(No Model.) 3 Sheets—Sheet 1.

R. WRIGHT & J. E. PARKER.

MACHINE FOR PERFORATING HOLLOW OR PNEUMATIC TIRES.

No. 543,792 Patented July 30, 1895.

Fig 1.

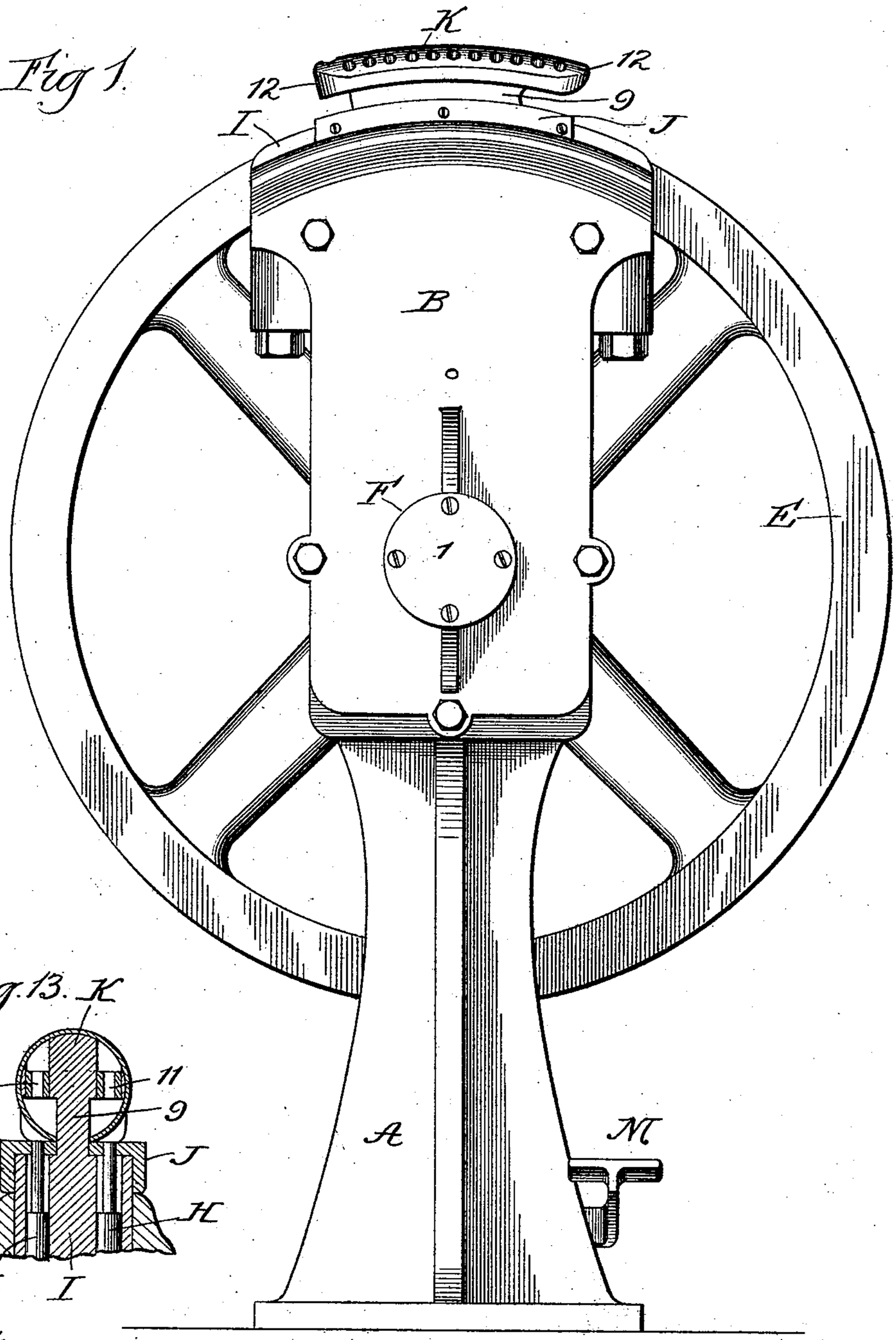

Fig. 13. K

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Fig 2.

