

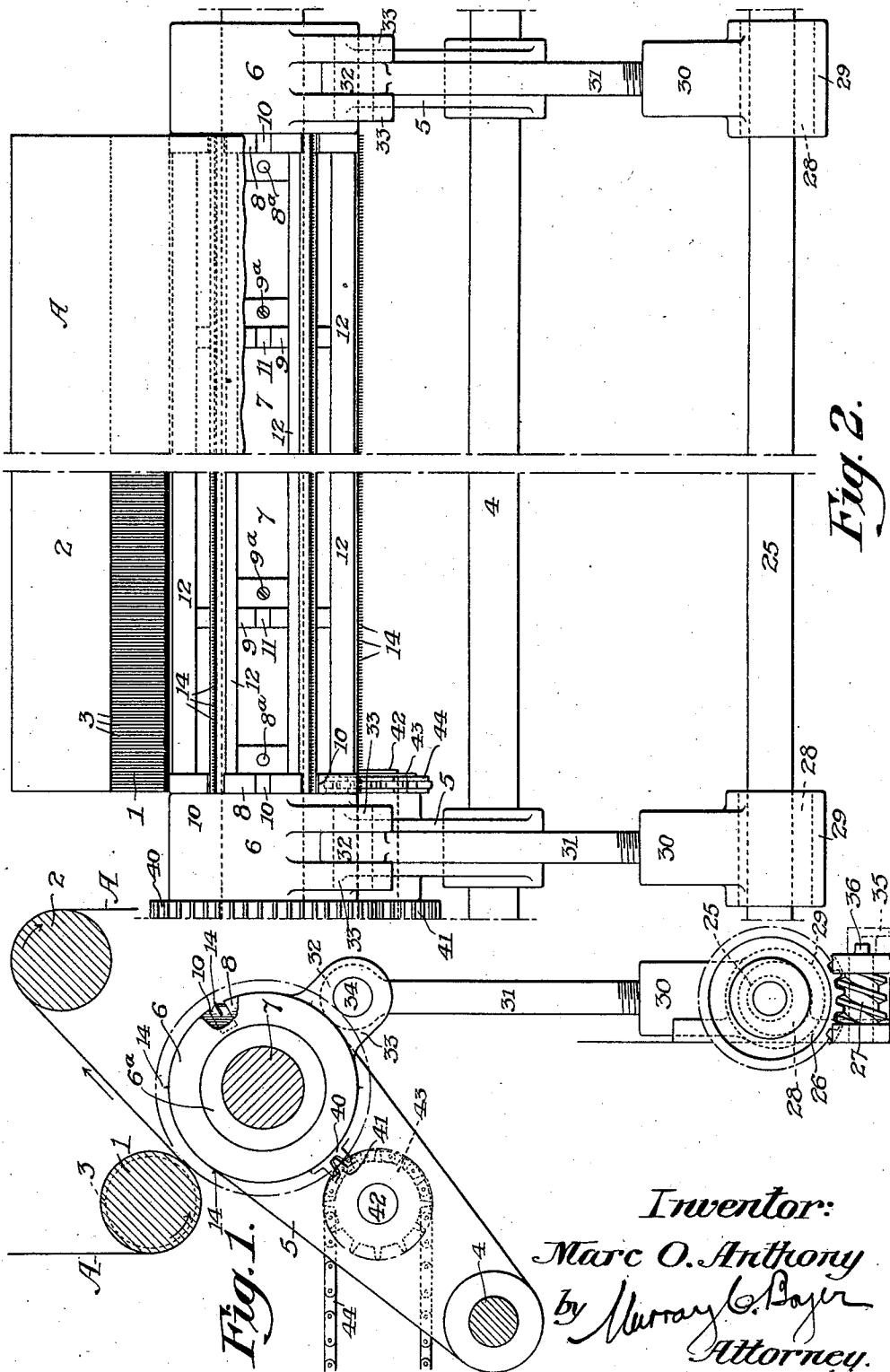
May 28, 1929.

M. O. ANTHONY

1,714,583

PERFORATING MECHANISM

Original Filed Aug. 28, 1924 4 Sheets-Sheet 1



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M. O. ANTHONY
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Fig. 3.

