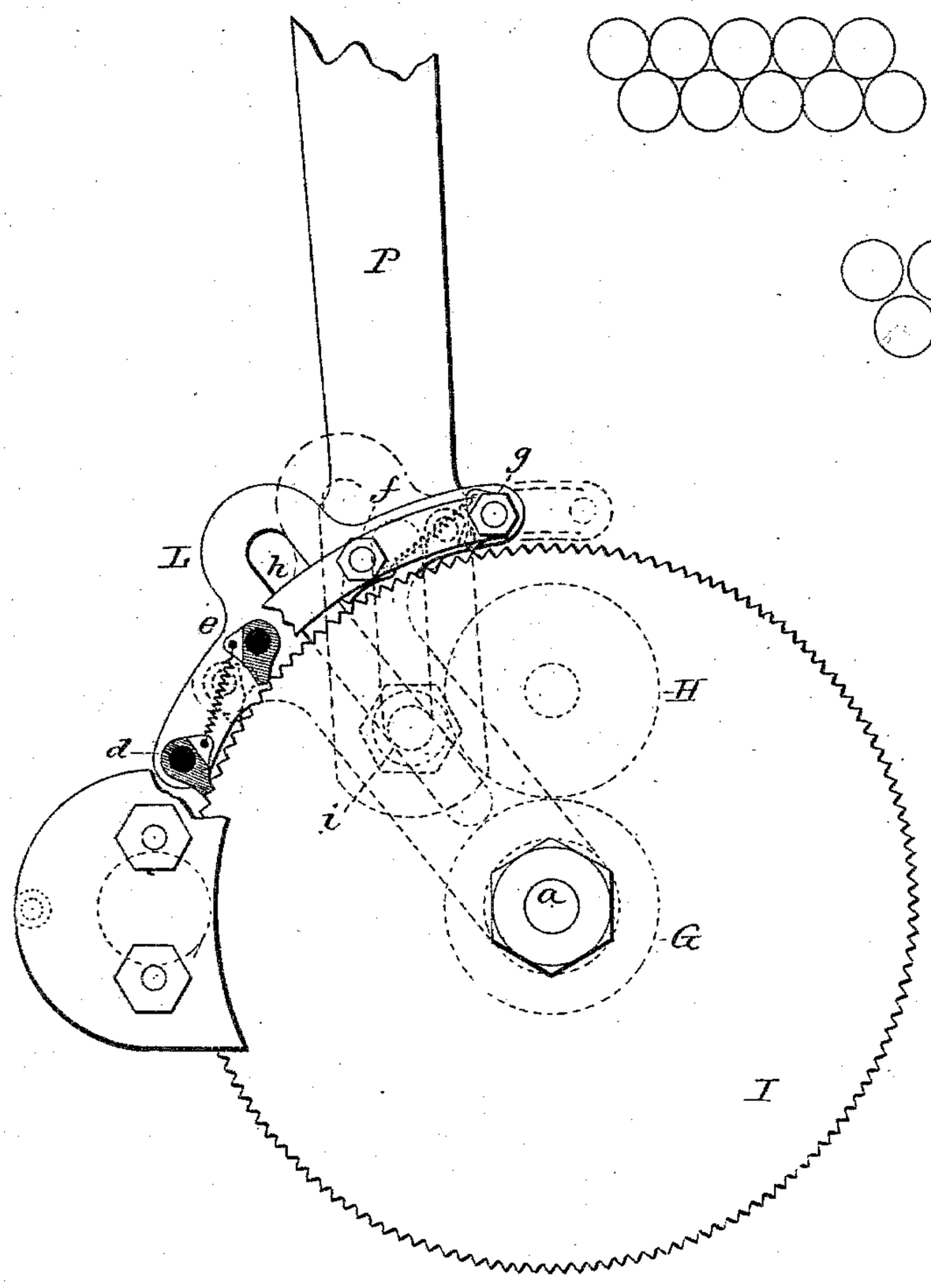
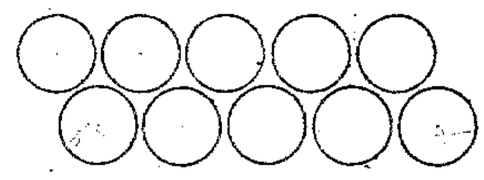


Fig. 4

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM MASON, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE WINCHESTER REPEATING ARMS COMPANY, OF SAME PLACE.

