Nov. 3, 1925. 1,559,987

J. H. REINHARDT

PERFORATING MACHINE

Filed Jan. 19, 1922 2 Sheets-Sheet 1

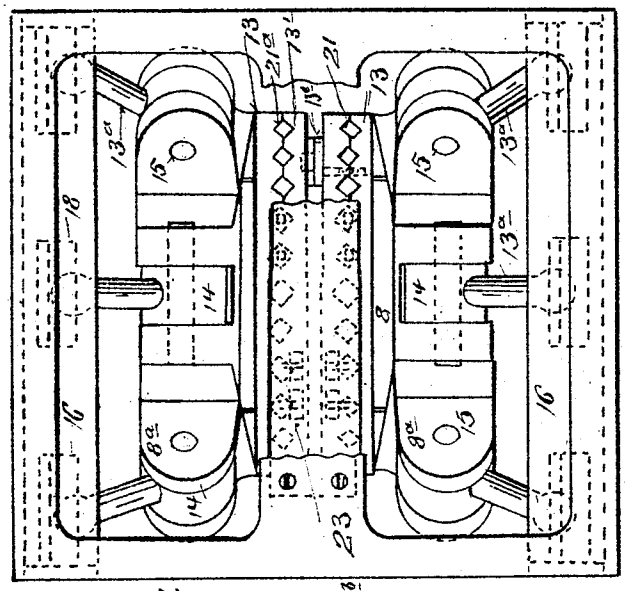


Fig. 2.

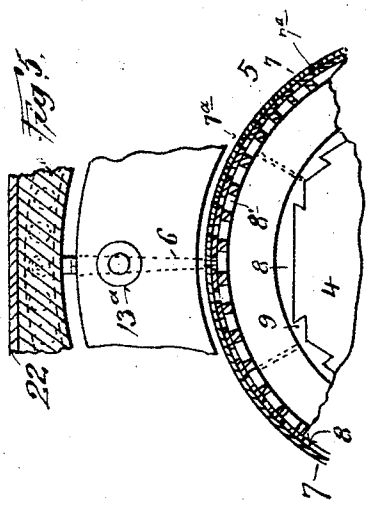


Fig. 5.

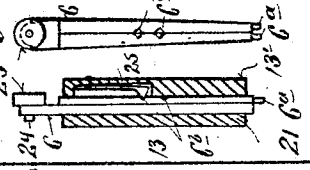


Fig. 6.

Fig. 7.



Fig. 8.

Fig. 1.

Fig. 9.

INVENTOR

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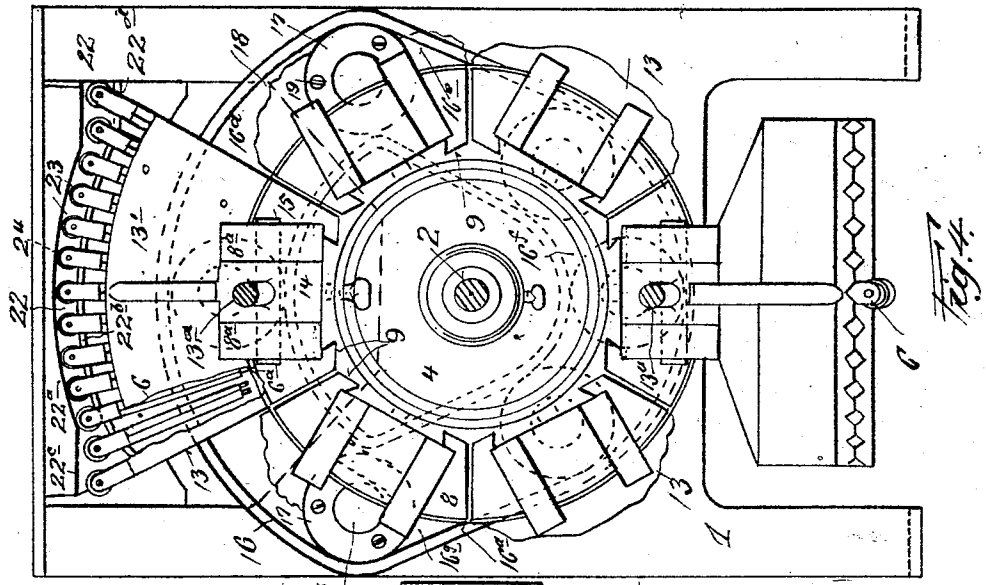


Fig. 4.