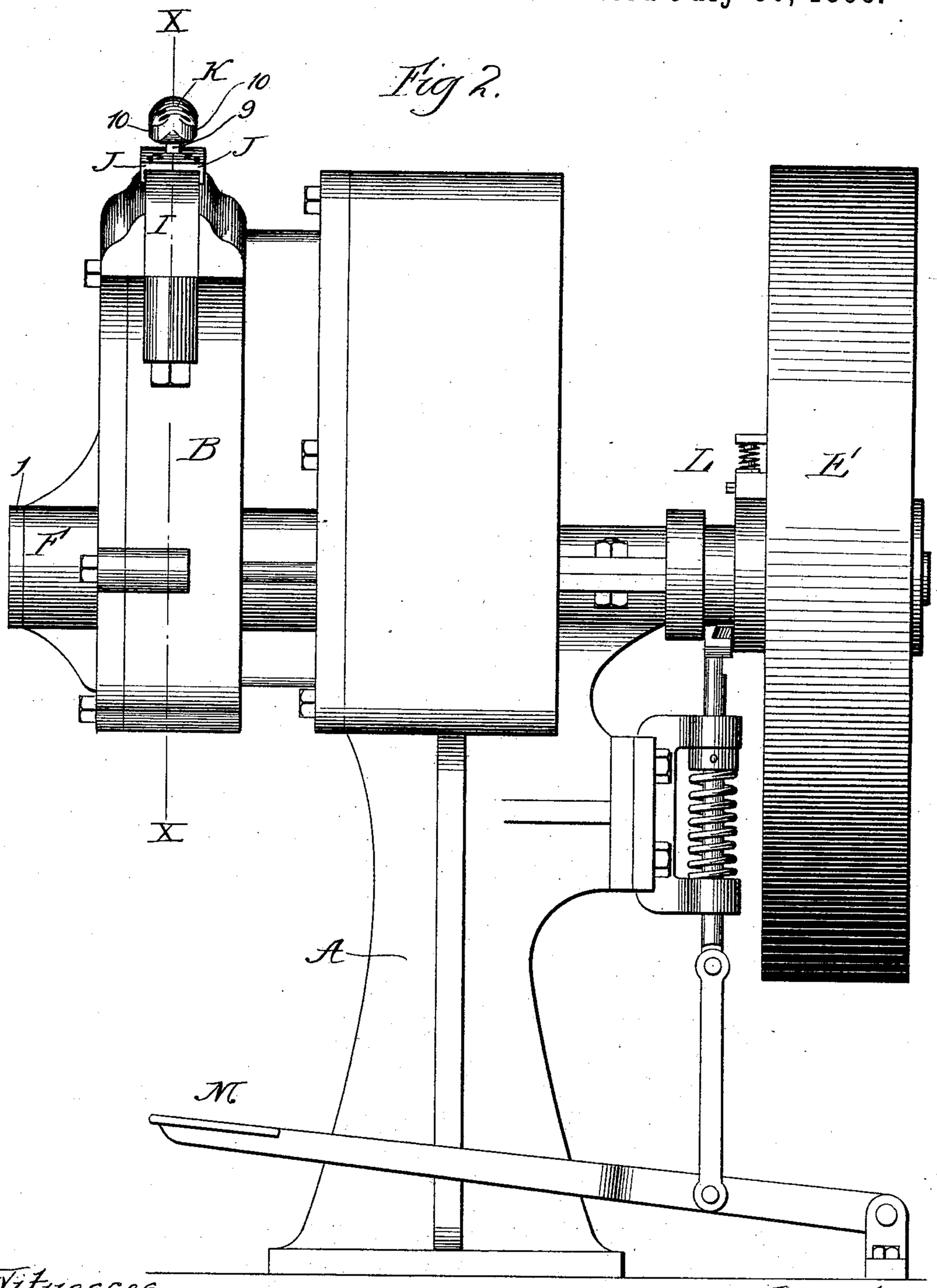

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