MECHANICAL FEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 301,736, dated July 8, 1884.

Application filed January 28, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MASON, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Mechanical Feeding Devices; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view of one-half of a punching and drawing machine, showing my invention as applied thereto, the feed being at the rear of the machine; Fig. 2, a top view of the ratchet-wheel, pawls, and connections, enlarged; Fig. 3, a side view of the same; Figs. 4 and 5, diagrams to illustrate the operation of the invention.

This invention relates to an improvement in that class of feeding devices which consist of a pair of rolls to which an intermittent rotation is given, and by which the material or article introduced between the rolls will receive therefrom an intermittent progressive movement. Such feeding apparatus is employed in various branches of manufacture—such, for instance, as feeding paper which is to be cut, or some act intermittently performed upon it, or feeding wire which is to be cut into certain lengths, sheet metal which is to be cut off into certain lengths, or which is to be punched at certain predetermined intervals, and the various other purposes for which such feeding-rolls are adapted. In the usual construction of such apparatus the intermittent rotation is imparted by means of a pawl hung upon an arm to which a vibratory movement is imparted, and in cases where a fine adjustment is required the ratchet-wheel is made of large diameter and fine teeth; but such adjustment is limited to the extent of a single tooth—that is, no adjustment can be made less than a single tooth—for the reason that the pawl engages one tooth to turn the wheel, then on the next turn will engage another, passing over perhaps several teeth before it so engages the second tooth; but as it cannot engage at any point between two adjacent teeth it must take either the tooth which it engaged in the first instance or the one next to it as the least variation which can be made. Again, in the employment of a wheel with such fine teeth, frequent breakages occur, and the breaking of a single tooth necessitates repairs before the machine can be further used. In many classes of work employing such feed a nicer adjustment is desirable, not to say necessary. For illustration, in cutting small blanks from sheet metal—say for cartridge-primer cups—unless the blanks be cut as close together as possible, the waste of metal will be very considerable. To avoid this waste the punchings must be as close together as possible, as seen in Fig. 4. Now, suppose the single ratchet-feed has the teeth of the wheel one-sixteenth of an inch pitch, from which, because of the less diameter of the roll, one thirty-second of an inch will be the least adjustment which can be made by the rolls, and suppose that in such machine the punchings are made as seen in Fig. 5, so as to leave a space between adjacent punchings slightly less than one thirty-second of an inch. Now, as the ratchet-wheel cannot be adjusted except to the extent of a single tooth, as before described, this is the minimum waste which can be produced on the machine in that condition. In such case, with the use of the single pawl, it has been necessary, in order to avoid such waste, to change the rolls, either by substituting others of smaller diameter or turning down those already in the machine. Therefore, to adjust the machine from one size punching to another, any adjustment less or more than the single tooth of the wheel necessitates a change in the diameter of the rolls.

The object of my invention is to overcome these difficulties; and it consists in combining with the feed-rolls a ratchet-wheel with several pawls, each of said pawls arranged in a different relative position to the teeth of the wheel, whereby the several pawls divide the distance between one tooth and the next, as more fully hereinafter described.

In illustrating my invention, I show it in a punching and drawing machine, of which it is necessary to give only a general description.