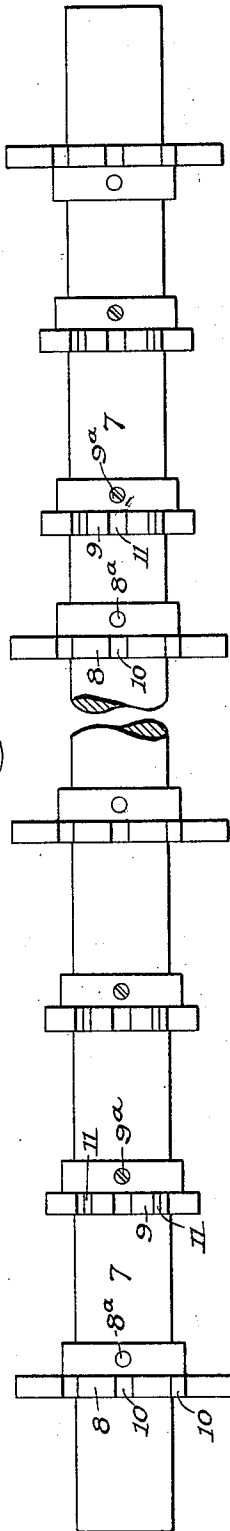


Fig. 4.

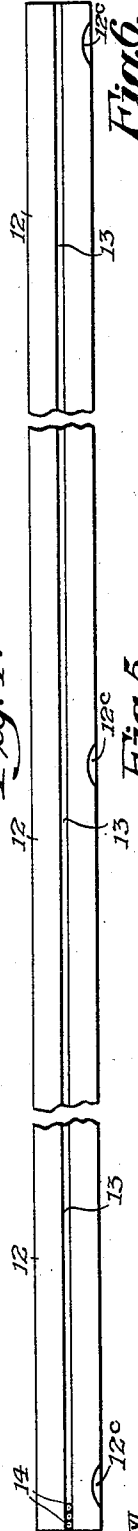


Fig. 5.

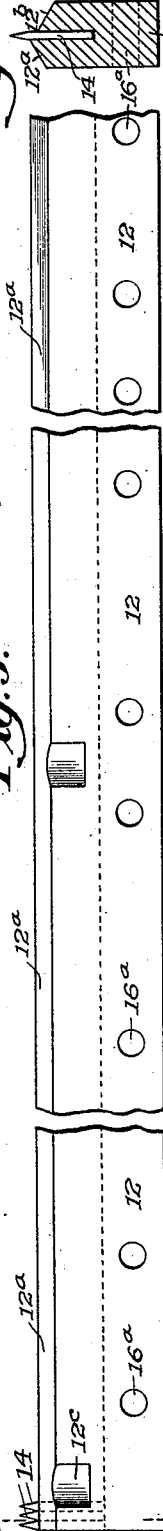


Fig. 6.

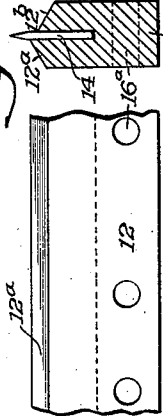


Fig. 7.

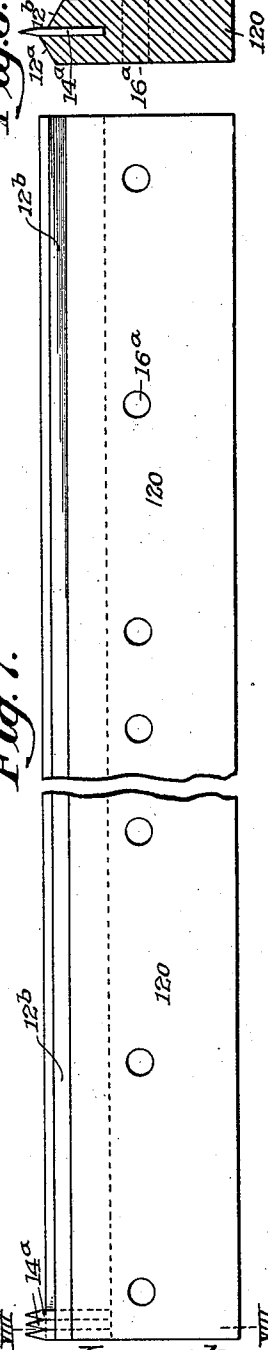
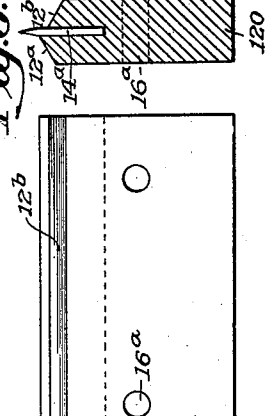


Fig. 8.



