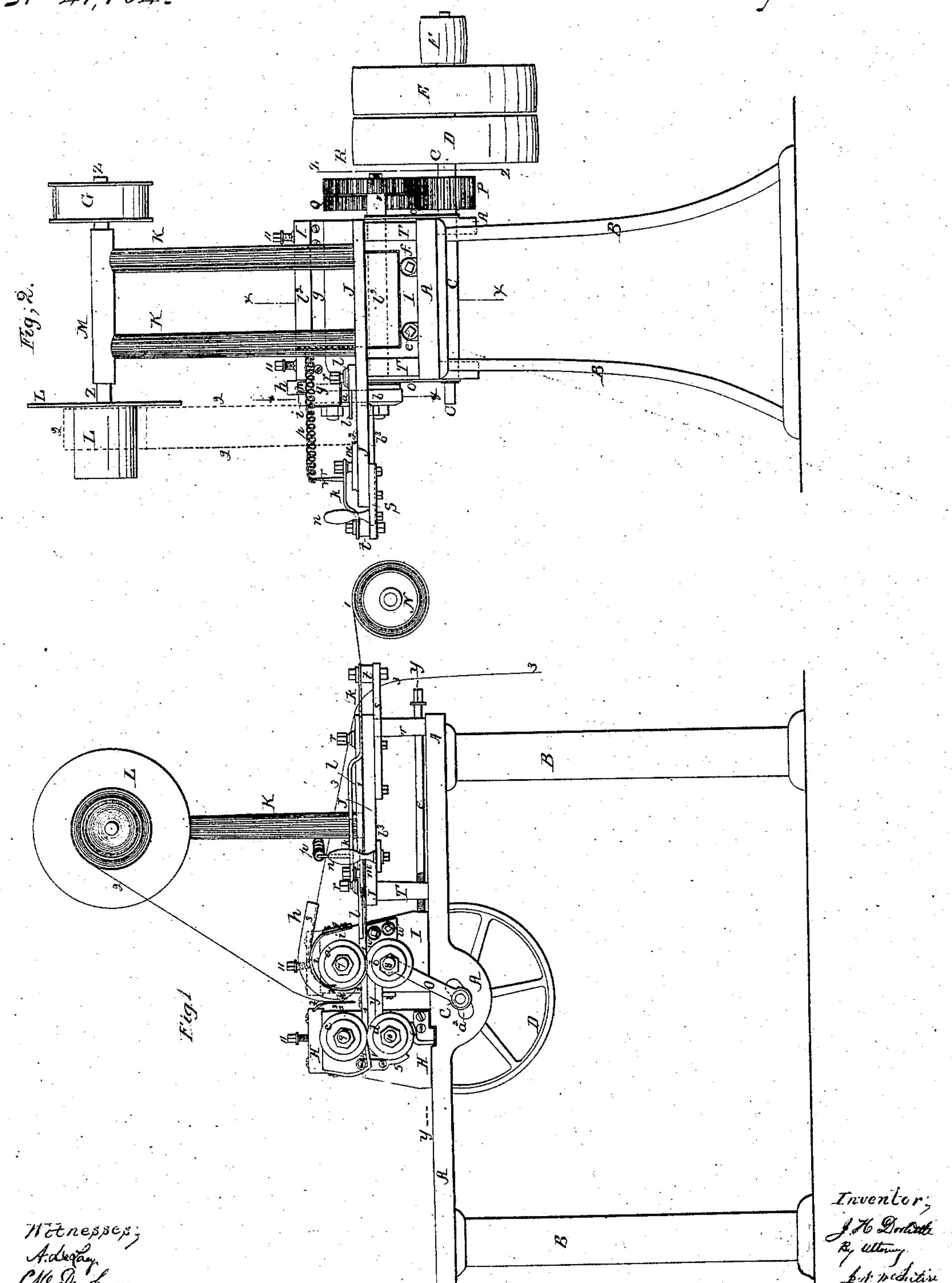
Sheet 1-2 Sheets.

J. H. Doolittle,

Making Sheet Metal Clasps.

No. 47,704. Patented May 16, 1865.



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C. M. De Lacy

Inventor;
J. H. Doolittle
By attorney
J. A. McIntire

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Sheet 2 - 2 Sheets.

J. H. Doolittle,

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Fig. 5.

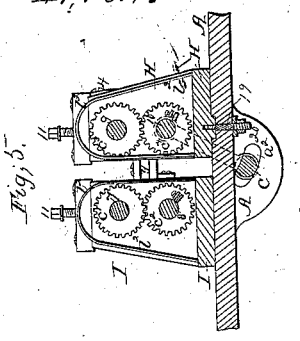


Fig. 9.