Fig 3

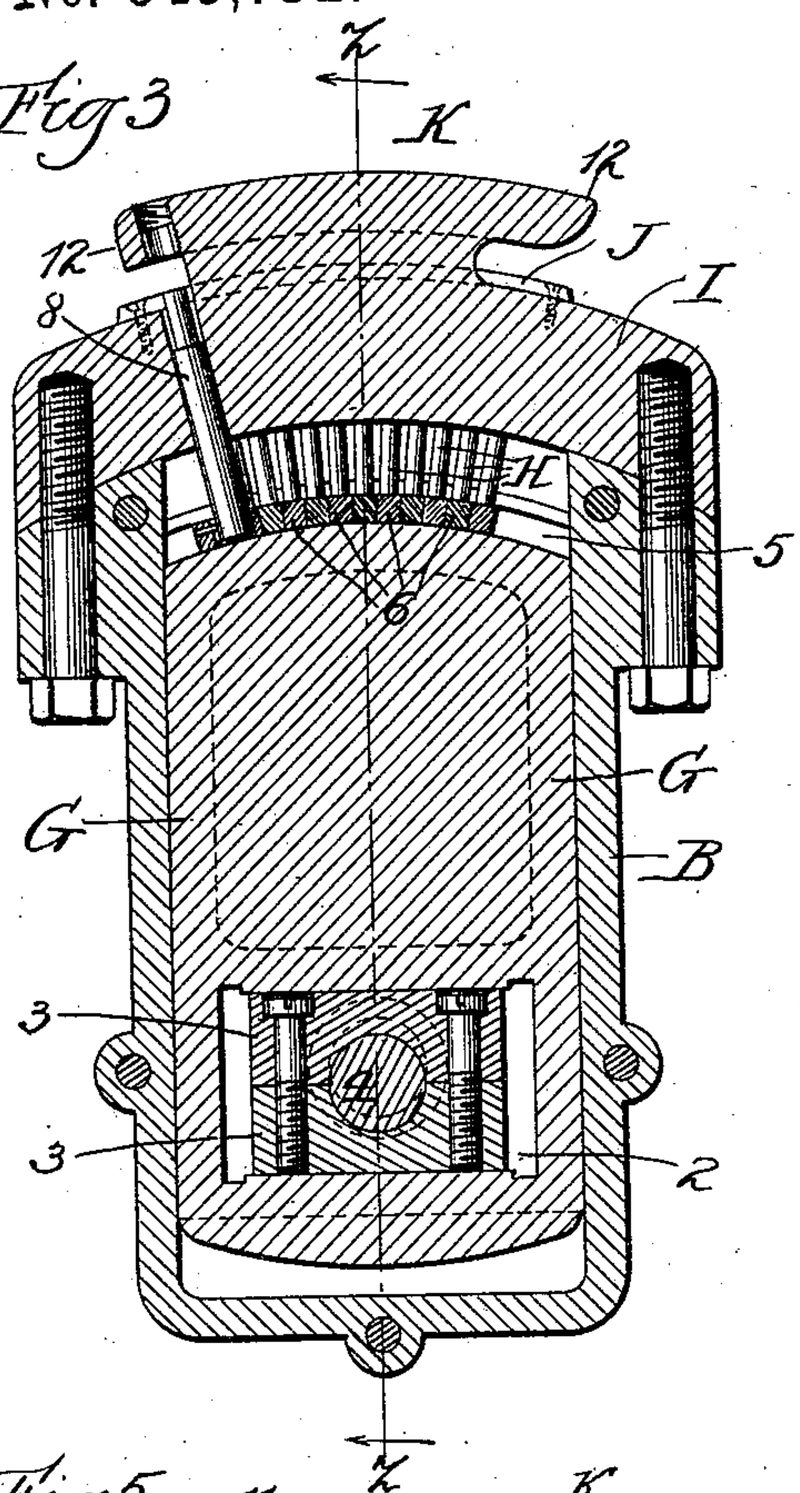


Fig. 4.