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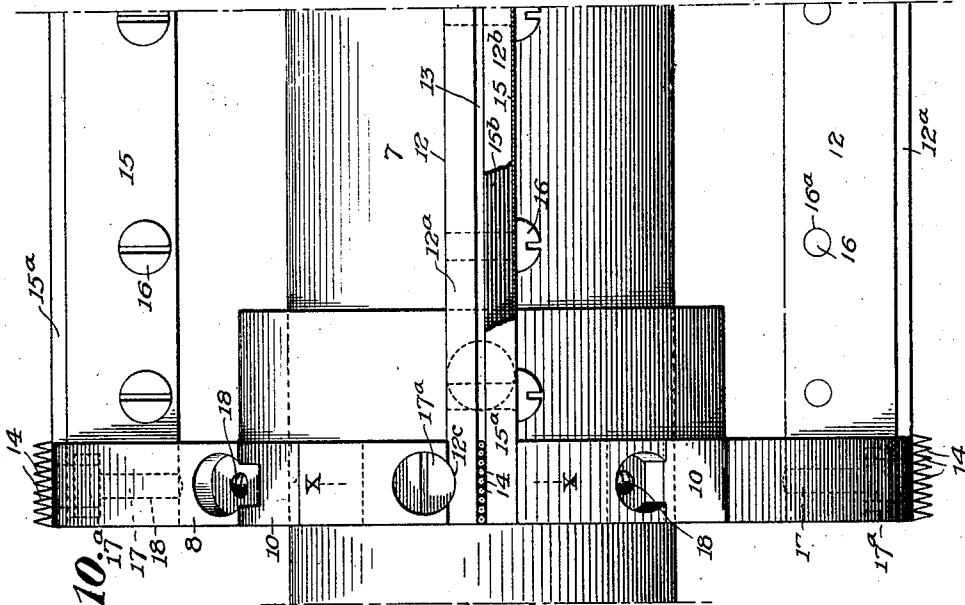


Fig. 10.

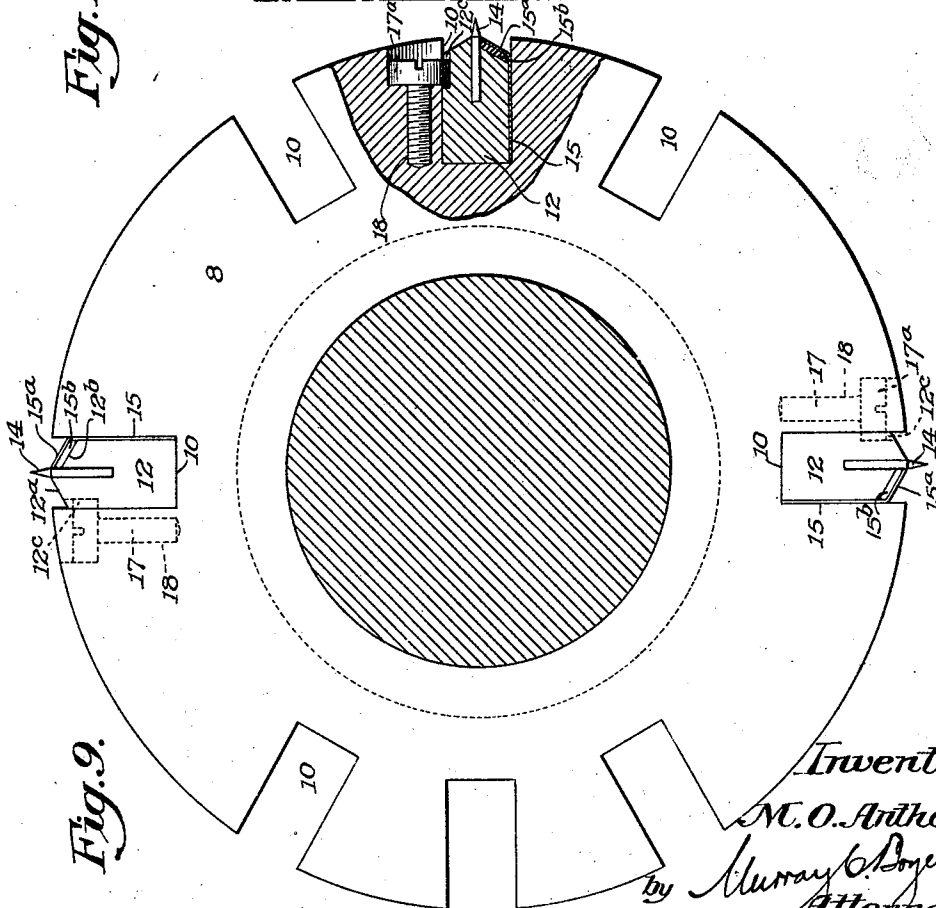


Fig. 9.