A represents the driving-shaft, arranged in suitable bearings, B, and to which power is applied in the usual manner of applying power to driving-shafts. On this shaft is the eccentric C, which carries the central or drawing slide D; E, an eccentric arranged on the same shaft, and which carries the plate F, giving to it the usual reciprocating motion to operate the punches connected to said plate; G H, the feed-rolls, (see broken lines, Fig. 3,) which are arranged with their axes parallel to each other, and distant from each other according to the thickness of the metal, and are arranged in the proper relative position to the punches and dies, and so that the sheet, strip, or whatever it may be, passed through them will be delivered into the proper relative position to the mechanism to operate thereon. On the shaft *a* of one of the rolls which extends outside, as seen in Fig. 1, the ratchet-wheel I is secured. The teeth of this wheel are cut in the usual manner of cutting ratchet-teeth, and as seen in Fig. 3. On the shaft *a* a lever, L, is loosely hung, and so as to vibrate on that shaft as a center. Vibratory motion is imparted to this lever by a cam, M, on the driving-shaft through a lever, P, and so as to turn the said lever from one extreme position to the other, as indicated by solid and broken lines in Fig. 3. At the periphery of the wheel the lever is extended, preferably, forward and back, and onto this extended surface several pawls, *d e f g*, more or less, are hung, as seen in Fig. 3. These pawls are arranged with relation to each other and the teeth of the wheel so as to divide the space of one tooth into several divisions—that is to say, suppose the forward pawl, *d*, to be in a position to exactly engage the tooth as shown, the next pawl, *e*, stands one-fourth of the pitch back of its tooth, the next pawl, *f*, stands two-fourths back of its tooth, and the pawl *g* three-fourths back of its tooth, and this is the extreme advance position of the lever. Now, if the lever in its return or backward movement be, say, four and one-half teeth, as seen in broken lines, Fig. 3, the pawl *f* will engage a tooth on the ratchet, while the pawl *d*, which before engaged the tooth, will stand two-fourths in rear of its next tooth. The lever advancing in this condition, the pawl *f* will be the active pawl. Then on the return four and one-half teeth the pawl *d* will again engage, making nine teeth in the two feeds; or suppose it to be four and one-fourth teeth, then, the pawl *d* having made the first engagement, the next pawl, *e*, will make the second at four and one-fourth. The next will be made by the third pawl making eight and one-half teeth in the two feeds. The next engagement will be by the pawl *g* making twelve and three-fourths teeth. Then the next engagement will be made by the pawl *d* making seventeen teeth. Thus each feed will have been to the extent of four and one-fourth teeth. The divisions between the pawls with relation to the teeth of the wheel varying by fractions of the pitch, the minimum adjustment will be the fraction of the pitch indicated by the number of pawls. It will therefore be seen that by increasing the number of pawls a very fine or minute adjustment may be made. If the feed be a full number of teeth, then the one pawl which happens to be in the position where the feed commences will be the only pawl to act while that extent of feed is retained.

For the purpose of increasing the throw of the lever, whereby a greater number of teeth may be taken at each feed, the lever is constructed with a radial slot, *h*, in which the stud *i*, with which the lever P is engaged, may be adjusted to take it farther from or nearer to the center, according as the throw is to be increased or decreased. If it be moved to the extent to take a whole tooth, then, as before stated, the one pawl will be the one to constantly act. If (with the four pawls) the adjustment of the stud *i* be to increase half the tooth, then the pawls *d* and *f* will alternate in their action, as before stated, and so if it be one-fourth, then the four pawls will act as before described. The minute adjustment attained by the use of several pawls thus arranged enables the adaptation of the same rolls to a very great range of feed. The strip to be fed is introduced between the rolls in the usual manner, and the intermittent vibrating movement of the lever L imparts a corresponding intermittent rotative movement to the rolls and progressive feed to the strip between them.

This description of my invention as applied to a machine for drawing and punching metal will be sufficient to enable those skilled in the art to adapt this improvement to feed-rolls of other machines where an intermittent rotative movement is required, it only being necessary that the lever carrying the pawls shall have a movement imparted to it to cause the pawls to travel in a circle concentric with the wheel, as by vibratory movement of the lever; and by the term lever and its vibratory movement I wish to be understood as including a device which will carry the pawls in a path concentric with the ratchet-wheel.

I claim—

The combination of the feed-rolls, a toothed ratchet in connection therewith, a vibrating lever, two or more pawls hung upon said lever to engage the teeth of the ratchet, the said pawls arranged distant from each other fractions of the pitch of the teeth of the ratchet, and means, substantially such as described, for imparting vibratory movement to said lever, substantially as specified.

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