H. SWANSON.

PUNCHING MACHINE.

APPLICATION FILED JAN. 10, 1920.

1,353,292.

Patented Sept. 21, 1920.

6 SHEETS—SHEET 1.

Fig. 1.

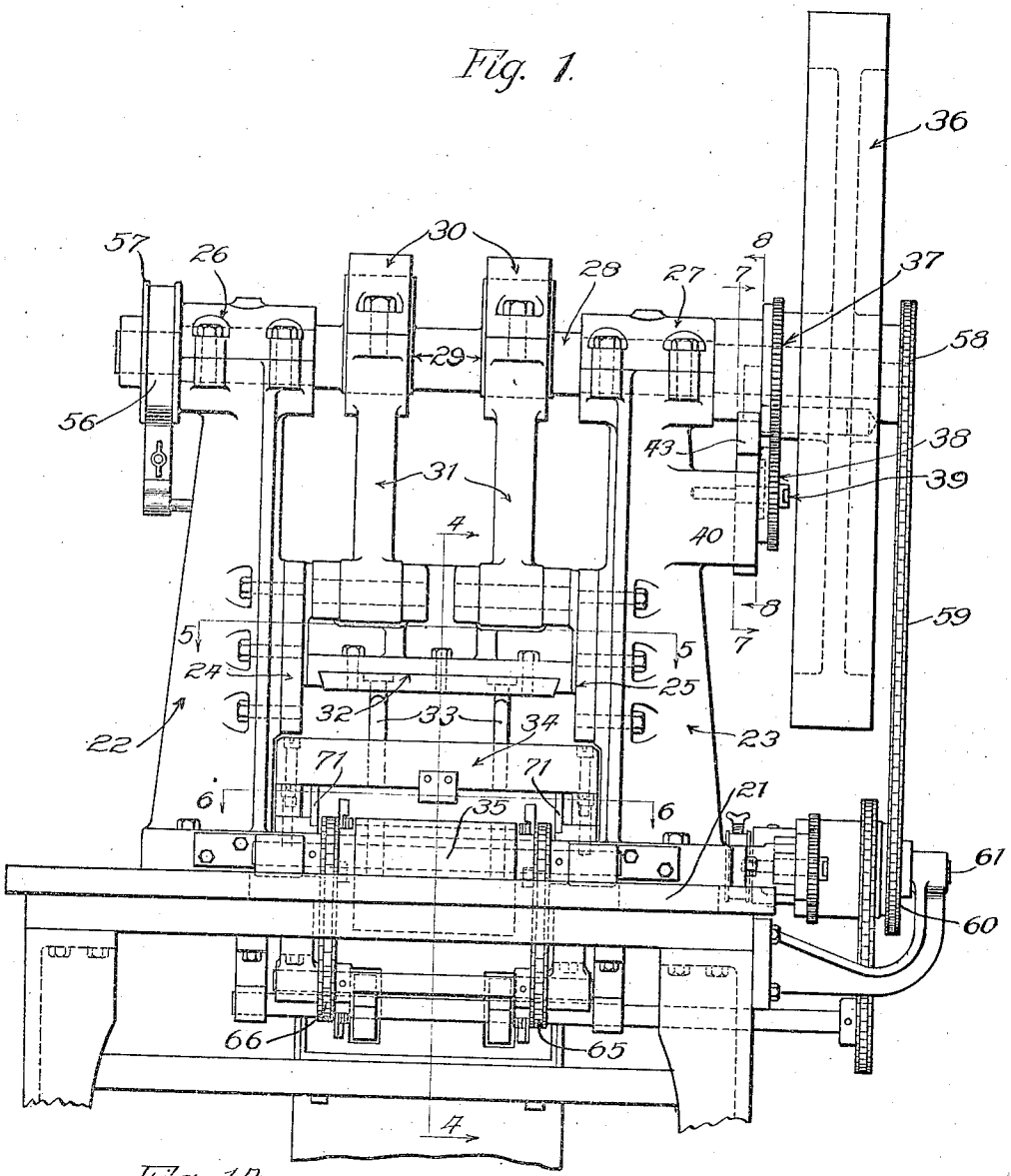
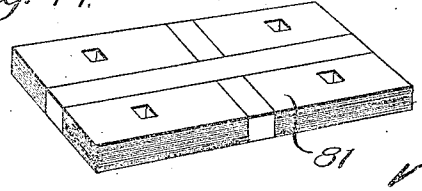


Fig. 14.



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PUNCHING MACHINE.