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Fig. 14.

A		A		A		A		
b	B	c	C	a	D a	E	F	G
b	b	b	b	c	c	a	b	b
b	b	b	b	a	a	a	b	b
b	B	b	C a	D	E	F	G	G
b	b	b	b	b	a	b	c	c
b	b	b	b	b	b	a	b	b

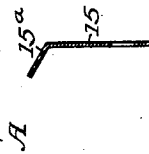


Fig. 13.

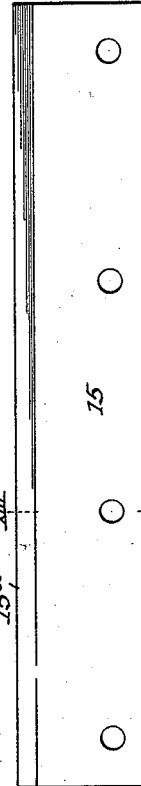


Fig. 12.

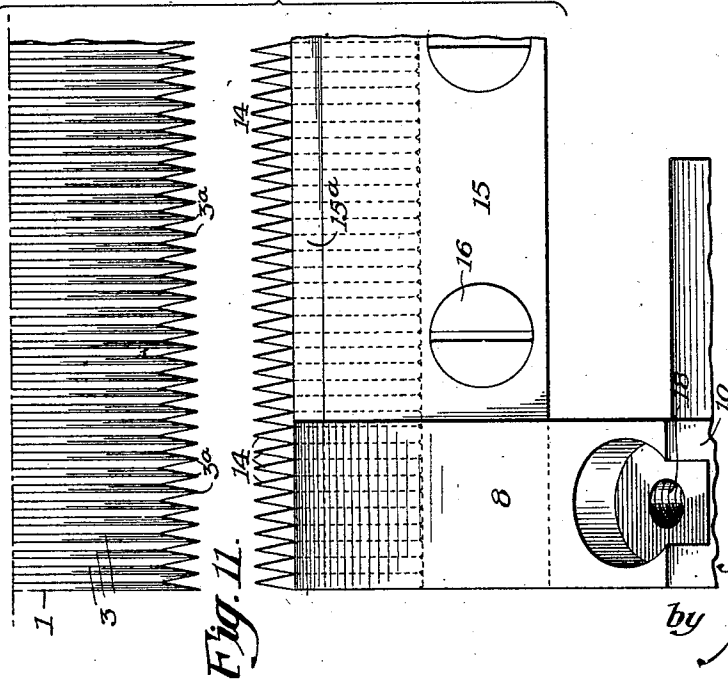


Fig. 11.

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UNITED STATES PATENT OFFICE.

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PERFORATING MECHANISM.

Application filed August 28, 1924, Serial No. 734,683. Renewed April 10, 1929.

My invention relates to mechanism for perforating continuous webs and while my improved structure is applicable for use with continuous webs of paper subsequently employed for any purpose, it has been especially designed for the purpose of perforating at regular or irregular intervals and in parallel lines, continuous printed webs subsequently developed as continuous fan-folded sheets for railroad freight and way bills and duplicates, order blanks, etc.

One object of my invention is to provide simple and effective means for effecting the desired perforations during the travel of the web.

A further object of my invention is to provide a simple form of perforating roll comprising notched disks mounted on a shaft; the notches receiving longitudinally slotted bars carrying individual perforating points arranged in suitable gangs, which points are locked in the slotted bars carried by said notched disks.

A further object of my invention is to provide a construction of perforating roll permitting use of sets of disks of different diameters whereby different lengths of perforating bars may be employed; such arrangement permitting continuous aligned perforations across the entire web or short lines of perforations at any desired intervals.

A further object of my invention is to provide efficient means for locking the perforating elements in their carriers.

A further object of my invention is to provide simple and efficient means cooperating with the perforating points in effecting the perforations.

And a still further object of my invention is to provide means for moving the perforating roll into and out of operative position.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a view in side elevation, largely diagrammatic, showing the relation between the perforating roll and a complementary grooved roll with which pin points carried by the perforating roll are adapted to co-act,

and the means for shifting the perforating roll into and out of cooperative position.