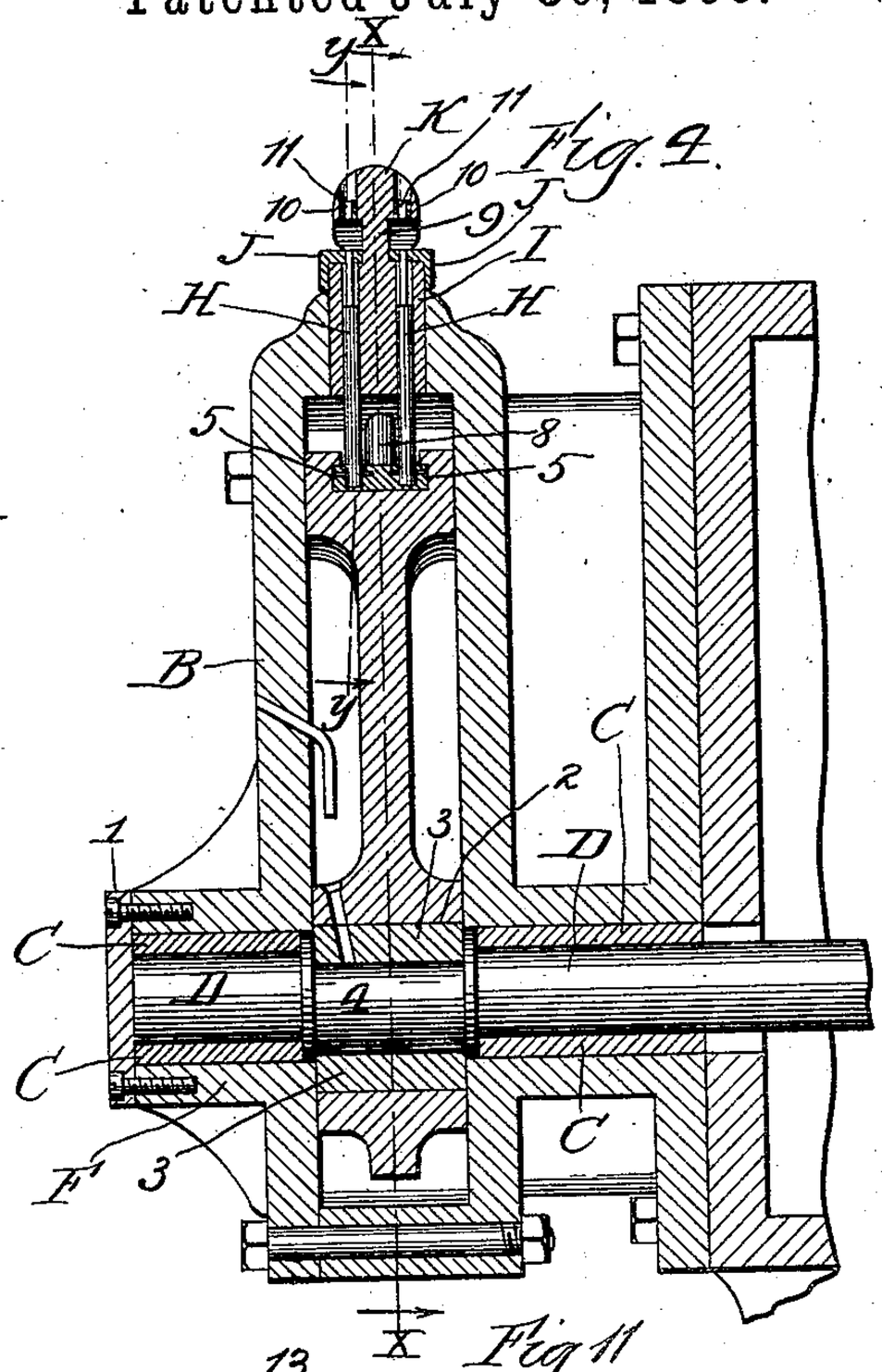


Fig. 5.

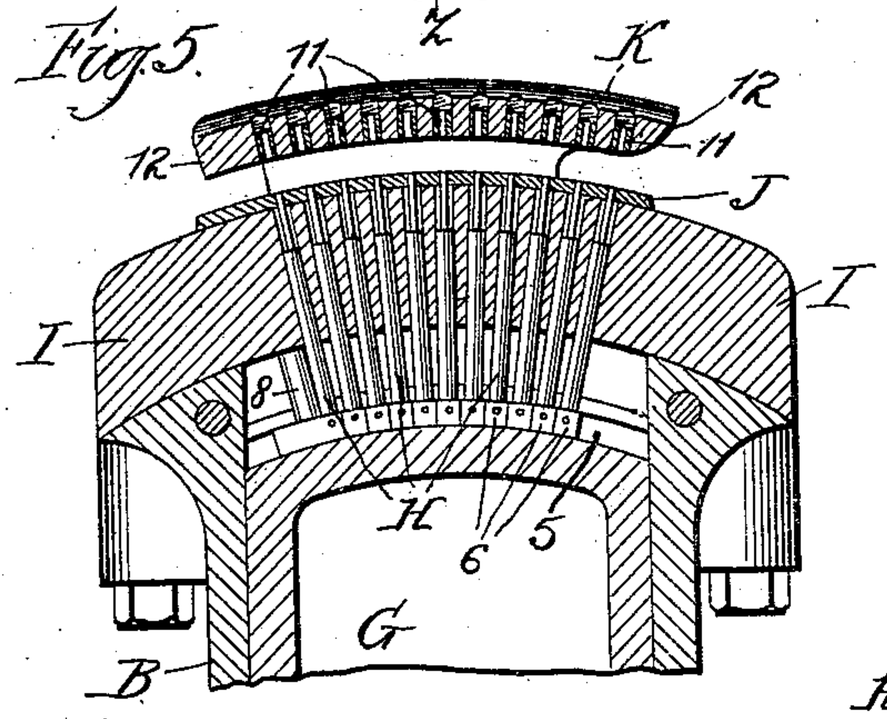


Fig. 11

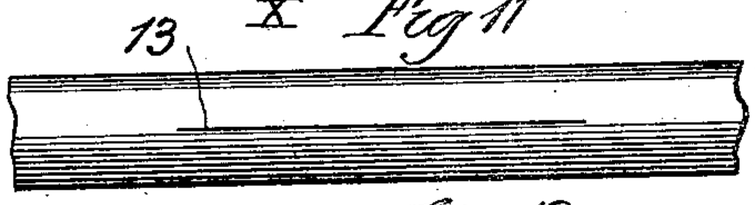


Fig 12

Fig. 6.