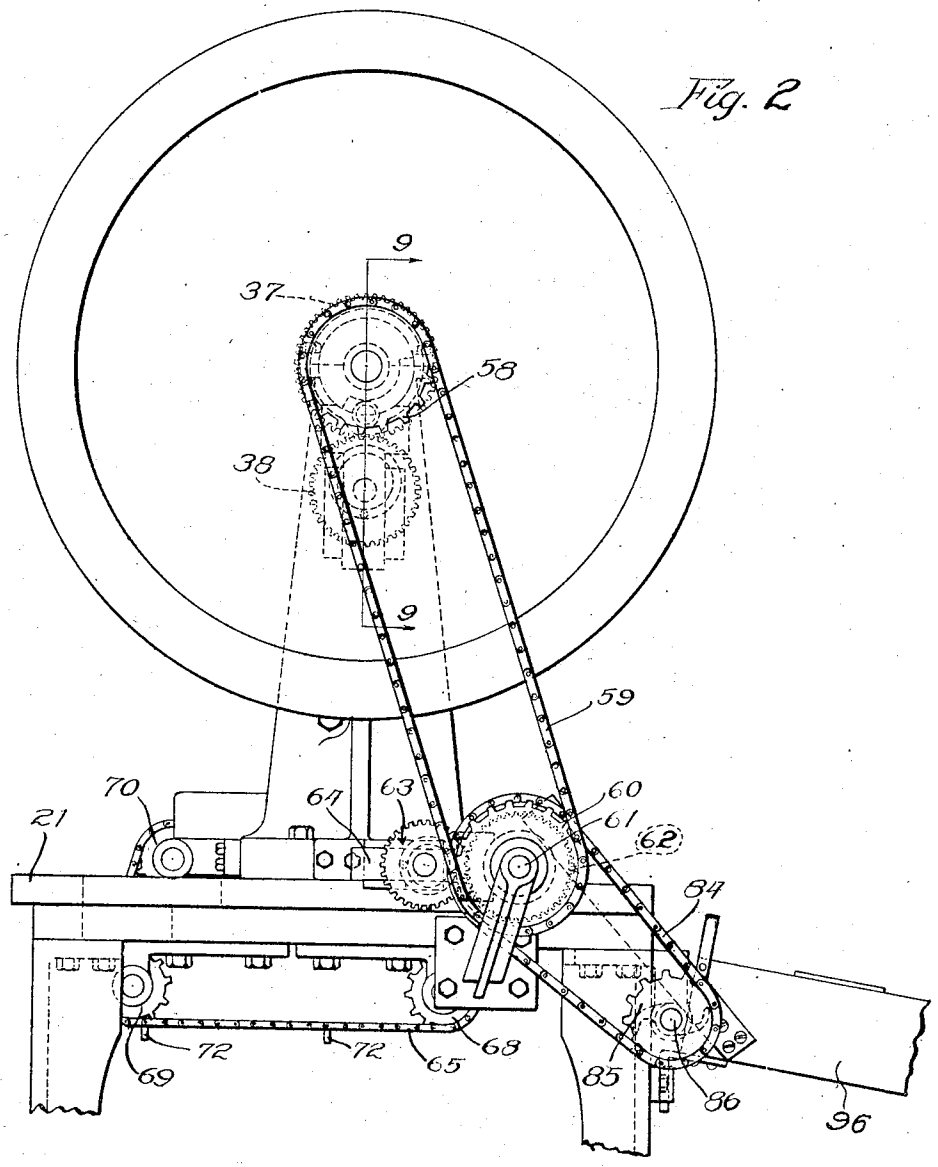
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6 SHEETS—SHEET 2.

Fig. 2



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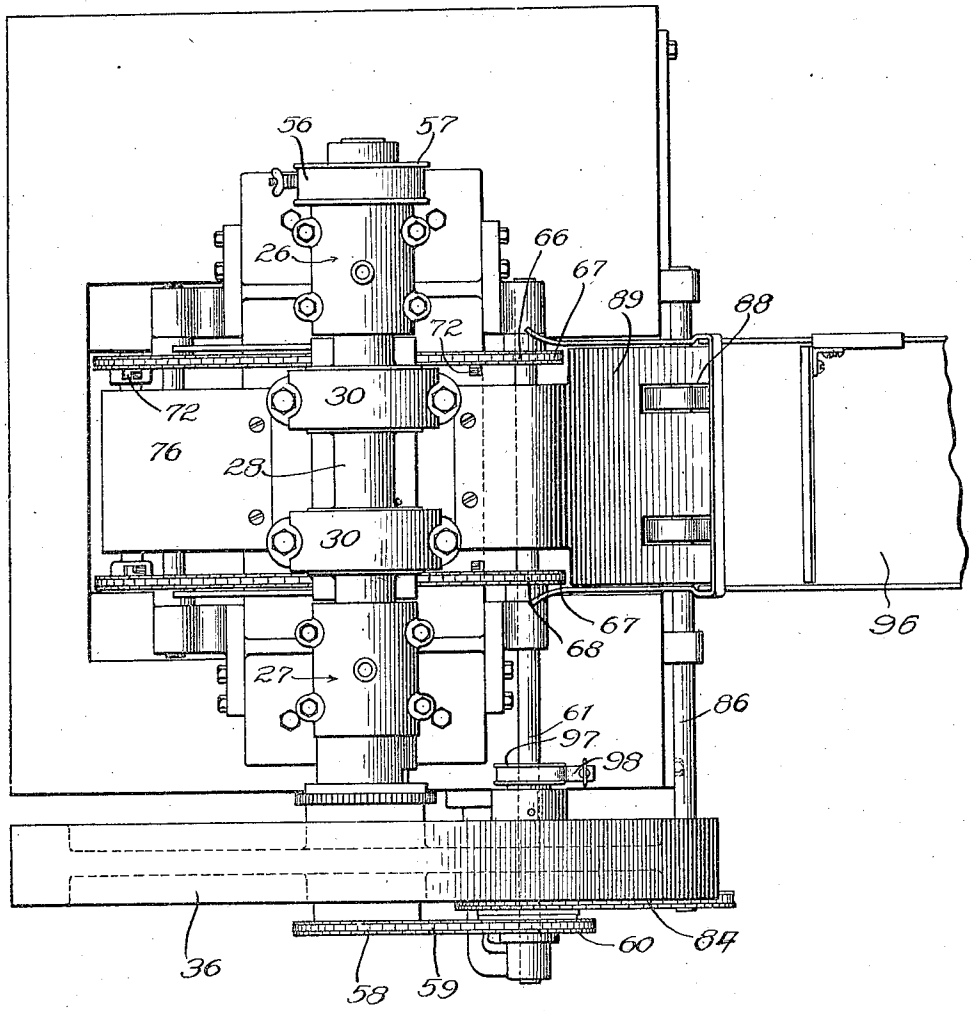
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6 SHEETS—SHEET 3.