Fig. 2, is a front elevation, largely diagrammatic and partly broken away, of the grooved roll and perforating roll and the supporting means for the latter.

Fig. 3, is a view in elevation of the shaft of the perforating roll, partly broken away; showing the several notched disks carried thereby to receive the grooved bars carrying the perforating points.

Fig. 4, is a full-sized plan view, partly broken away, of one of the full length grooved bars receiving the perforating points and supported by the notched disks.

Fig. 5, is a view in elevation of the bar shown in Fig. 4.

Fig. 6, is a sectional view on the line VI—VI, Fig. 5.

Fig. 7, is a view in elevation of one of the shorter grooved bars, showing the face opposite that illustrated in Fig. 5.

Fig. 8, is a sectional view on the line VIII—VIII, Fig. 7.

Fig. 9, is a full-sized view of one of the disks carried by the perforating roll, showing certain of the point-carrying bars positioned therein and illustrating the retaining means for securing the perforating pin points in place; said view being partly in section on the line IX—IX, Fig. 10.

Fig. 10, is a view in elevation showing an edge view of the disk illustrated in Fig. 9, and the point-carrying bars supported thereby.

Fig. 11, is an enlarged view illustrating the relation between the perforating-point carrying bars and the grooved roll cooperating therewith in effecting the desired perforations.

Fig. 12, is a view in elevation of the retaining device carried by the point-carrying bars for holding said points in place.

Fig. 13, is a sectional view on the line XIII—XIII, Fig. 12 and

Fig. 14, illustrates a section of the continuous web with lines of perforations produced by my improved mechanism indicated thereon.

In Fig. 1, of the drawings, 1 and 2 represent

sent driven rolls or drums, which may be associated with a web printing press, and around which a paper web, indicated at A, may pass; said rolls being driven in any suitable manner, and the roll 1 being provided with closely spaced annular grooves 3, for a purpose hereinafter described.

A cross-bar or rod 4, suitably mounted in the frame of the press supports a pair of arms 5, having hubs 6, receiving suitable bushings 6^a, in which are journaled the ends of a shaft 7, forming part of a built-up perforating roll. This roll is preferably made up of the central shaft 7, carrying a plurality of disks 8 and 9 mounted in spaced relation; the disks 8 being of a greater diameter than the disks 9. The disks 8 may occupy a fixed position on the shaft 7, and be held thereto by pins 8^a, while the disks 9 are circumferentially adjustable on the shaft 7, and may be held to said shaft by suitable set screws 9^a.

The several disks 8 and 9, are notched or slotted at diametrically opposite points, and in the present instance, each disk is provided with eight slots or notches, those of the disks 8 being indicated at 10, and those of the disks 9 being indicated at 11; three of said notches on opposite sides of said disks being disposed on radial lines 60°, apart, while the three notches set at opposite sides of the disks at right angles to those first mentioned may be disposed on radial lines 30° apart.

Adapted to be secured in the slots or notches of the disks 8, are bars 12, which are longitudinally grooved at 13, to receive perforating elements 14. The upper edges of the bars 12 are downwardly and outwardly beveled in opposite direction, as indicated at 12^a and 12^b; the latter being somewhat lower than that indicated at 12^a, while the apex of said bevel 12^a coincides with the peripheral surface of the disk. The perforating elements 14 may be in the form of pointed members, and for convenience I have employed phonograph needles of a standard gage and length, which are assembled side by side in the longitudinal grooves 13 formed in said bars. These needle points may be held in place by thin metal strips 15, applied to one wall of said bars and having overhanging flanges 15^a, between which and the beveled upper surface 12^b of said bar 12, strips 15^b, of elastic material, such as rubber, are placed, the upper edges of which rubber strips bear against the sides of the needle points. These retaining strips 15 may be held in place by screws 16, adapted to enter threaded apertures 16^a, in the needle carrying bars 12.

The bars 12, which are mounted in the slots or notches 10 of the disks 8, may be continuous bars, that is to say, in a web printing press capable of printing a web 100" wide, for instance, these point-carrying bars 12 may extend substantially the full width of the press;

being supported at regular intervals in said disk 8, which latter being pinned to the shaft 7 and being disposed with their notches in alignment, support the point carrying bars in proper relative position and definite alignment.

Depending upon the rows of perforations desired in the web passing through the press, as many of the slots or notches of said disks 8 may receive the point-carrying bars 12 as may be desired. The disks 9 may be circumferentially adjustable on said shaft 7, and the extreme diameter of these disks 9, equalling the diameter between the roots of the notches 10, of the disks 8, said point-carrying bars 12 may rest upon the peripheral surfaces of said disks 9 at points between said disks 8, after said disks 9 have been adjusted circumferentially of the shaft 7 to permit such disposal and fixed in such positions by the set screws 9^a.