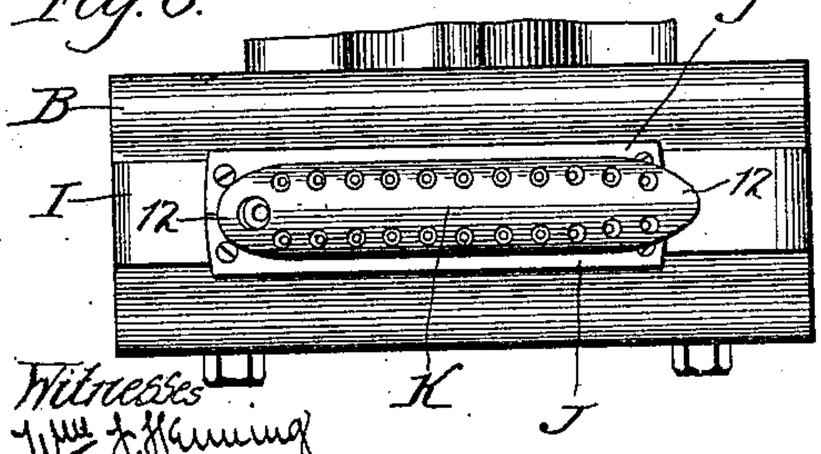


Fig. 7.

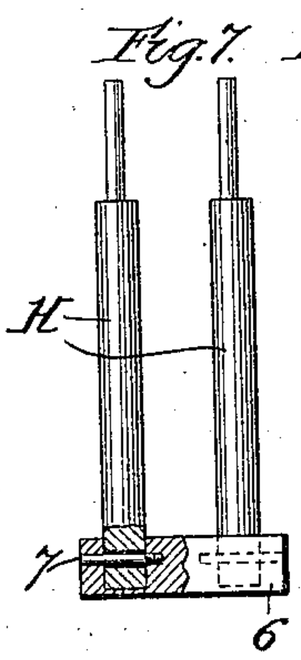


Fig. 8.

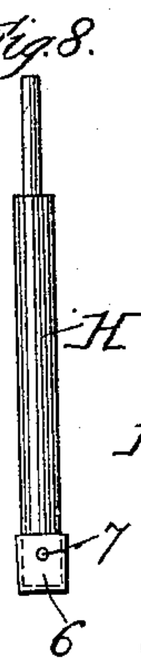


Fig. 9.

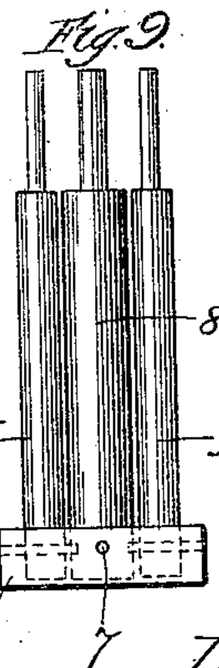
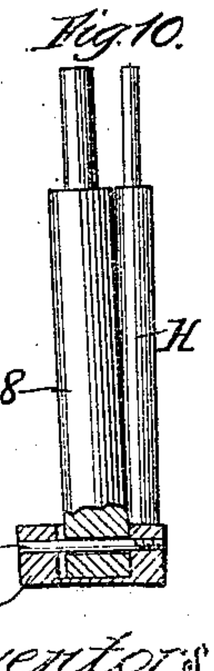


Fig. 10.



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UNITED STATES PATENT OFFICE.

RUFUS WRIGHT AND JOHN E. PARKER, OF CHICAGO, ILLINOIS, ASSIGNORS TO MORGAN & WRIGHT, OF SAME PLACE.

MACHINE FOR PERFORATING HOLLOW OR PNEUMATIC TIRES.

SPECIFICATION forming part of Letters Patent No. 543,792, dated July 30, 1895.

Application filed July 23, 1894. Serial No. 518,329. (No model.)