Fig. 3.



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6 SHEETS—SHEET 4.

Fig. 5

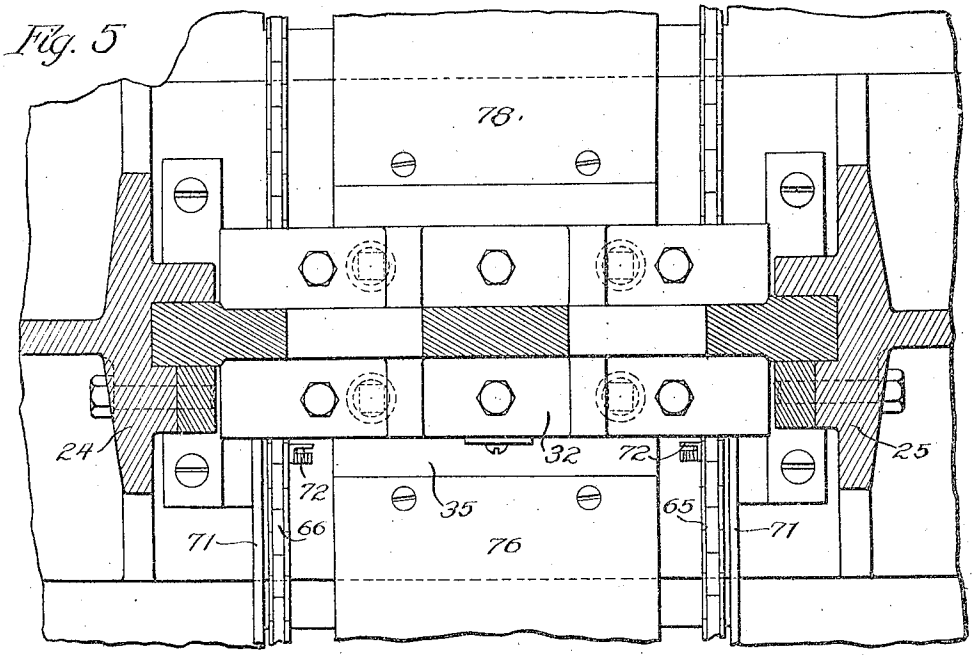
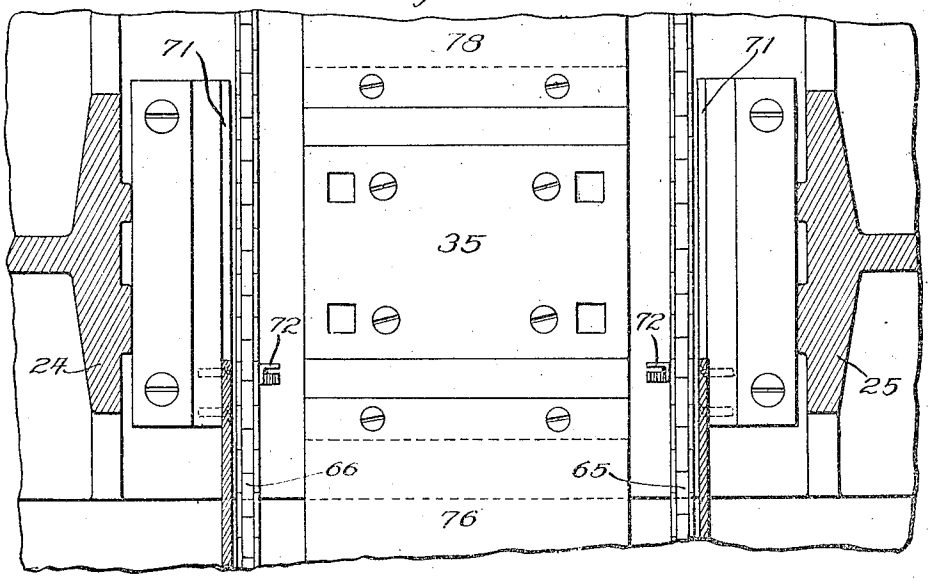


Fig. 6



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1,353,292. **Patented Sept. 21, 1920.**

6 SHEETS—SHEET 5.

Fig. 7.

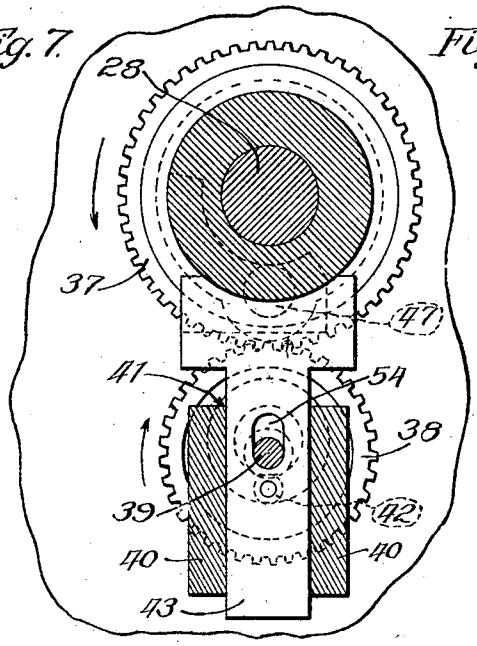


Fig. 8.