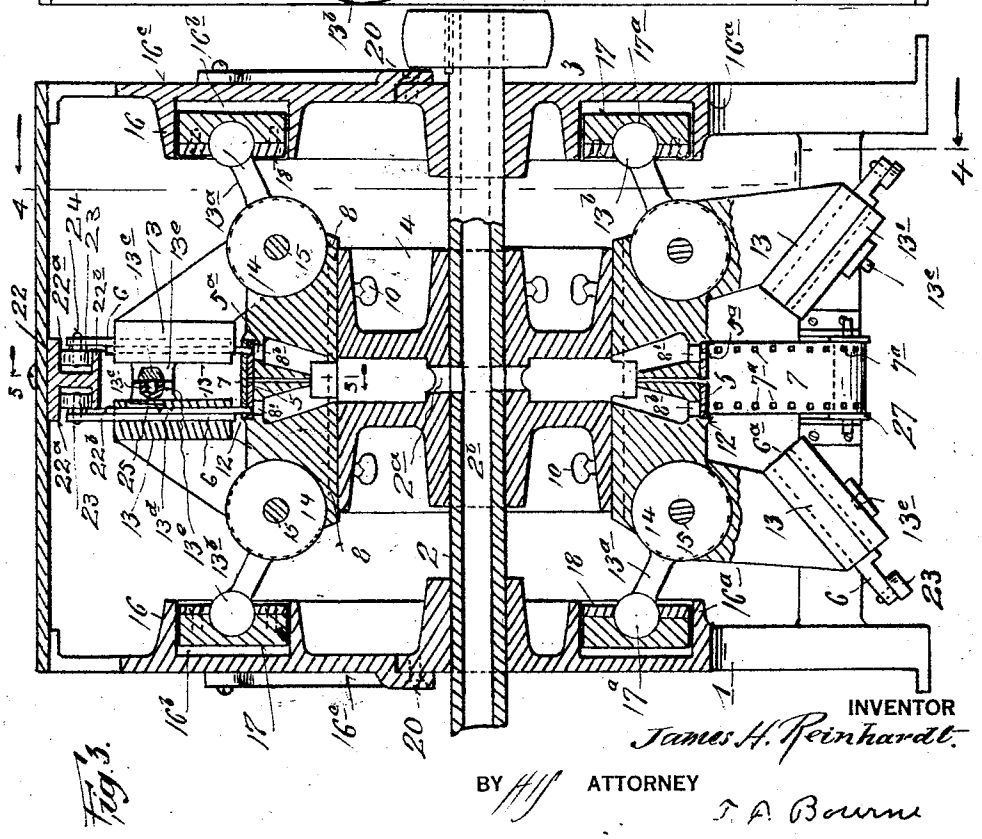


Fig. 3.

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Patented Nov. 3, 1925. 1,559,987

UNITED STATES PATENT OFFICE.

JAMES H. REINHARDT, OF EAST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-FIFTH TO THEODORE F. BOURNE, OF MONTCLAIR, NEW JERSEY.

PERFORATING MACHINE.

Application filed January 19, 1922. Serial No. 530,260.

To all whom it may concern:

Be it known that I, JAMES H. REINHARDT, a citizen of the United States, and resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Perforating Machines, of which the following is a specification.

My invention has reference to machines for perforating or indenting suitable material in a continuous manner, and more particularly to perforating machines in which the perforating or indenting devices rotate bodily and during rotation the material to be perforated or indented travels with the perforating means.