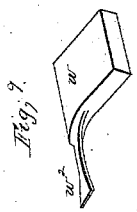


Fig. 12.

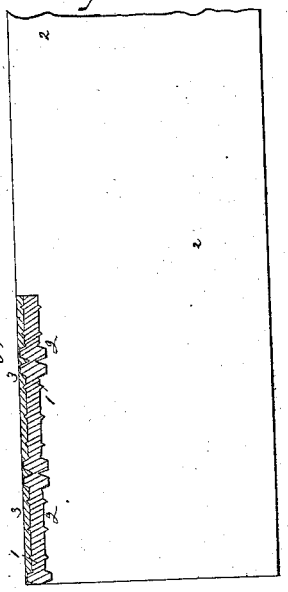


Fig. 8.

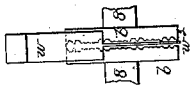


Fig. 4.

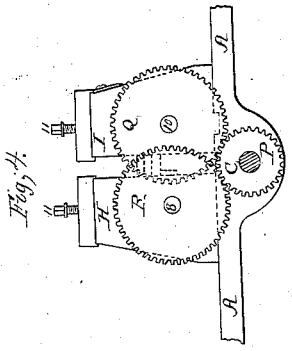


Fig. 7.

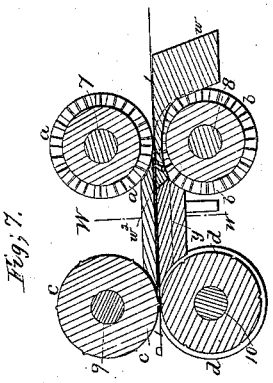


Fig. 11.

Fig. 3.

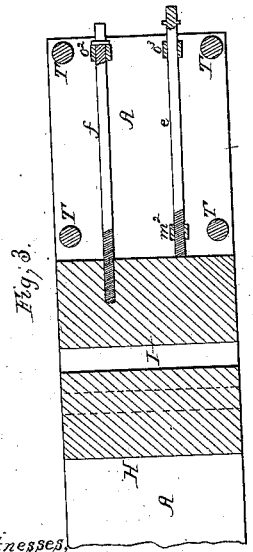


Fig. 6.

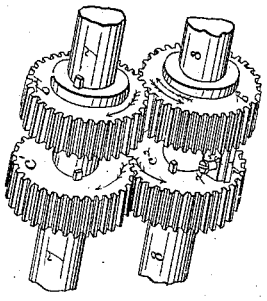
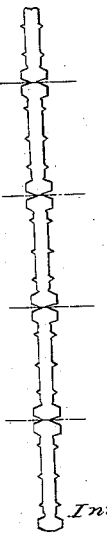


Fig. 10.



Witnesses,
A. DeLacy
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Inventor;
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By Attorney. A. K. McIntire

UNITED STATES PATENT OFFICE.

JOHN H. DOOLITTLE, OF ANSONIA, CONNECTICUT.

IMPROVED MACHINE FOR MAKING CLASPS FROM SHEET METAL.

Specification forming part of Letters Patent No. 47,704, dated May 16, 1865.

To all whom it may concern:

Be it known that I, J. H. DOOLITTLE, of Ansonia, of the county of New Haven, in the State of Connecticut, have invented certain new and useful Improvements in Machinery for Making Clasps from Sheet Metal for Hoop-Skirts, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention relates to that class of machines for cutting out and stamping up sheet metal in which the material is cut out and formed up by being passed between rotary dies or die-rolls, and has for its objects to perfect the operation of such machinery by various new devices, combinations, and adjustments, so as to render it capable of forming clasps, &c., rapidly and perfectly from a strip of material fed into the machine by a continuous operation.

To these ends my said invention consists in the employment of a series of two or more sets of rotary dies so constructed and operating that a sheet or strip of stock passed through the several sets of dies will be cut into blanks, which will be formed up into clasps and discharged from the dies, substantially as hereinafter more fully explained.

My invention further consists in making one or both sets of dies adjustable toward and from the other set, for the purpose of registering the blanks formed by the first set properly to the second set, as hereinafter more fully described.

My invention further consists in the employment, in combination with the gears which drive the rotary dies, of a device for taking up or preventing all play or backlash in said gears, so as to cause the rotary dies to work perfectly together, as hereinafter more fully explained.