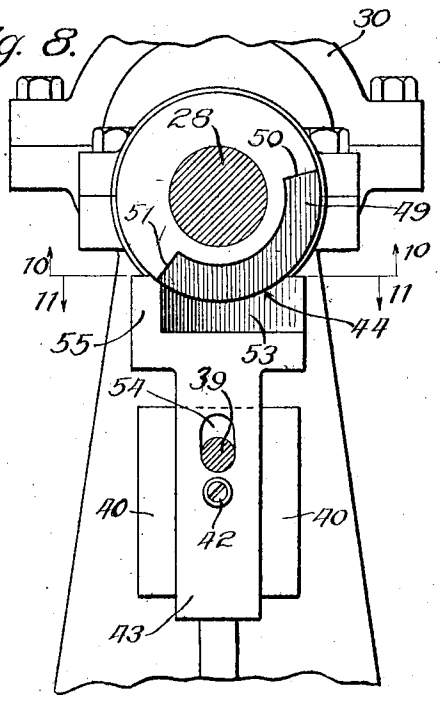


Fig. 9.

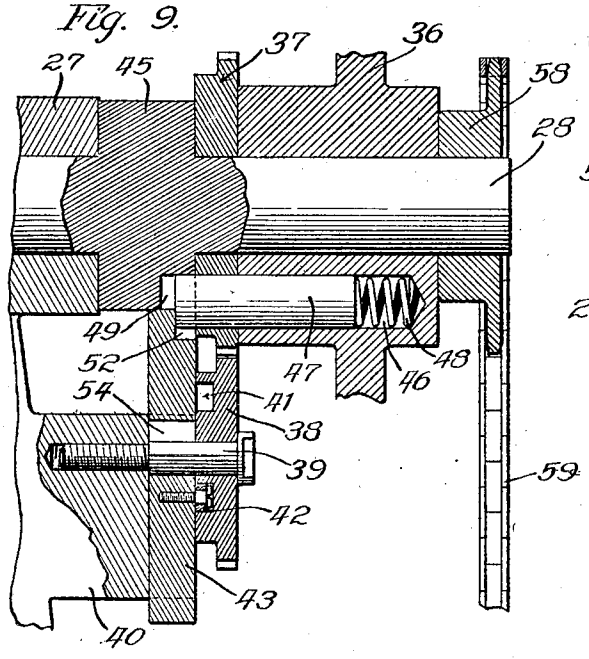


Fig. 10.

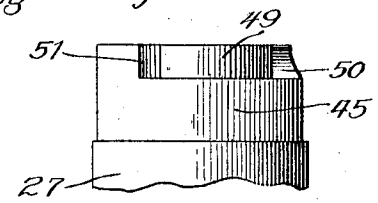
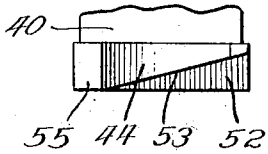


Fig. 11.



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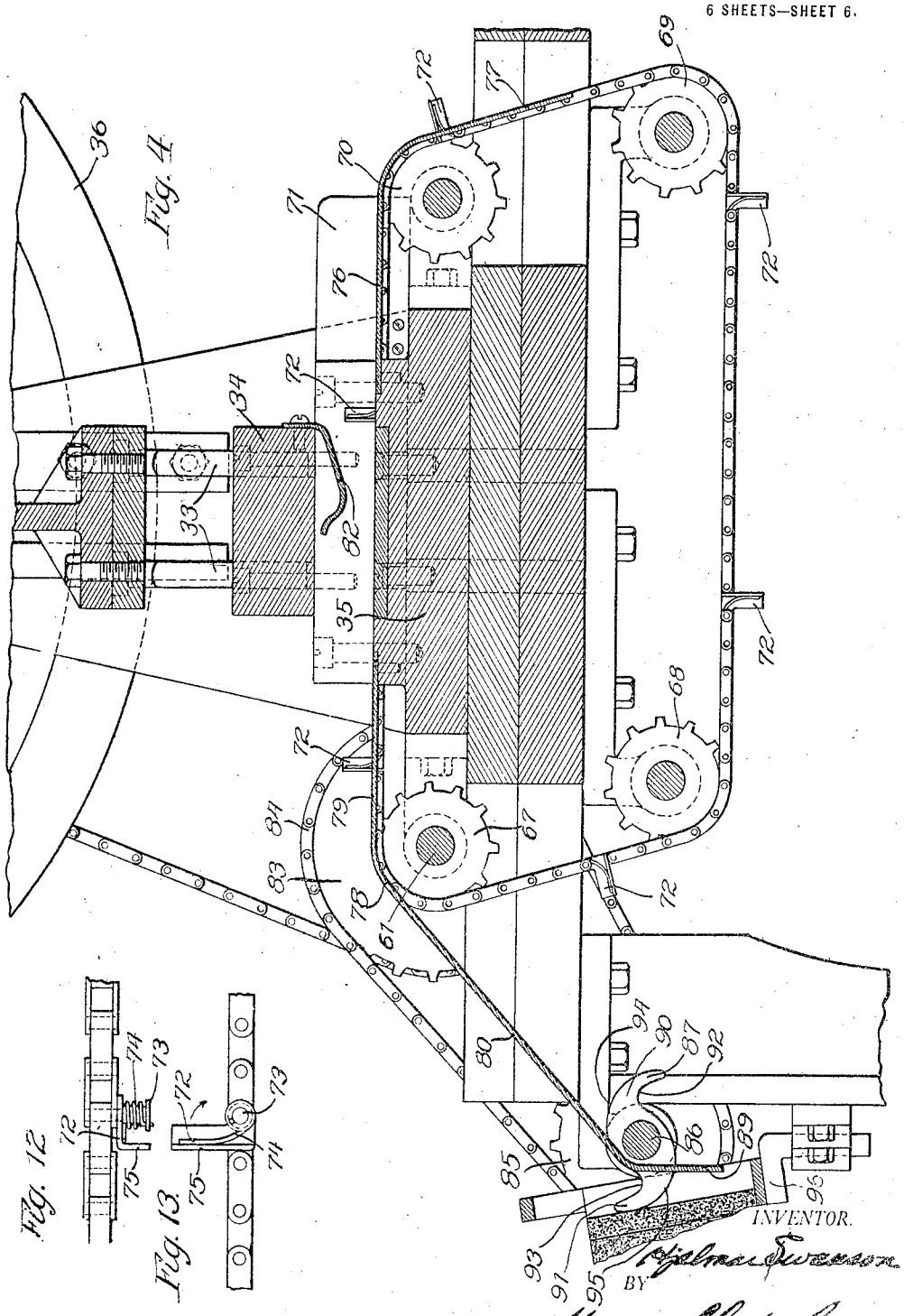
PUNCHING MACHINE.