To all whom it may concern:

Be it known that we, RUFUS WRIGHT and JOHN E. PARKER, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Machines for Perforating Hollow or Pneumatic Tires, of which the following is a specification.

Prior to our invention the class of hollow or pneumatic tires has included a construction of tire involving a tubular sheath having a split of suitable length formed along its base or seating portion, so as to provide an opening for the insertion and removal of an air-tube. An illustration of such construction is found in the well-known "Morgan & Wright" tire. The splits in these sheaths have generally been laced up after the insertion of the air-tube, and to introduce the lacing a sail-maker's needle has been employed. The work of thus lacing the sheath by a sewing process has, however, been laborious and expensive.

The object of our invention is to avoid this process of puncturing the sheath along the edge portions of its split with a sail-maker's or lacing needle; to dispense with the time and labor involved in the work of manually puncturing the sheath; to perforate the sheath mechanically and with great rapidity; to perforate the annular tubular sheath along both sides of its split or division simultaneously and without flattening the material to an extent to cause it to pucker or wrinkle along the portions where the perforations are formed, and to provide certain further matters of improvement in a machine for such purpose, as hereinafter set forth.

In a perforating-machine characterized by our invention the edge portions of the split base of the tire-sheath which is to be perforated are confined between opposing curved faces, which substantially correspond in curvature with the longitudinal curvature of the annular tire-sheath, in which way these edge portions of the sheath can be kept free from puckering during the operation of perforating the same. One of these curved faces is formed upon or provided by a head or guide-piece, and is provided with a series of guide-openings through which reciprocating punches are arranged to work. The opposing curved face which overhangs the curved face on the head is formed upon or provided by a shoe or die-plate, which is adapted for insertion within and removal from the annular tire-sheath, the entrance and exit of such shoe or die-plate being by way of the longitudinal opening afforded by the split in the sheath. The shoe is arranged upon the head, and when in place within the sheath the edges of the latter along the split will lie opposite the connecting medium between the head and the overhanging portion of the shoe. The punching ends of the punches are arranged along a curved line corresponding with the longitudinal curvature of the faces on the shoe and the head, and said punches are also disposed radially, so that each punch will work perpendicular to the material—that is to say, it will not pass obliquely through the same, but will form a hole, whereof the depth is equal to the shortest distance between the inner and outer surfaces of the sheath. The punches are preferably operated by a reciprocating plunger, and to such end the punches have movable connections with the plunger, thereby permitting a relative shift of the points of connection between the two during operation.

Further details are hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a side elevation. Fig. 3 is a transverse sectional view taken on the line *x x*, Fig. 2. Fig. 4 is a longitudinal sectional view through the front portion of the machine. Fig. 5 is a sectional view taken on the line *y y*, Fig. 4. Fig. 6 is a top plan view of the shoe or die plate designed to be inserted within the slit in the sheath. Figs. 7, 8, 9, and 10 are detail views showing the manner of connecting the punches with their respective blocks or bases. Fig. 11 is a face view of a portion of a sheath, showing the same as it appears before being punched. Fig. 12 is a similar view showing the sheath after it has been punched by our machine. Fig. 13 is a sectional detail view showing the sheath on the shoe and in position to be punched.

Referring to the drawings, A designates a

standard or support, to which is suitably attached a head or casing B inclosing the punches and their operating mechanism. The casing is provided with stationary boxes C, in which works a drive-shaft D, carrying a fly-wheel E. In order to centralize the strain on the shaft when the machine is in operation and also to overcome the lifting tendency of the shaft induced by the weight of the fly-wheel, we provide the casing with an extension F, in which is located one of the boxes C. The extension projects a sufficient distance beyond the casing to allow the weight and resistance offered by the plunger G when operated to be centered at a point on the shaft where these two opposing forces will counterbalance the weight of the fly-wheel, and by this means we overcome the lifting tendency before referred to, and thereby effect an even wear of the boxes, resulting in a smooth and regular action of the machine while in operation. A plate 1 is employed to close the extension to prevent entrance of dust to the shaft.

The plunger G is adapted to be reciprocated vertically, in order to operate a series of reciprocating punches H for perforating the sheath. Any suitable or well-known mechanism may be employed for imparting motion to the plunger, but as a preferred means we provide the plunger with a rectangular slideway or opening 2, in which is fitted a sliding box 3.