My invention further consists in making one or both sets of dies adjustable in the line of their axes for the purpose of setting the sets of dies properly in line in the direction of the line of feed of the material through them, as hereinafter fully set forth.

My invention further consists in the employment, in combination with the female of the blank-cutting set of dies, of an intermediate stock-sustaining bar or supporter to sustain the stock pressed into said female die and to induce its disengagement therefrom, all as hereinafter more fully explained.

My invention further consists in the employment, in combination with the two sets of dies, of a bridge as conductor, through which the strip of blanks formed by the first set of dies passes to the second set of dies, in a manner and for purposes hereinafter fully described.

My invention further consists in the use, in connection with the clasp-forming dies, of suitable clearing-fingers for disengaging the clasps from the dies, substantially as hereinafter fully described.

My invention consists, finally, in the use of a deflector, in combination with the first set of dies, for the purpose of clearing the strip of scrap from the said dies and deflecting it off into a chute, as hereinafter fully explained.

To enable those skilled in the art to which my invention relates to make and use my several improvements, I will proceed to describe their construction and operation, referring by letters and figures to the accompanying drawings, in which—

Figure 1 is a front elevation of a clasp-making machine embracing my said improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a horizontal section at *y y*, Fig. 1. Fig. 4 is a vertical section at *z z*, Fig. 2. Fig. 5 is a vertical section at *x x*, Fig. 2. Fig. 6 is a detail perspective view showing the device for preventing backlash in the die-driving gears. Fig. 7 is a detail sectional view on the line & &, Fig. 2. Fig. 8 is a top view of the female die of and its stock-supporting bar, and Fig. 9 is a perspective view of said supporting-bar detached. (Figs. 6, 7, 8, and 9 are drawn to a scale about double that of the preceding figures.) Fig. 10 is a plan view showing the shape of the strip of blanks formed by the first set of dies. Fig. 11 is a perspective view of a finished clasp, and Fig. 12 is a plan view of the strip of stock fed to the machine, showing the method of cutting up said stock. The three last-mentioned figures are drawn to a scale of full size.

Wherever the same parts of the apparatus appear in the different figures they are indicated by the same figure or letter of reference.

The red lines in Figs. 1, 2, and 7 are used to illustrate the material being operated upon.

A is the bed-plate of the machine, which is

supported on suitable frame-work or legs, B, and on which are arranged two stands, H and I, in which are hung, in suitable bearings, the four shafts 7 8 9 10, which carry the four rotary dies *a b c d*. These shafts 7 8 9 10 receive motion in the following manner, viz:

On the back ends of the two lower shafts, 8 10, are two spur gears, Q and R, which mesh into a pinion, P, on the rear end or portion of the main driving-shaft C, and which receives motion from said pinion, (see Figs. 2 and 4,) and the two sets of shafts 7 8 and 9 10 are geared together by gears c' c^2 b^3 b^4. (See Fig. 6.)

D and E are a fast and a loose pulley on the main shaft C, and to which the main belt is applied.

F is a small pulley, from which a belt is run to a shaft overhead, which belts down to the pulley G of the reel-shaft *z*. (See Fig. 2.) Said reel-shaft *z* is hung in a sleeve, M, mounted on two columns, K K, supported from the table J, and carries a reel, L, on which the surplus stock from the dies is wound, as will be presently described. The stand I is adjusted nearer to or farther from the stand H by means of two screw-rods, *e f*. (See Fig. 3.)

y is a bridge or conductor through which the strip of blanks is guided and passes from the dies *a b* to the dies *c d*. Arranged near the latter are three clearers, 4 5 3, (see Fig. 1,) the function of which is to disengage from the dies the finished clasps.

h is the chute or box through which the strip of scrap passes off, and *i* is the deflector which disengages the strip of scrap from the die *a* and guides it into the chute *h*.

The table J is supported from the bed A by means of five columns, T, and has arranged on its top surface an adjustable stop and guide-plate, *l*, against which one edge of the strip of stock rests while being fed into the machine, said plate *l* being secured to the table J by means of screw-bolts *r*, which pass through slots in the former into the latter.

m is a pressure-wheel, which is formed with a groove in its face and which keeps the strip of stock up against the guide-plate *l*. Said wheel *m* is hung on a stud mounted in the end of a vibratory bar, *k*, which is pivoted at one end to a stud, *t*, projecting from the arm *s*, (see Figs. 1 and 2,) and which is provided with a projecting arm or bar, *v*.

p is a spiral spring, which has one end fastened to said bar *v*, the other end to one of the columns K, and which exerts a constant tendency to pull the arm *k*, with its pressure-wheel *m*, toward the guide-plate *l*. The driving-belt is changed from one to the other of the pulleys D E by means of an ordinary shipper, worked by a slide-bar, b^3, running under the table J, and provided with a suitable handle, *n*.