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1,353,292.

Patented Sept. 21, 1920.

6 SHEETS—SHEET 6.



INVENTOR.

BY Hjalmar Swanson

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ATTORNEYS

UNITED STATES PATENT OFFICE.

HJALMAR SWANSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO CUMMINS PERFORATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PUNCHING-MACHINE.

1,353,292. Specification of Letters Patent. **Patented Sept. 21, 1920.**

Application filed January 10, 1920. Serial No. 350,627.

To all whom it may concern:

Be it known that I, HJALMAR SWANSON, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Punching-Machines, of which the following is a specification.

This invention relates to perforating or canceling machines and the like, and has for its general object the provision of a simply constructed though highly efficient machine of this character, which embodies, among other features, a novel automatic feed of the material to and from the punching or canceling mechanism, the feed of the material being so timed with relation to the operation of the punching or canceling mechanism that material is progressively advanced into the path of the punching mechanism, held in position sufficiently long to permit the punching mechanism to perform its operation, and is then further advanced to the point of discharge.

A more detailed object of the invention is to construct the feeding mechanism in such manner that, although highly efficient for performing its function of feeding the material, parts of said feeding mechanism are adapted, on encountering undue or destructive pressures such as might occur if the machine becomes jammed, to yield and to prevent such pressures from causing injury to parts of the machine.

The invention has for other objects such other improvements in construction and advantages in operation as may be found to obtain in the mechanism hereinafter described or claimed.

In the accompanying drawings, forming a part of this specification and showing, for purposes of exemplification, a preferred form and manner in which the invention may be embodied and practised but without limiting the claimed invention specifically to such illustrative instance or instances:

Figure 1 is a front elevation of a perforating machine constructed in accordance with the invention;

Fig. 2 is a side elevation of the same looking from the right of Fig. 1;

Fig. 3 is a top plan view;

Fig. 4 is an enlarged vertical sectional elevation taken substantially in a plane indicated by the line 4—4 of Fig. 1;

Fig. 5 is an enlarged horizontal sectional elevation taken substantially in a plane indicated by the line 5—5 of Fig. 1;

Fig. 6 is an enlarged horizontal sectional elevation taken substantially in a plane indicated by the line 6—6 of Fig. 1;

Fig. 7 is an enlarged detailed vertical sectional elevation taken in a plane indicated by the line 7—7 of Fig. 1;

Fig. 8 is an enlarged detailed vertical sectional elevation taken in a plane indicated by the line 8—8 of Fig. 1;

Fig. 9 is an enlarged detailed vertical sectional elevation taken in a plane indicated by the line 9—9 of Fig. 2;

Fig. 10 is a fragmentary detailed view of the driven shaft looking from the horizontal plane and in the direction of the arrows 10—10 of Fig. 8;

Fig. 11 is an enlarged detailed view of the clutch cam looking from the plane and in the direction of the arrows 11—11 of Fig. 8;

Fig. 12 is an enlarged detailed top plan view of a fragment of the feed chain;

Fig. 13 is a side elevation of the parts illustrated in Fig. 12; and,

Fig. 14 is a perspective of a bundle of bank notes perforated by the machine illustrated in the drawings.

The same characters of reference designate the same parts throughout the several views.

In the illustrated embodiment of the invention, the machine is especially designed for the purpose of perforating packages or bundles of bank notes and the like, and for convenience the present description of the machine will be confined to this use of the invention. Features of construction of the machine are readily susceptible of other uses, however, and it is manifest that the scope of the invention is by no means confined to the specific use and specific embodiment herein described as an illustrative example.

Referring to the drawings, the various parts and the instrumentalities of the machine are supported by a table or platform 21. Mounted on the platform 21 are pedestals 22 and 23 provided along their facing vertical sides with guides 24 and 25 and also having at their upper ends bearings 26 and 27 which mutually support the main horizontal driven shaft 28. A pair of eccentrics

29 is mounted on the aforesaid shaft 28 and supported by the respective eccentrics 29 are collars 30 respectively provided with depending vertical arms 31 which are mutually pivoted at their lower ends to a frame 32 mounted for vertical sliding movement in the hereinbefore mentioned vertical guides 24 and 25. The frame 32 supports a plurality of punches 33 adapted to pass through alined holes in a horizontal guiding block 34 supported by the lower ends of the pedestals 22 and 23, and to coöperate with dies formed in the die block 35 mounted on the platform or table 21. With this construction, the punches 33 are lowered and elevated into and away from the dies formed in the die block 35 at each rotation of the main driven shaft 28.