In my Letters Patent No. 1,092,596, April 7, 1914, for perforating machines, I have illustrated means for perforating or indenting strips of material wherein the perforating means rotate around a common axis and at a suitable position of such rotation said perforating means act upon the strip to perforate or indent the same. My present improvements have particular reference to the class of machines set forth in my aforesaid Letters Patent.

My present invention is particularly adapted to perforate spaced rows of holes in moving picture films, although my improvements may be used to perforate other strips in single rows or in a plurality of spaced rows of perforations.

In the example of my invention illustrated in the accompanying drawings, I provide a rotary head or support which carries cooperative male and female punches and dies, the female dies being retained in position upon said head and the male punches being reciprocatively carried by movable members to be brought opposite a strip on said dies for perforating or indenting it at a proper position of rotation of the parts. Said members are movable with relation to the female dies to present the male punches thereover and to remove said punches therefrom out of the planes of the strip to be perforated, means being provided to cause the punches to advance to the dies and retreat therefrom as required, during rotation of said head, members and punching means.

My invention also comprises novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a partly broken side view of a perforating machine embodying my invention;

Fig. 2 is a partly broken plan view of the machine;

Fig. 3 is a vertical substantially central section of the machine;

Fig. 4 is a section substantially on the plane of line 4, 4, in Fig. 3, parts being omitted;

Fig. 5 is a fragmentary sectional view substantially on the line 5, 5, in Fig. 3;

Fig. 6 is a detail section substantially on line 6, 6, in Fig. 4;

Fig. 7 is a detail of one of the punches;

Fig. 8 is a fragmentary detail of means for retaining the punches in retracted position, and

Fig. 9 is a fragmentary view of the female dies.

Similar numerals of reference indicate corresponding parts in the several views. Parts have been omitted in some of the views for clearness of illustration.

The numeral 1 indicates the main frame of the machine, in which is suitably journaled a shaft 2. Said shaft may be rotated by pulley 3 or in any desired manner. Upon shaft 2 is secured a head or support 4 which carries the perforating or indenting devices. As illustrated, the perforating or indenting devices comprise female dies 5 and male perforating or indenting elements such as punches 6 to cooperate therewith for punching or indenting strip or material 7. The female dies are shown in the form of elongated metal strips having rows of perforations 5^a, spaced apart according to the desired spacing of perforations 7^a in strip or material 7. The dies and punches are shown carried by blocks 8 for convenience of support upon head 4, there being any desired number of said blocks arranged around said head and detachably connected thereto. I have shown the head 4 and blocks 8 having angular surfaces to provide joints, shown in the nature of dove-tail joints at 9, (Fig. 4), whereby the blocks may be slidably attached to the head and held in firm position thereon, screws 10 serving to secure the blocks on the head. The female die-plate 5 may be secured along the periphery of

blocks 8 by screws 11, (Fig. 9), whereby the dies may be removed and replaced. Adjacent to the outer edges of the dies the blocks 8 are shown provided with radially disposed stops or flanges 12 to engage the edges of the strips or films 7 to guide the latter in perforating or indenting position, Fig. 3.