The shaft D is provided with a crank or eccentric 4 working in the box 3, it being obvious that in order to permit the shaft to turn and thereby impart a vertical reciprocating motion to the plunger, the box 3 must be free to slide laterally in the slideway 2. The top of the plunger is curved and is provided with a T-groove 5, in which work the blocks or bases 6 of the punches H. Each block, with the exception of one, carries two punches, which are movably held in place within a recess in the block by means of a pin or screw 7, such arrangement being necessary in order to permit the punches to have a radial movement independent of the lateral movement of their respective blocks when the plunger is reciprocated, as will appear later on. One of the end blocks carries a third punch 8 for punching the opening through which projects the air-tube nipple, such punch 8 being arranged intermediate of and slightly in advance of the two adjacent punches, as clearly shown in Fig. 9. The free ends of the punches work in openings formed in a head or head-block I, which is provided with an oblong longitudinally curved face and secured to the casing, and in order to permit of the punches operating upon a curved surface, such as that presented by the base portion of an annular tubular pneumatic tire-sheath, the punching ends of the punches are arranged along a curved line corresponding with the curvature of the face of the head and also substantially corresponding with the longitudinal curvature of the annular tire-sheath, it being observed that the curvature of the face of the head is also formed with reference to such longitudinal curvature of the sheath, so that when the base portion of the latter is placed upon the curved face of the head, it will lie thereon without puckering or wrinkling. It is also desirable to punch the holes true and straight through the material without slant, and this we attain by radially disposing the punches, whereby each punch will pass through the curved material in a line perpendicular to the material at the point of penetration. In other words, the length of the hole punched in the sheath will be the shortest distance between the two surfaces of the material. The openings in the head-block also radiate from a common center and thus serve as guides to cause the punches to move in predetermined lines. These openings extend through the curved face of the head or head-block I, and hence permit the reciprocating punches to project from such face when the plunger is moved in a direction for causing such action on the part of the punches. When the punches are in their dropped positions, as shown in Figs. 3 and 5, the blocks are in contact with each other, but as soon as the plunger lifts, the contact of the punches with the walls of the openings in the head-block causes the respective blocks to separate and slide laterally in the groove 5, such lateral movement varying in the different bases in a ratio proportionate to difference in the incline or pitch of the successive openings with relation to the center opening, which in this instance is projected in a vertical line, the reverse movement of the plunger causing the blocks to resume the position shown in figures referred to.

In order to give the requisite rigidity to the punches the body portion of each is made of considerable thickness, but the upper end is reduced to the size of the opening to be made in the sheath. As there would be a tendency for the reduced ends of the punches to spring when in operation, it is essential that they should be guided throughout their entire length, and to accomplish this end the head-block is provided with a two-part plate J, having openings of a size corresponding to the diameter of the reduced portions and in which the latter work.

The plate is made removable in order that should it be desired to increase or diminish the size of the openings to be made in the sheath, such result may readily be effected by providing a number of plates, each having different-sized openings, and when it is desired to change the size of the punches it will only be necessary to employ a plate having openings corresponding in size to the diameter of the reduced portion of the punches so employed.

A further reason for having the plate made removable is that the continued friction of the punches against the walls of the plate-openings will cause them to wear away, and

thereby allow the punches to spring or bend. By having the plate made separable from the head-block this defect may be effectually remedied.

The head-block carries a shoe or die-plate K, which may be made integral with the block or detachable therefrom. The shoe is provided with a longitudinally-curved face or under side portion which overhangs the longitudinally-curved face of the head and which is curved to correspond to the longitudinal curvature of the annular sheath and is formed with a neck 9, against which bear the walls of the sheath on each side slit, and with two flanges or ledges 10, having radially-arranged openings provided with removable dies 11, into which the punches enter when the plunger is raised. The shoe is provided at its ends with an extension 12, designed to bear upon the uncut portion of the sheath at each end of the slit, and thereby hold the sheath in place upon the shoe.

The fly-wheel is loosely mounted on the shaft and constantly rotates, a suitable clutch L, operated by a foot-lever M, being employed to lock the fly-wheel on the shaft and thus operate the plunger. As the clutch may be one of the many forms in common use, and as its operation is well known and understood, a detailed description of its operation is deemed unnecessary.

In practice the shoe is inserted into the slit 13 of the sheath, the walls of the slit bearing against the neck, as shown in Fig. 13. The clutch is then operated, and the shaft in turning raises the plunger and causes the punches to perforate the sheath in the manner shown in Fig. 12.

What we claim as our invention is—

1. A machine for perforating pneumatic tire-sheaths, comprising one or more series of reciprocating punches arranged for perforating the sheath alongside a longitudinal slit in the base portion thereof, a head provided with guide-ways for the reciprocating punches, and a shoe or die-plate arranged over the cutting ends of the punches and rigidly connected with the head, the said shoe or die-plate being graduated in width and length to admit of its introduction and removal through the split in the sheath, and being arranged with relation to the head to permit the marginal portions of the sheath along the split to lie between the shoe or die-plate and the head and abut against the connection between the head and the shoe or die-plate, substantially as set forth.