The punches 33 which coöperate with the dies formed in the die-block 35 are respectively positioned on the opposite sides of the median lines of stacks of separate sheets of material such as the bank notes illustrated in Fig. 14, as each stack of said sheets is fed into punching position. During the punching operation, the punches themselves act to hold all the sheets of a stack being punched, and the effect of the punching operation is to punch holes in each stack of sheets or bank notes, the holes being located within the edges of the bank notes and respectively positioned in the four quarters of each bank note of a stack, with the result that the bank notes are mutilated, preliminary to cutting or slicing the stack of bank notes for shipment for purposes of redemption; consequently no part of the punched bank notes would be again available for circulation.

In accordance with the invention, means is provided for intermittently clutching the shaft 28 with a power source, so as to effect an intermittent operation of the shaft 28 and punch. Journaled on the driven shaft 28 is a driving fly wheel 36 adapted to be connected with a suitable source of power, such as an electric motor (not shown), and fixed to a gear 37 in mesh with a cam-operating gear 38 that is rotatably mounted on a short stub shaft 39 supported by a bearing 40 projecting from the pedestal 23. The cam operating gear 38 is provided with an eccentric groove 41, within which runs a roller 42 that projects from the face of the cam 43. The upper end of said cam 43 is formed with an arcuate recess 44 extending inwardly from the top face thereof and having its axis substantially coincident with the axis of rotation of the hereinbefore mentioned driven shaft 28. Said driven shaft 28 is provided with a collar 45 adapted to enter the arcuate cut away portion 44 of the cam 43, when the latter is in its elevated position. Formed in the hub of the driving fly wheel 36 is a longitudinally extending socket 46 within which is mounted a movable clutch pin 47. As shown more particularly in Fig. 9, the outer end of such clutch pin passes through the gear 37 and is adapted to span the peripheries of the collar 45 and upper end of the cam 43; the inner end of said pin bears against a coiled spring 48 positioned in the inner end of the socket 46. An arcuate groove 49 terminating at its opposite ends in approximately radial shoulders 50, 51 is cut away from that face of the collar 45 in juxtaposition with respect to the face of the gear 37; and the upper end of the cam 43 is formed with a recess 52 having an inclined vertical face 53, as shown more particularly in Fig. 11. The cam 43 has a slotted pivot on the stub shaft 39 as indicated at 54, to permit up and down movements of the cam, effected by the travel of the roller 42 in the eccentric groove 41 of the gear 38.

The ratio of the driving fly wheel 36, gears 37 and 38 and other parts is such that, in the present embodiment, the driven shaft 28 is clutched to the driving fly wheel 36 and makes a complete revolution on every third revolution of the driving fly wheel 36, in other words, the cycle of operation is such that each operative movement of the driven shaft 28 is succeeded by two idle revolutions of the driving fly wheel 36 during which the driven shaft 28 is stationary. This mode of operation is accomplished by the above described cam controlled clutch mechanism in the following way: gear 37 is constantly driven by the driving fly wheel 36 as well as gear 38 in mesh with gear 37; the rotation of the eccentric groove 41 causes a vertical reciprocatory movement of the cam 43, to shift the latter intermittently into and out of position for engaging the pin 49 which is constantly traveling in a circular path. Assuming that the shaft 28 is stationary and that the pin 47 is in a retracted position, the outer end of the pin travels over the face of the collar 45 until the pin strikes the groove 49, whereupon the pin is advanced by said spring into the groove and travels therein until it abuts against the shoulder 51. Engagement of the pin with the shoulder 51 completes the clutching of the fly wheel 36 to the shaft 38 and the latter makes a complete revolution. The parts are so timed, however, that toward the end of the revolution of the shaft 28 the cam 43 is moving toward the collar 45; while at the same time the pin 49 is being carried toward the inclined vertical face 53 at the upper end of the cam 43. Just about at the end of the revolution of the shaft 28 the pin is brought into engagement with said inclined face 53 of the cam 43 and riding along said inclined face to the high point 55 is retracted into position for releasing the collar 45 and shaft 28 from the fly wheel 36 whereupon said

shaft 28 stops turning. When the pin 47 moves out of engagement with the cam, it travels idly over the face of the now stationary collar 45 and on again arriving at the groove 49 is again retracted by the cam 43. On the third revolution of the fly wheel, however, the cam 43 is in its retracted position and the pin is permitted to pass along the groove 49 until it strikes the shoulder 51, so as to effect another complete revolution of the shaft 28.

Each revolution of the shaft 28 through the eccentrics 29 and other connection hereinabove described effects first a down and then an up stroke of the frame carrying the punches 33. A constantly tensioned band brake 56 is applied to a brake drum 57 mounted on the shaft 28. This causes the shaft 28 to stop quickly whenever the clutch pin is released and prevents any idle movement of the shaft.