The punches 6 are slidably carried by movable members 13 that are carried by corresponding blocks 8. The members 13 are shown provided with projections or jaw pieces 14 received between spaced jaws 8^a on blocks 8 and pivotally supported thereon by pins or pivots 15, whereby said members are pivotally carried on the blocks to rock back and forth. I have provided two annular rows of blocks 8, six blocks in a row, each block having a pivotal member 13, arranged around head 4 on opposite sides thereof, whereby members 13 are arranged in opposing pairs, the members of each pair being adapted to swing toward and from each other. The number of said blocks and members may be varied, as well as the number of rows thereof. Each member 13 is preferably in segmental form adapted to be positioned radially respecting head 4 for the punching operation. In Figs. 1 and 4 part of the members 13 and punches 6 are omitted, although intended to complete the circle. The corresponding female die 5 is carried by a block 8 to cooperate with the punches 6 of the corresponding member 13. The members 13 are rocked as they are carried around with head 4 to position the punches for perforating strip 7 and to withdraw the members and punches from such position. Each member 13 is shown provided with a projection or arm 13^a for operation by a cam 16 carried by frame 1 on the corresponding side. The cams 16 are shown in the form of grooves containing slidable disks or plates 17 pivotally connected with the corresponding arm 13^a. Said arms are shown provided with ball-like ends 13^b nested in sockets 17^a in disks 17 and retained by apertured plates 18, shown held on disks 17 by screws 19, (Figs. 3 and 4). The parts 13^b, 17 and 18 serve in the nature of universal or ball-and-socket joints during rotation of members 13 around shaft 2. The cams 16 are shown in the form of grooves, portions 16^a of which are shown as part of frame 1, and portions 16^b of which cam grooves are on plates 16^c detachably carried by said frame by means of screws 20. The cam plates 16^c may be removed for adjustment of parts within frame 1. To retain opposing members 13 from relative movement when in the punching position I preferably provide the opposing faces of said members with cooperative projections and recesses 13^c, 13^d, (a projection on one member to enter a recess in the other member), as indicated in Fig. 3, the members 13 preferably having opposing bosses 13^e, containing said projections and recesses, to engage in the punching position.

The punches 6 are shown slidable in radially disposed guideways 21 in the corresponding members 13, (Figs. 2 and 6). For convenience of manufacture and for accessibility the members 13 are provided with a removable wall or plate 13′ which may be secured to the main body of the member by screws. In the example illustrated the punches 6 are shown rectangular in cross section located in opposing V-like radial grooves 21^a in members 13 and corresponding plates 13′ (Fig. 2), whereby the punches are guided. At their inner or operating ends the punches 6 have or are formed with one or more projections or pins 6^a to cooperate with the apertures 5^a of dies 5 to perforate or indent the material 7. By providing at least two projections or pins 6^a on each punch 6 the main bodies of the punches may be made substantial and provide proper spacing for punching holes near the margins of conventional moving picture films. The blocks 8 are shown provided with holes 8′ registering with apertures 7^a of dies 7, said holes communicating with recesses 8^b in said blocks, which recesses communicate with holes 2^a in shaft 2 that communicate with bore 2^b of said shaft, (Figs. 3 and 5). By blowing air through bore 2^b the chips or punchings from material 7 will be drawn away from dies 5 and discharged from said bore.

To move the punches toward and from dies 5 during their bodily rotation with head 4 and blocks 8 I have illustrated cam member 22, supported by frame 1 adjacent to the outer ends of the punches to cooperate with the corresponding punches. Said cam member is shown in channel or groove-like form to receive and actuate projections from the punches shown in the form of anti-friction rolls 23 journaled on pivots or pins 24 carried at the outer ends of the punches. The cam member is shown provided with an outer surface 22^a and an inner surface 22^b spaced therefrom for the passage therebetween of the projections or rollers 23, said surfaces being shown concentric around the axis of shaft 2. At the entrance to the space between said surfaces is an eccentric or substantially flat outer surface 22^c which merges with curved surface 22^a to engage projections or rolls 23 to cause the punches to be pushed toward the dies 5 for perforating or indenting the material 7, and at the opposite or delivery end an eccentric or substantially flat inner surface 22^d merges with curved surface 22^b to cooperate with projections or rollers 23 to cause the punches to be withdrawn from the dies and said material. The arrangement is such that as the punches 6, which are radially outwardly positioned, are

bodily rotated in the direction of the arrows in Figs. 1 and 4, the projections 23 will successively engage cam surface 22^e which will cause the punches to move toward the companion die 5 to punch or indent the material 7 on the die, said projections remaining in the groove between surfaces 22^a, 22^b, to retain the punches in the die, until projections 23 engage cam surface 22^d which will act with said projections to successively withdraw the punches from material 7 and the dies 5, the punches then being in the outward position to later engage the surface 22^e.