To simplify the drawings I have omitted the shipper, showing only its bar b^3 broken off. (See Figs. 1 and 2.)

w is a plate, which is secured to the stand I, and is so constructed as to present a thin knife-like portion between the two halves of the female die *b*, to support the stock while being cut in said die, as will be presently explained. (The peculiar shape and the arrangement with die *b* of this plate *w* is clearly seen at Figs. 7, 8, and 9.)

l^2 are removable sheet-metal covers or cases placed over the sets of die-shafts 7 8 and 9 10 and their gears, to protect them from dirt,&c.

N is a reel located at any suitable distance from the bed A of the machine, and which is filled with the strip of stock to supply the machine. The stand H is adjustable crosswise of the bed-plate A, and is retained in position by bolts and nuts 19 20. (See Fig. 5.) The object of this adjustability of one of the stands crosswise of the bed A, or in the direction of the axes of the shafts 9 10, is to enable the operator to set the two sets of dies *a b* and *c d* in line in the direction of motion of the material passing through them. The conductor *y* is also adjustable in the same directions as stand H.

As before mentioned, the stand I is adjustable lengthwise on the bed A by means of rods *e* and *f*. The object of this adjustment to bring the two sets of dies *a b* and *c d* nearer together or farther apart is to enable the operator to regulate the distance between the two sets of dies in accordance with size of clasp or kind of article to be made, different kinds of work requiring to be registered differently from the first to the second sets of dies.

The method of adjusting stand I will be readily understood by reference to Fig. 3, where it will be seen that rod *e* passes through two fixed ears or small stands, m^2 and o^3, the former of which, m^2, has a female screw cut in it to match the thread on rod *e*, and that rod *e* comes against the side of stand I, so that by screwing the rod *e* into its nut m^2, said rod will push the stand I on its ways or bearings on the upper surface of bed A. The rod *f*, however, screws into the stand I, and its collar bears against the stand o^2, so that by screwing in the rod *f* the stand I will be pulled back or caused to move in an opposite direction to that caused by screwing in rod *e*. Thus it will be seen that by the alternate turning of the two rods *e* and *f* the stand I may be moved toward or from the stand H and be held in position.

In order that the gears Q and R may always remain in perfect mesh with the pinion P while the distance between the centers of the former two is variable, the shaft C of pinion P is hung in curved slots a^2 (see Fig. 1) and connecting-links *o*, the said slots being made in the arcs of circles struck from the center of shaft 10 and the said links being connected to the shaft 8, so that, while the distance between centers of gears Q and R is changed, the distance between each of said centers and center of pinion P remains always the same.

The greatest difficulty heretofore encoun-

tered in the practical working rotating or circular dies has been found in overcoming the play or backlash of the driving-gears, which will prevent the dies from traveling perfectly together during their revolutions, for even if the gears were made to work perfectly, without any play, they would soon wear so as to spoil the accurate working of the dies together. The device which I have employed to effectually overcome this difficulty is clearly illustrated at Fig. 6, where 7 and 8 are the two shafts, on the ends of which are dies matching each other. On the shaft 7 are keyed two gears, c' and b^4, which mesh into two gears, c^2 and b^3, on lower shaft, 8; but only one of said gears—viz., c^2—is fast on shaft 8, the other, b^3, being loose or free to turn on shaft 8. From one side of gear c^2 there projects a lug, r^2, and from the adjacent side of gear b^3 projects a lug, s^2. In the latter is a set-screw, x, which passes through it and bears against the surface of lug r^2. It will now be observed that the gears c' and b^4, being both fast on shaft 7, and the gear b^3 being loose on shaft 8, the result of turning in the screw x will be the wedging in opposite directions of the gear c^2 (with its shaft) and the gear b^3, the former being pressed in the direction indicated by the red arrow and the latter in the direction shown by the blue arrow, and it will be seen that the effect of this operation is to bring the opposite sides of the teeth of gears c^2 and b^3 in contact with the surfaces of the teeth of gears c' b^4, or in effect to make the teeth of gears c' b^3 completely fill the spaces between teeth of gears c' b^4, and thus make the gears work perfectly together, and as the surfaces of the teeth wear, the screw x is made to keep them always in contact. (The red arrows may indicate the directions of motions of the gears.) Of course a single gear equal in length of face to the two, c' and b^4, may be employed in lieu of them. There would be a natural tendency in the material cut out between the dies a and b to cling to the female die b. To overcome this and cause the strip of blanks—such, for instance, as shown at Fig. 10—to properly leave the die b, I have employed a device, which I call an "intermediate supporting and disengaging plate," w w^2. (See Figs. 7, 8, and 9.) This plate, as seen, is formed with a projecting thin portion, and is so arranged as that said thin part w^2 (see Figs. 7, 8) comes in between the two halves or opposite edges of the two parts of die b, its top edge coming about level with the top or highest point in the circumference of said die b; but the upper edge of the portion w^2 of said plate has a slight depression at about where the dies a and b come together, equal in depth to the thickness of the metal being cut out, and said portion w^2 connects with the bridge y, which forms a continuation of the supporting-surface on which the strip of blanks rides to the next set of dies, c d. The bridge y is so made as to properly accommodate the strip of blanks and so that said strip can be pushed through it—to the next set of dies—without possibility of being crimped up, and said bridge is so formed that its top portion extends in under the die a, of a width not more than the width of blank-strip, and prevents any possibility of the strip of blanks following up on the surface of a, and affords a guide for the upper surface of the strip of blanks from the time it comes from between dies a and b.