The prime function of the disks 9, however, is to provide means whereby short perforating-point-carrying bars 120, illustrated in Figs. 7 and 8, may be supported and disposed between the disks 8, longitudinally of the perforating roll, at any desired intervals with respect to the main perforating bars 12, whereby the perforating roll is capable of effecting aligned perforations at any desired interval with respect to the perforations made by the points of said bars 12, or with respect to matter appearing upon the printed web.

The bars 120, shown in Figs. 7 and 8, which may be mounted in the notches 11 of the disks 9, are of such a length as to lie between the disks 8 longitudinally of the perforating roll, and except for their length, these bars 120 are of substantially the same character as the continuous bars 12, and the perforating points are secured thereto in the same manner. They are wider, however, inasmuch as the disks 9 are smaller in diameter than the disks 8, in order that the apex of the highest beveled side of said bars 120 may be brought into alignment with the peripheral surface of said disks 8, and occupy relatively thereto the same position as the bars 12, which overlie the disks 9. The perforating points 14^a, will be held in the grooves 13^a of the shorter bars 120 in precisely the same manner as they are held to bars 12, and these points will describe the same orbit as the points carried by said bars 12.

After the pin points 14 (or 14^a) have been assembled in the several bars and held by the retaining elements, said bars may be set as desired in the aligned notches 10 and 11 of the respective disks 8 and 9; being held in place by set screws 17 of the fillister type, adapted to threaded apertures 18, formed in the edges of the disks, adjacent to the notches therein; the heads 17^a, of said screws bearing against the sides of the point-carrying bars 12 and serving to hold the latter in place in the disks, and said bars having curved re-

cesses 12^c receiving a portion of the heads of said screws.

The dimensions of the respective point-carrying bars are such that the points are equidistant from the axis of rotation and follow the same peripheral path or orbit. The grooves 3 of the roll 1, over which the web A passes, are formed with interposed walls 3^a, preferably brought to a knife edge which may be on the same bevel as that of the perforating elements, with which they register. It will be understood that if the roll carrying the perforating points is brought into contact with the web as it passes over said roll 1, the points will enter said web and pass between the knife edged walls making up said grooves and effect pin point perforations in the paper web in lines defined by the point-carrying bars of said perforating roll. The perforating roll is driven at proper relative speed with respect to the web A, so that as each series of perforating points is presented to the same, it will pass through and into the annular spaces of the roll 1, and then travel with the web to the point of separation.

In order that the point-carrying roll may be brought into operative position with respect to the grooved roll 1, the following mechanism may be provided.

A shaft 25 suitably mounted in suitable bearings may carry at its end a worm wheel 26, to which motion may be imparted by a worm 27. This shaft 25 carries eccentric members 28, one at each end of the same, and adapted to embrace these eccentric members are straps 29, having threaded sockets 30, which receive threaded bolts 31, the opposite ends of said bolts having eyes 32 adapted to be disposed between ears 33, carried by the arms 5, and being secured thereto by pins 34. It will be understood, therefore, that rotation of the shaft 25 carrying the eccentrics 28 will effect movement of said arms 5 to bring the point-carrying roll into operative position with reference to the grooved roll 1, so that as said rolls are rotated by suitable means, and at the proper speed with respect to the moving web; movement being imparted to the roll 1 by the moving web, the latter will be perforated each time a row of points contacts with the web in cooperation with said roll 1. The worm 27 may be turned by a crank handle 35, adapted to a squared end 36 of the worm shaft, as indicated by dotted lines.

Fig. 14, is a diagrammatic view of a section of the paper web, having a series of lines of perforations, indicated at *a*, extending entirely across the same in parallel lines and produced by points carried by the bars 12, and two series of shorter lines of perforations indicated at *b*, produced by points carried by the bars 120. This web is to be fan-folded, an operation which is performed automatically as the web is delivered from the machine, and the lines marked *c* indicate the

lines of folds imparted to the web by mechanism which forms no part of my invention to produce the respective sections B, C, D, E, F and G. The shorter point-carrying bars 120 may be set at any desired position in the length of the perforating roll, and in the present instance such bars have been set to engage the first and fifth sections of the finally fan-folded web; such arrangement permitting the independent parts of said sections B and F to be divided in halves after such sections have been operated upon to produce a bill, order or the like, following the separation of the several sections of said web.