Any suitable means may be provided to retain the punches 6 in set position. I have shown spring fingers 25 to engage notches 6^b in the punches, which fingers are shown located in groove 26 of plate 13′ (Figs. 3, 6 and 8). Said spring fingers may be in comb-like form, the back bar 25^a of which may be screwed or riveted on plate 13′.

The flexible strip or material 7 to be perforated or indented may be received from a supply spool, in an ordinary way, (not shown), and passed over a guide roller 26 on frame 1, whence said strip passes partly around head 4 resting upon the adjacent dies 5, (Fig. 3), to be perforated or indented. The strip passes from the punches to a receiving device, such as preferably over a guide roller 27 on frame 1, (Figs. 1 and 3), whence the strip passes to a take-up spool or the like 28 which may be operated in any desired way to wind the perforated strip. An idle roller 29 may press against the strip 7 to cause it to be seated snugly against dies 5, between guide stops 12, as the strip is taken up on the rotary dies, and to assure that the strip will be retained out of the path of the rotating punches and their carrying members 13. The roller 29 is shown pivotally carried by arm 30 pivoted at 31 on bracket 32 carried by frame 1, (Fig. 1), a spring 32 normally pressing said arm and roller toward strip 7. The rollers 26 and 27 are shown on the same side of and below the punching devices so that the members 13 may be timed for rocking movements without undue speed and to allow ample time for the punching operations.

Where a single row of perforations or indentations is to be produced in a strip of material 7 a single annularly disposed row of punches and corresponding holes 5^a may be provided around the rotative head 4. If two or more parallel rows of perforations or indentations are to be made in a strip the rows of holes may be appropriately located in the die plate 5 and the punches 6 may have corresponding spaced punching projections or pins for said holes. In the example illustrated I have shown two annular series of blocks 8, side by side, on head 4, each block having a rockable member 13 provided with punches 6 and each block having a female die plate 5 for the corresponding punches. The opposing members 13 approach and recede during rotation with head 4 and their arms 13^a extend outwardly in opposite directions to be actuated by corresponding cams 16, shown disposed at opposite sides of the machine, (Fig. 3). The cam member 22 has the previously described cam surfaces on opposite sides to cooperate with the projections or rolls 23 of the corresponding annular series of punches, whereby the punches will operate substantially simultaneously at a definite portion of strip 7, along opposite sides thereof, in desired spaced relation.

In accordance with the example illustrated, when strip 7 is in position on dies 5 and the head 4 is rotated some of the members 13 will be in position over the strip and other of said members will be away from said strip more or less. Normally or when not punching the punches will be in the outer or retracted position, away from strip 7. When the projections 23 of the punches approach and engage cam surface 22^e the punches will be pushed toward strip 7 to perforate it and the arcuate surfaces 23^a and 23^b will retain said punches in such position, during travel of the punches with head 4, until the projections 23 engage cam surface 22^d, whereupon the punches will be retracted from the dies and strip, being successively moved outwardly. Following the operation of one of the members 13 and its punches, let it be assumed that during its rotation with head 4 all of its punches have been retracted from its die 5 and strip 7, its disk 17 having traveled through the arcuate portion 16^d of cam 16, Fig. 4. Said disk next encounters the receding portion 16^e of cam 16 which will cause the disk to approach shaft 2, thereby causing member 13 to rock on its pivot 15 to carry its punches outwardly to one side of the plane of the adjacent edge of strip 7 so that the punches will be free to be carried around with head 4 without engaging the strip. The lower curved portion 16^f of cam 16 will retain member 13 and its punches retracted from strip 7, as head 4 is rotated, until the punches have passed to a position where they will not encounter the up-passing portion of the strip, whereupon the disk will travel in the portion 16^g of cam 16 which will act with disk 17 to cause member 13 to be swung inwardly to present its punches over its die and over the unpunched adjacent part of the strip on the die. Continued rotation of head 4 will cause the projections 23 of the punches of said member 13 to successively engage cam surface 22^e to push the punches inwardly to puncture or indent the strip on the die, said punches being re-