The general operation of the whole machine will be readily understood from a brief explanation, after what has been said of the construction and operation of the several parts. The supply-reel N, being filled with a strip of stock of the desired length and width, the operator starts the stock through the first set of dies, generally moving the driving-shaft c by hand, and then, pulling the shipper-handle u, sets the machine running and guides the end of surplus stock onto reel L, where it there continues to wind automatically. As the strip of stock passes over the table J it is confined edgewise between the guide-plate l and the pressure-roll m. The effect of the first set of dies through which the stock passes is to divide it into three parts, (as illustrated at Fig. 12, the red portion being a strip of scrap, the blue a strip of clasp-blanks, and the white the surplus stock, which is removed on reel L, and afterward run through the machine again.) These three portions of the stock, respectively numbered in red 1 2 3 at Figs. 12, 7, 12, are separated from each other upon leaving the dies a b. The strip of scrap 3 follows up on the face of die a until disengaged by the deflector i and guided into the chute h, through which it passes, and thence off from the machine. The strip of blanks 1 passes on through the bridge Y, (see Figs. 1 and 7,) and thence through the dies c d, where the blanks are cut apart and formed up into clasps (like that shown at Fig. 11) and discharged into a sheet-metal hood or conductor, through which they fall into a receptacle provided for them. The strip of surplus stock 2 passes around outside of chute h, against deflector a^3, and thence onto reel L. After the whole length of the stock has passed through the machine, the operator takes the coil from reel L, and, placing it on reel N, starts the end into the machine, as before, when another strip of scrap is cut therefrom and discharged, another strip of blanks is cut off and made into clasps, and the surplus stock is again wound on reel L, and so on till the entire strip of stock is made into clasps. The length and width of the stock will, of course, be whatever is convenient or desirable.

In running the machine which I have built and successfully worked, (and which is now running,) I have generally used strips of metal manufactured about six inches wide, and have run it through the machine about

eleven times in making such clasps as seen at Fig. 11, turning out 2,250 finished clasps per minute.

It will be understood that various modifications may be made in the construction of my improved machine without departing from the spirit of my invention, and I wish to cover all modifications of or modes of carrying out my invention, although I have shown the one way in which I have very successfully practiced it.

Having now fully explained my invention and described the construction and operation of my improved machine, so that those skilled in the art can make and use it—

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of two or more sets of rotary dies to cut out and form the blanks, when constructed, arranged, and operating substantially as described.

2. Making the sets of dies adjustable, substantially as described, for the purpose of registering differently and adapting the machine to different kinds of work, as hereinbefore described.

3. Making one or both sets of the above-described dies adjustable in the direction of their axes, substantially as described, for the purpose of settling the dies in line, one set with another, as set forth.

4. The employment, in combination with the female die *b*, of a sustaining and disengaging guide-plate, w^2, or its equivalent, substantially as and for the purposes set forth.

5. In combination with the rotary dies *c d*, the series of clearing-fingers 4 5 6, the whole arranged and operating as specified, for the purpose set forth.

6. In combination with the cutting-out dies *a b*, the clearer and chute *h* and deflector *i*, arranged to operate substantially as set forth.

In testimony whereof I have hereunto set my hand and seal.

JOHN H. DOOLITTLE. [L. S.]

Witnesses:

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M. DE LACY.