As may be understood, the lines of perforations may be disposed at any point with respect to the web, depending upon the positioning of the respective point-carrying bars in the notched disks of the shaft 7; the continuous lines of perforations may be more widely separated as desired by omitting certain of the point-carrying bars 12, and the shorter bars 120 may be set to produce lines of perforations at any desired point with respect to the continuous lines of perforations, since the disks carrying such shorter bars are circumferentially adjustable on the shaft 7, while the long bars 12 occupy a fixed position with relation thereto; hence such shorter lines of perforations *b* may bear any spaced relation to the continuous lines of perforations *a*.

The perforating roll is driven at the same speed as the moving paper web so that the perforating points may enter and leave the same properly and effect the desired perforations in cooperation with the annularly grooved roll 1, and for this purpose the shaft 7 of the perforating roll is provided with a gear wheel 40, meshing with a gear wheel 41, journaled on a stub shaft 42 carried by one of the supporting arms 5. The opposite end of said stub shaft carries a sprocket wheel 43, over which passes a sprocket chain 44, which may receive motion from any suitable driving or driven member of the press or other machine with which the perforating mechanism is associated.

I claim:

1. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, slotted point-carrying bars mounted on said shaft, and separable, independent perforating points fixed in contacting alignment in the slots of said bars.

2. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, notched disks secured to said shaft, slotted point-carrying bars fixed in the notches of said disks, separable, independent perforating points carried in contacting alignment in

the slots of said bars, and means for holding said points in place.

3. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising independent sets of point-carrying bars mounted on said shaft and adjustable with respect to each other, and separable, independent perforating points fixed in contacting alignment in the slots of the respective bars.

4. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, independent sets of notched disks secured to said shaft, independent sets of point-carrying bars adapted to the notches of the respective disks, separable, independent perforating points mounted in contacting alignment in the slots of said bars, and means for holding said points in place.

5. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, notched disks secured to said shaft, slotted point-carrying bars mounted in the notches of said disks, means carried by said disks for securing said point-carrying bars thereto, separable, independent perforating points mounted in contacting alignment in the slots of said bars, and means for holding said points in place.

6. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, a series of notched disks carried by said shaft, slotted point-carrying bars mounted in the notches of said disks, means for securing said bars to the disks, separable perforating points mounted in the slots of said bars, and elastic means carried by the bars for holding said points in place.

7. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, notched disks carried by said shaft, a series of slotted point-carrying bars mounted in the notches of said disks, means for securing said bars in place, separable perforating points mounted in the slots of said bars, elastic holding means in engagement with said points, and separable plates for securing said elastic means to the bars and in contact with said points.

8. In perforating mechanism, the combination with operative means and supporting means, of a perforating roll comprising a shaft journaled in said supporting means, a series of notched disks carried by said shaft, slotted point-carrying bars mounted in the

notches of said disks, means for securing said bars in place, separable perforating points mounted in the slots of said bars, rubber pads carried by the bars in engagement with said points, and separable plates secured to said bars for confining the rubber pads against the points.

9. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars each carrying a plurality of independent perforating points in contacting alignment, supporting means therefor, and a roll provided with a plurality of annular grooves for cooperation with said points.

10. In perforating mechanism, the combination with a perforated roll comprising a shaft, notched disks carried by said shaft, a series of longitudinal bars mounted in the notches of said disks; said bars being slotted, and a plurality of independent perforating points mounted in contacting alignment in the slots of said bars, of a roll provided with a plurality of annular grooves for cooperation with said points.

11. In perforating mechanism, the combination with a perforating roll comprising a shaft, notched disks carried by said shaft, a series of longitudinal bars mounted in the notches of said disks said bars being slotted, and a plurality of independent perforating points mounted in contacting alignment in the slots of said bars, of a roll provided with a plurality of annular grooves for cooperation with said points; the grooves of said roll having substantially the same angularity as said points.

12. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars carrying perforating points and a supporting shaft, an annularly grooved roll for cooperative engagement with said points, adjustable supports for the perforating roll shaft whereby said roll may be moved into and out of cooperative position with respect to the grooved roll, and an eccentric for operating said adjustable supports.

13. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars, tapered perforating points carried thereby and a supporting shaft, an annularly grooved roll for cooperative engagement with said points; the grooves of said roll having substantially the same angularity as the points, adjustable supports for the perforating roll shaft whereby said roll may be moved into and out of cooperative position with respect to the grooved roll, and an eccentric for operating said adjustable supports.

14. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars carrying perfo-

rating points and a supporting shaft, an annularly grooved roll for cooperative engagement with said points, arms supporting the perforating roll shaft, and an eccentric for moving said arms to shift the perforating roll into and out of cooperative position with respect to the annularly grooved roll.

15. In perforating mechanism, the combination of a perforating roll carrying rows of perforating points set longitudinally thereof, an annularly grooved roll for cooperative engagement with said points, pivotally mounted arms supporting the perforating roll, a shaft, a pair of eccentrics mounted on said shaft, straps encircling said eccentrics and operatively connected to said arms, and worm gearing for rotating said shaft whereby the arms may be moved to shift the perforating roll into and out of operative position with respect to the annularly grooved roll.

16. In perforating mechanism, the combination of a perforating roll, arms supporting said roll, an annularly grooved roll over which a paper web passes associated in cooperative relation with said perforating roll, and an eccentric for moving said arms to bring the perforating roll into cooperative relation with the grooved roll.

17. In perforating mechanism, the combination of a perforating roll, arms supporting said roll, an annularly grooved roll over which a paper web passes associated in cooperative relation with said perforating roll, and worm gearing for moving said arms to bring the perforating roll into cooperative relation with the grooved roll.

18. In perforating mechanism, the combination of a perforating roll carrying perforating points set longitudinally thereof, an annularly grooved roll cooperating with said perforating roll and receiving the points of the latter, pivotally mounted arms supporting said perforating roll, a shaft, a pair of eccentrics mounted on said shaft, straps encircling said eccentrics, bolts connecting said straps with said pivotally mounted arms, a worm wheel on the end of said shaft, a worm in operative engagement with said worm wheel, and means for operating said worm whereby the shaft may be turned to cause the eccentrics to move the pivotally mounted arms and shift the perforating roll into and out of cooperative position with respect to the grooved roll.

19. A perforating roll comprising a shaft, a series of disks carried by said shaft and disposed in spaced relation thereon; said disks having radial notches, slotted bars mounted in said notches parallel with the axis of said shaft, means for securing the bars to the disks by headed screws; the bars being notched to accommodate the heads of said screws, a series of perforating points disposed in the slots of said bars, and detachable means carried by

said bars for retaining the points in the slots of the same.

20. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars, a series of separable, independent perforating points carried by said bars and radially disposed, supporting means for said bars, an annularly grooved roll for cooperation with said points; the grooves of said roll registering with said points, and means for driving said perforating roll.

21. In perforating mechanism, the combination of a perforating roll comprising a series of longitudinal bars, a series of separable, independent, tapered, perforating points carried by said bars and radially disposed, supporting means for said bars, an annularly grooved roll for cooperation with said points; the grooves of said roll having substantially the same angularity as said points, and means for driving said perforating roll.

22. In perforating mechanism, the combination of a roll carrying radially disposed perforating points, arms supporting said roll, an annularly grooved roll over which a paper web passes associated in cooperative relation with said perforating points, an eccentric for moving said arms to bring the perforating points into cooperative relation with the grooved roll, and means for driving the roll carrying the perforating points.

23. In a perforating device, the combination of an annularly grooved roll in contact with a moving web of paper which imparts motion thereto, a perforating roll comprising a series of longitudinal bars and a series of separable, independent perforating points carried by said bars, and supporting means for the perforating roll; said perforating roll being mounted for cooperation with said grooved roll so that said points may pass through the paper web and into the grooves of said roll.

24. In a perforating device, the combination of a roll provided with a plurality of annular grooves and disposed in contact with a moving web of paper which imparts motion thereto, a perforating roll comprising a shaft, a plurality of disks mounted on said shaft; said disks being notched, slotted bars carried in the notches of said disks, securing means therefor, and a plurality of independent perforating points fixed in contacting alignment in the slots of said bars; said perforating roll being mounted for cooperation with said grooved roll so that said points may pass through the paper web and into the grooves of said roll which register with said perforating points.

25. In a perforating device, the combination of an annularly grooved roll in contact with a moving web of paper which imparts motion thereto, a perforating roll comprising

a series of longitudinal bars carrying a series of separable, independent perforating points and supporting means therefor, and means for driving said perforating roll at the same speed as the moving web; said perforating roll being mounted for cooperation with said grooved roll so that said points may pass through the paper web and into the grooves of said roll which register with said perforating points. 10

In witness whereof I have signed this specification.

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