tained in engagement with the holes in the strip to feed it by and with the punches while the said projections 23 travel between the arcuate cam surfaces 22^a and 22^b. When the said projections 23 again encounter the eccentric or lateral cam surface 22^d the punches will be withdrawn from strip 7, as before described. Corresponding operations, as above described, occur with each succeeding member 13 and its punches with respect to the cam member during rotation of head 4, whereby the strip is continuously punched or indented and fed as required. Since, in the example illustrated, the members 13 are arranged in pairs the cam members 16 and 22 are correspondingly oppositely disposed so that the members 13 of each pair will approach and recede from one another from opposite sides of strip 7 to cause the punches of each pair of said members to simultaneously punch or indent opposite sides of said strip, whereby the strip will be accurately held by the punches as fed thereby. The construction enables the holes to be punched in the strip always in positive spaced relation without danger of variation, which is particularly advantageous for moving picture films. Although the punches rotate bodily with head 4 the punching operation is rectilinear, so that the punches enter the strip and recede from it in a right line so as not to distort the strip nor the edge of its holes 7^a.

Having now described my invention, what I claim is:

1. A perforating machine comprising a rotative head, a member movably carried by said head, punches movably carried by said member arranged in an annular row circumferentially around said head and operative radially thereof, die means carried by said head and cooperative with said punches, means to operate said member to place the punches over the die means and to remove the punches to one side of the plane of a strip on the die after punching the strip during rotation of said head, and means to operate said punches.

2. A perforating machine comprising a rotative head, a member movably carried by said head, punches movably carried by said member arranged in an annular row circumferentially around said head and operative radially thereof, die means carried by said head and cooperative with said punches, means to operate said member to place the punches over the die means and to remove the punches to one side of the plane of a strip on the die during rotation of said head, after punching the strip and means to operate said punches successively to punch or indent said strip during rotation of the head.

3. A perforating machine comprising a rotative head, a member movably carried by said head and provided with guideways located in an annular row circumferentially around said head, punches operative in said guideways, die means to cooperate with said punches, means to actuate said punches successively toward and from the die means, and means to move said member and its punches toward said die means for punching the strip and from said die means after punching the strip during rotation of said head.

4. A perforating machine comprising a rotative head, a member movably carried by said head and provided with guideways located in an annular row circumferentially around said head, punches operative in said guideways, die means to cooperate with said punches, cam means to successively advance the punches toward the die means, retain them in cooperation therewith and successively withdraw the punches from the die means during rotation of the head and punches, and means to move said member with its punches in position over the die means before the punches cooperate with said cam means and to withdraw said member and its punches from operative relation to the die means after all of said punches have passed from the cam means during the rotation of said head.

5. A perforating machine comprising a rotative head, a member movably carried by said head and provided with guideways located in an annular row circumferentially around said head, punches operative in said guideways, die means to cooperate with said punches, cam means to operate said punches comprising an eccentric surface to advance the punches successively to the die means, a concentric surface to retain the punches temporarily in the last named position, and an eccentric surface to retract the punches from the die means, said punches having means to cooperate with said cam means, and means to move said member with its punches away from the die means and return them to operative position respecting the die means during rotation of said head.

6. A perforating machine comprising a rotative head, a member movably carried by said head, punches movably carried by said member arranged in an annular row circumferentially around said head and operative radially thereof, die means carried by said head and cooperative with said punches, means to operate said member to place the punches over the die means and to remove the punches to one side of the plane of a strip on the die during rotation of said head, means to operate said punches and spaced guiding means supported by said head on opposite sides of the die means to guide a strip of material upon said die means during rotation of said head.

7. A perforating machine comprising a

rotative head, a member movably carried by said head, punches movably carried by said member arranged in an annular row circumferentially around said head and operative radially thereof, die means carried by said head and cooperative with said punches, means to operate said member to place the punches over the die means and to remove the punches to one side of the plane of a strip on the die during rotation of said head, means to operate said punches, and means spaced apart on one side of said head to guide said strip to and from said die means partly around said head.