2. A machine for perforating pneumatic tire-sheaths, comprising one or more series of reciprocating punches for perforating the sheath alongside a longitudinal slit in the base portion thereof, a head provided with guide-ways for the reciprocating punches and having a curved face through which the punches are arranged to work, and a shoe or die-plate connected with the head and having a curved face arranged over the punches, said shoe or die-plate being graduated in width and length with reference to its introduction and removal through the split in the sheath, and being arranged with relation to the head to permit the marginal portions of the sheath along the split to lie between the curved faces of the shoe or die-plate and the head and abut against the connection between the head and the shoe or die-plate, substantially as set forth.

3. A machine for perforating pneumatic tire-sheaths comprising a head having a face curved with reference to the annular curvature of a pneumatic tire-sheath, a shoe or die-plate arranged over the curved face of the head and having a correspondingly curved face, a neck rigidly connecting the shoe or die-plate with the head, and reciprocating punches arranged to work through the curved face of the head at opposite sides of the neck, the said shoe or die-plate being graduated in width and length with reference to its introduction and withdrawal through a split in the base of a pneumatic tire-sheath, and arranged to permit the edge portions of the sheath along such split to lie between the opposing curved faces of the head and the shoe or die-plate and abut against the neck.

4. A machine adapted for perforating pneumatic tire-sheaths having longitudinally split base portions, and comprising a couple of parallel series of reciprocating punches, a head having guide-ways for the punches, and a shoe or die-plate adapted in size with reference to its insertion and removal through the split in the base of the sheath and connected with the head by a neck arranged in a plane between the planes in which the two series of reciprocating punches operate, said shoe or die-plate being provided with female dies 11 substantially as described.

5. A machine for perforating pneumatic tire-sheaths, comprising a set of radially arranged reciprocating punches, a head provided with guide-ways for the radially arranged reciprocating punches, and a shoe or die-plate arranged opposite the cutting ends of the punches and adapted for insertion and removal through an opening formed longitudinally through the base portion of a pneumatic tire-sheath, said shoe or die-plate and its connection with the head being also arranged to permit the edge portions of the sheath along its longitudinal opening to lie between the head and the shoe or die-plate, substantially as set forth.

6. A perforating machine comprising a movable abutment for operating the punches, and a series of radially arranged reciprocating punches, having shifting connections with the movable abutment, for the purpose set forth.

7. A machine for perforating pneumatic tire-sheaths, comprising a set of radially arranged reciprocating punches, a head provided with guide-ways for the said punches, and a shoe or die-plate arranged opposite the cutting ends of the punches and adapted for

insertion and removal through a longitudinal opening in the base-portion of a pneumatic tire-sheath, substantially as set forth.

8. A machine for perforating pneumatic tire-sheaths, comprising a movable abutment arranged for operating the punches and consisting of a reciprocating plunger, a set of reciprocating radially arranged punches having shifting connections with the reciprocating plunger, a head provided with guide-ways for the reciprocating punches and having a curved face through which the punches are arranged to work, and a shoe or die-plate for the purpose set forth connected with the curved face of the head and having a curved face arranged opposite said curved face of the head, substantially as described.

9. A machine for perforating pneumatic tire-sheaths, comprising a reciprocating plunger G for operating the punches, a set of radially arranged punches having shifting connections with the plunger, a head I provided with guide-ways for the reciprocating punches and having a curved face, and a shoe or die-plate K arranged over the curved face of the head and connected therewith by a neck, substantially as described.

10. A machine for perforating pneumatic tire-sheaths, comprising a casing B, a reciprocating plunger G, an eccentric 4 for operating the plunger a set of radially arranged reciprocating punches, a head I provided with guide-ways for the punches, and a shoe or die-plate K arranged over and connected with the head, substantially as described.

11. In a perforating machine a plunger having its top provided with a curved groove or way, a series of punches carrying blocks or bases working in the way, a head-block having radially disposed openings in which the punches work and a die plate with which the punches coact.

12. A perforating machine comprising a casing B a plunger G, located therein a sliding box and drive-shaft for operating the plunger, a series of punches H connected with the plunger a head-block I having radially disposed openings in which the punches work, a shoe K on the head-block having openings with which the punches coact, and a plate J on the head-block, substantially as described.

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