The invention further provides an improved feeding mechanism for feeding material into position for being punched while the punches 33 are idle, holding the material in punching position on the down and up stroke of the punches, and then feeding the material to a point of discharge. For this purpose, the fly wheel 36 is provided with a sprocket 58 that is geared by a sprocket chain 59 with a sprocket 60 rotatably mounted on the intermittently operable shaft 61 journaled in suitable bearings extending above the table or platform 21. The shaft 61 is provided with a brake drum 97 encircled by a constantly-tensioned brake band 98 for stopping the shaft quickly and preventing overthrow, during its periods of rest. Sprocket 60 is fixed to a gear 62 that meshes with a cam operating gear 63 that is adapted to reciprocate a cam 64 similar to the before mentioned cam 43 and controlling the operation of a clutch pin for connecting or disconnecting the sprocket 60 with respect to the shaft 61. The mechanism for clutching the shaft 61 to the sprocket 60 is similar to the clutch mechanism hereinabove described for clutching the fly wheel 36 to the driven shaft 28 and need not be redescribed here; it will be sufficient to state that the shaft 61 is driven by the sprocket 60 while the punches are idle so as to advance material into or out of their path. The shaft 61 constitutes the drive shaft for a pair of feed chains 65 and 66 which pass over sprockets 67 fixed on the shaft 61, thence through an opening in the platform 21 to two pairs of idle sprockets 68 and 69 mounted below the platform 21 and thence through an opening in said platform to a pair of idler sprockets 70 mounted above said platform. The upper operative reaches of the feed chains 65, 66 extend along the opposite sides of the die plate 35, as shown in Fig. 6, and between a pair of vertical guides 71 mounted above the platform 21. Projecting from the inner edges of the respective chains 65, 66 and arranged oppositely with respect to each other are upstanding guiding fingers 72 positioned at suitable points along the feed chains 65, 66.

Each finger is yieldably mounted on its respective chain, so as to be capable of rearward movement with respect to the direction of movement of the chain. Referring more particularly to Figs. 12 and 13, the finger is pivotally mounted on a stud 73 projecting laterally from the inside of the chain. Encircling the stud is a coil spring 74 having one end in engagement with the head of the stud and the other end in engagement with the lateral flange 75 of the finger. The spring 74 operates to maintain the finger 72 normally in elevated position, but permits the finger to yield rearwardly, should it encounter an obstruction, such as might occur from a jamming of material beneath the punches while the chain is traveling along the side of the die plate 35. This construction prevents damage or breaking off of the feeding fingers, as they can readily yield and pass beneath an accumulation of material.

A horizontal feed plate 76 is mounted flush with the die plate 35 and is preferably provided with a depending apron 77, as shown more particularly in Fig. 4. At the discharge end of the die plate 35 is a discharge plate 78 having a horizontal portion 79 flush with the die plate and a downwardly inclined portion 80 over which the punched material discharges. In passing from the horizontal portion 79 of the discharge plate 78 to the downwardly inclined portion or chute 80 the punched material passes beyond the influence of the feed chains and gravitates to the discharge point.

As stated, the present machine is particularly adapted for punching bundles or packages of bank notes and the like, such as are indicated at 81 in Fig. 14. For holding a stack of separate sheets of material, such as a package of bills, in position over the die plate 35 the guiding plate 34 is provided with a leaf spring 82 which incurves beneath the plate 34, as shown in Fig. 4. The packages of bills are deposited one by one on the feed plate 76 and a pair of oppositely disposed fingers 72 moving into engagement with the package of bills pushes the same forwardly until it arrives in punching position beneath the guide plate 34. On arrival of the package in such position the chains stop moving and the package is held in position for being punched by the leaf spring 82 which coöperates with the two fingers 72 in engagement with the rear edge of the package. After the punches have descended to perforate the bills and have been retracted, the intermittently operating chains advance

the package from the punching position over the horizontal portion 79 of the discharge plate 78 to the downwardly inclined chute 80, whereupon the punched package passes beyond the chain and gravitates to a stacking mechanism.

The stacking mechanism is constructed in the following manner: driven by the sprocket 60 is a constantly rotating sprocket 83 that is geared by a sprocket chain 84 with a sprocket 85 mounted on the stacker shaft 86. Said shaft 86 is provided with a pair of stacker cams 87 that are adapted to move through slots 88 formed in an apron 89 depending from the lower end of the discharge chute 80. Each cam is composed of a pair of oppositely disposed arms 90, 91 respectively formed with oppositely extending recesses 92, 93 and with oppositely extending curved presser faces 94, 95, the presser face of one arm merging into the recess of the opopsite arm, as shown. Mounted in front of the depending apron 89 is an inclined stacker chute 96 of proper dimensions to receive the packages of bills, arranged in substantially upright position, as shown in Fig. 4.

The cams 91 are constantly rotated in a counter-clockwise direction by the shaft 86 and when a package of perforated bills arrives at the lower end of the chute 80 it first passes into engagement with the recesses 93 or 92 of the pair of cams. As the recesses pass, during the movement of the cams, from beneath the package of bills, the latter is permitted to fall between a previously stacked package and the apron 89. The receding movement of the recess 93, for example, is accompanied by a movement of the presser face 94 or 95 toward the falling package of bills and the latter presser faces engaging the face of the package, by reason of their curvature, push the package, and the row of previously stacked packages forwardly in the chute 96 to make room for the next package of bills discharged by the chute 80.

The invention as hereinabove set forth is embodied in a particular form of construction but may be variously embodied within the scope of the claims hereinafter made.

I claim:

1. In a machine of the character described, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain for advancing material toward and from said punching mechanism; a driven member for operating said feed chain; means for clutching said last named driven member with the aforesaid driving member, during the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; braking means constantly operative with respect to both driven members; and spring means engageable with the material fed to the punching mechanism for holding such material in punching position; substantially as specified.

2. In a machine of the character described, in combination: driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain for advancing material toward and from said punching mechanism; a driven member for operating said feed chain; means for clutching said last named driven member with the aforesaid driving member, during the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; and braking means constantly operative with respect to both driven members; substantially as specified.