8. A perforating machine comprising a rotative head, a member movably carried by said head, punches movably carried by said member arranged in an annular row circumferentially around said head and operative radially thereof, die means carried by said head and cooperative with said punches, means to operate said member to place the punches over the die means and to remove the punches to one side of the plane of a strip on the die during rotation of said head, means to operate said punches, means spaced apart on one side of said head to guide said strip to and from said die means partly around said head, and means to operate against said strip to snug it in said guiding means as the strip advances to said die means.

9. A perforating machine comprising a rotative head, a pair of opposing members movably carried by said head, means to move said members toward and from each other during rotation of the head, cooperative punching means carried by said head and by said members and having movable elements for perforating or indenting material therebetween, and means to actuate said movable elements during rotation of said head.

10. A perforating machine comprising a rotative head, a pair of opposing members movably carried by said head, means to move said members toward and from each other during rotation of the head, die means carried by said head, punching elements carried by said members and spaced apart to move with the corresponding members toward and from each other with relation to the die means, and means to operate said punches during rotation of said head.

11. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, means to actuate said punches during rotation of said head, and means to move said punches over said strip and away from said strip to permit said punches to freely pass said strip during rotation of said head.

12. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, movable members carried by said head and provided with means respectively guiding said punches, means to move said members with their punches toward and from each other during rotation of said head and members to present said punches over and remove them from relation to said holes, and means to operate said punches to perforate the strip during rotation of said head with the punches.

13. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members carried by said head and each provided with an annular row of guideways receiving corresponding punches to cooperate with an adjacent row of holes, means to move said members with their punches toward and from each other to present the punches over and remove them from relation to the corresponding row of holes during rotation of said head and punches, and means to cause said punches to successively approach and recede from said holes during rotation of said head.

14. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members carried by said head and each provided with an annular row of guideways receiving corresponding punches to cooperate with an adjacent row of holes, means to move said members with their punches toward and from each other to present the punches over and remove them from relation to the corresponding row of holes during rotation of said head and punches, means to cause said punches to successively approach and recede from said holes during rotation of said head, and means cooperative between said heads to retain them in firm relation in perforating position.

15. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members carried by said head and each provided with an annular row of guideways receiving corresponding punches to cooperate with an adjacent row of holes, means to move said members with their punches toward and from each other to present the

punches over and remove them from relation to the corresponding row of holes during rotation of said head and punches, means to cause said punches to successively approach and recede from said holes during rotation of said head, one of said members having a projection and the other member having a recess to receive said projection to retain said members in firm relation when in perforating position.

16. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members each provided with a row of radially disposed guideways respectively receiving said punches, means to move said members and their punches toward and from each other respecting said holes during rotation of the head, and means to successively advance the punches of each row toward and from the corresponding hole during rotation of said head.

17. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members each provided with a row of radially disposed guideways respectively receiving said punches, means to move said members and their punches toward and from each other respecting said holes during rotation of the head, and cam means having surfaces concentric with the axis of said head and eccentric surfaces at opposite ends of said concentric surfaces, said punches having means cooperative with said cam surfaces for causing the punches to enter the corresponding holes, to remain therein and be retracted therefrom during rotation of the punches with the head.

18. A perforating machine comprising a rotative head provided with spaced annular rows of holes, spaced annular rows of punches to cooperate with said holes to perforate a strip therebetween with spaced rows of holes, opposing movable members each provided with a row of radially disposed guideways respectively receiving said punches, means to move said members and their punches toward and from each other respecting said holes during rotation of the head, cam means having surfaces concentric with the axis of said head and eccentric surfaces at opposite ends of said concentric surfaces, said punches having means cooperative with said cam surfaces for causing the punches to enter the corresponding holes, to remain therein and be retracted therefrom during rotation of the punches with the head, and means to retain said punches retracted from said holes until advanced to the holes by one of said eccentric cam surfaces.

19. A perforating machine comprising a rotative head provided with spaced annular rows of holes, guiding means at opposite sides of said rows of holes for guiding a strip over said holes, spaced annular rows of punches carried by said head to cooperate with the corresponding rows of holes, means to move the corresponding rows of punches over the strip and outwardly out of the planes of the corresponding edges of the strip during rotation of the head, and means to move said punches successively toward and from the strip during rotation of the head.

20. A perforating machine comprising a rotary head provided with spaced annular rows of holes and having guiding means for a strip at opposite sides of said holes, means on one side of said head to guide the strip to and from said guideway, cam means spaced from the head on its side opposite said guiding means, opposing movable members carried by said head on opposite sides of said rows of holes respectively, punches slidably carried by said members and radially disposed respecting said head, said punches having means to cooperate with said cam means for moving the punches toward and from said holes during rotation of said head, means to rock said members to position the punches over the holes in position for cooperation with the cam means and to place the punches and members out of the planes of said strip passing from and to its guiding means.

21. A perforating machine comprising a rotative head, blocks detachably carried by said head and provided with annularly disposed dies, members pivotally carried by said blocks and provided with annularly disposed rows of guideways, punches slidable in said guideways, means to rock said members and means to operate said punches during rotation of said head.

22. A perforating machine comprising a rotative head, blocks detachably carried by said head and provided with annularly disposed dies, members pivotally carried by said blocks and provided with annularly disposed rows of guideways, punches slidable in said guideways, cam means located outside of said blocks to operate said punches and means to rock said members relatively to said dies and cam means during rotation of said head.

23. A perforating machine comprising a rotative head, blocks detachably carried by said head and provided with annularly disposed dies, members pivotally carried by said blocks and provided with annularly disposed rows of guideways, punches slidable in said guideways, means to operate said

punches, and a grooved cam at one side of said head, said members having means operative in said cam to rock said members during rotation of said head.

24. A perforating machine comprising a rotative head provided with annular die means, members pivotally carried by said head, punches slidably carried by said members, means to actuate said punches during rotation of said head, said members having projections, a grooved cam, and means slidable in said cam and movably cooperative with said projections to rock said members during rotation of said head.

25. A perforating machine comprising a rotative head provided with annular die means, members pivotally carried by said head, punches slidably carried by said members, means to actuate said punches during rotation of said head, said members having projections, a grooved cam, disks slidable in said cam, and means pivotally connecting said projections and disks for causing rocking of said members during rotation of said head.

26. A perforating machine comprising a rotative head, blocks detachably secured around said head, die plates detachably secured to said blocks and provided with rows of holes, members pivotally carried by said blocks and provided with rows of guideways, punches slidable in said guideways, means to operate said punches and means to rock said members during rotation of said head.

27. A perforating machine comprising a rotative head, blocks detachably secured in annular rows on opposite sides of said head, die plates secured on said blocks and provided with rows of holes spaced apart, members pivotally carried by said blocks and spaced apart in pairs, means to rock the members of each pair toward and from each other during rotation of said head, punches movably carried by said members to cooperate with the corresponding die plates, and means to actuate said punches.

28. A perforating machine comprising a hollow shaft, a head secured thereon and provided with perforated die means, means providing communication between the hollow shaft and the perforations of the die means, punches to cooperate with said die means, means to movably support said punches on said head, and means to actuate said punches during rotation of said head.

29. A perforating machine comprising a rotative head, perforating devices carried by said head, means to guide material partly around said head between cooperative members of said perforating devices, means to move part of said devices to and from operative relation to said material during rotation of said head, means to move part of said devices toward said material and retain them in said material during part of the rotation of said head to continuously feed the material by said devices, and means to withdraw said devices from the material.

Signed at New York city, in the county of New York, and State of New York, this 17th day of January, A. D. 1922.

JAMES H. REINHARDT.