3. In a machine of the character described, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain for advancing material toward and from said punching mechanism; a driven member for operating said feed chain; means for clutching said last named driven member with the aforesaid driving member, during the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; braking means constantly operative with respect to both driven members; and means engageable with the material fed to the punching mechanism for holding such material in punching position; substantially as specified.

4. In a machine of the character described, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain for advancing material toward and from said punching mechanism; a driven member for operating said feed chain; and means for clutching said last named driven member with the aforesaid driving member, during

the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; substantially as specified.

5. In a machine of the character described, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain provided with material engaging means for advancing material toward and from said punching mechanism; a driven member for operating said feed chain; means for clutching said last named driven member with the aforesaid driving member, during the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; and means coöperable with said material-engaging means for holding the material in punching position; substantially as specified.

6. In a machine for canceling bank notes and the like, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; and an intermittently operable feeding mechanism having provision for advancing stacks of separate sheets of material, such as bank notes, toward and from said punching mechanism; substantially as specified.

7. In a machine for canceling bank notes and the like, in combination: an intermittently operable punching mechanism; an intermittently operable feeding mechanism having means for positively advancing and holding in registering position with respect to the punching mechanism stacks of separate sheets of material, such as bank notes; and a driving means common to both said mechanisms; substantially as specified.

8. In a machine for canceling bank notes and the like, in combination: an intermittently operable punching mechanism; an intermittently operable feeding mechanism having provision for advancing stacks of separate sheets of material, such as bank notes, toward and from said punching mechanism; a constantly operable stacker mechnism for receiving and stacking the stacks of punched sheets discharged by said feeding mechanism; and a driving means common to all of said mechanisms; substantially as specified.

9. In a machine for canceling bank notes and the like, in combination: a continuously-operating driving means; a punching mechanism driven intermittently by said driving means and including punching devices positioned on the opposite sides of the median lines of stacks of separate sheets of material, such as bank notes, fed to said punching mechanism, when such stacks are in position for being punched; and intermittently-operated means for feeding such stacks of material intermittently to the punching mechanism; substantially as specified.

10. In a machine for canceling bank notes and the like, in combination: a continuously-operating driving means, a punching mechanism driven intermittently by said driving means and including punching devices positioned within the edges of and respectively in the four quarters of stacks of separate sheets of material, such as bank notes, fed to said punching mechanism, when such stacks are in position for being punched; and intermittently-operated endless-belt feeding means for feeding such stacks of material intermittently to the punching mechanism; substantially as specified.

11. In a machine for canceling bank notes and the like, in combination: a continuously-operating driving means; a punching mechanism driven intermittently by said driving means and including punching devices positioned within the edges of stacks of separate sheets of material, such as bank notes, fed to said punching mechanism, when such stacks are in position for being punched, said punching devices acting to hold all the sheets of a stack during the punching thereof; and an intermittently-operating means for positively feeding such stacks of sheets intermittently to the punching mechanism, the stacks of sheets remaining in engagement with the feeding means during the punching operation; substantially as specified.

12. In a machine for canceling bank notes and the like, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a forwardly movable feed belt having means for positively advancing and holding in registering position with respect to the punching mechanism stacks of separate sheets of material, such as bank notes; and means for driving said feed belt intermittently; substantially as specified.

13. In a machine for canceling bank notes and the like, in combination: in intermittently operable punching mechanism; an intermittently operable forwardly movable feed belt having means for positively ad-

vancing and holding in registering position with respect to the punching mechanism stacks of separate sheets of material, such as bank notes; and a driving means common to both said punching mechanism and said feed belt; substantially as specified.

14. In a machine for canceling bank notes and the like, in combination: a driven member; a reciprocatory punching mechanism operated by said driven member, and including punching devices positioned on opposite sides of the median lines of stacks of separate sheets of material, such as bank notes, fed to said punching mechanism, when such stacks are in position for being punched; a driving member; means for intermittently clutching said driving member with said driven member for effecting an intermittent operation of the punching mechanism; a feed chain for advancing the stacks of sheets toward and from said punching mechanism; a driven member for operating said feed chain; and means for clutching said last named driven member with the aforesaid driving member, during the periods of rest of the punching mechanism and for disconnecting such driven member therefrom during the operation of the punching mechanism; substantially as specified.

15. In a machine of the character described, in combination: a punching mechanism; a chain for advancing material toward and from said punching mechanism; and a material-engaging member carried by said chain and yieldable automatically under pressure, when the material or a portion thereof remains engaged and arrested by the punching mechanism, to release the material from the chain; substantially as specified.

16. In a machine of the character described, in combination: a punching mechanism; a chain for advancing material toward and from said punching mechanism; and material-engaging means carried by said chain and yieldable automatically under pressure in a direction opposite to the direction of feed thereof, when the material or a portion thereof remains engaged and arrested by the punching mechanism, to release the material from the chain; substantially as specified.

HJALMAR SWANSON.

Corrections in Letters Patent No. 1,353,292.

It is hereby certified that in Letters Patent No. 1,353,292, granted September 21, 1920, upon the application of Hjalmar Swanson, of Chicago, Illinois, for an improvement in "Punching-Machines," errors appear in the printed specification requiring correction as follows: Page 3, line 13, for the word "connection" read *connections;* page 4, claim 1, read line 62 right side up; same page, line 77, claim 2, before the word "driven" insert the article *a;* page 5, line 125, claim 13, for the word "in," second occurrence, read *an;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of November, A. D., 1920.

[SEAL.]

L. B. MANN,

Acting Commissioner of Patents.

Cl. 164–88.