T. M. AVERY.

PERFORATING MACHINE.

APPLICATION FILED JUNE 26, 1915.

1,180,102.

Patented Apr. 18, 1916.

2 SHEETS—SHEET 1.

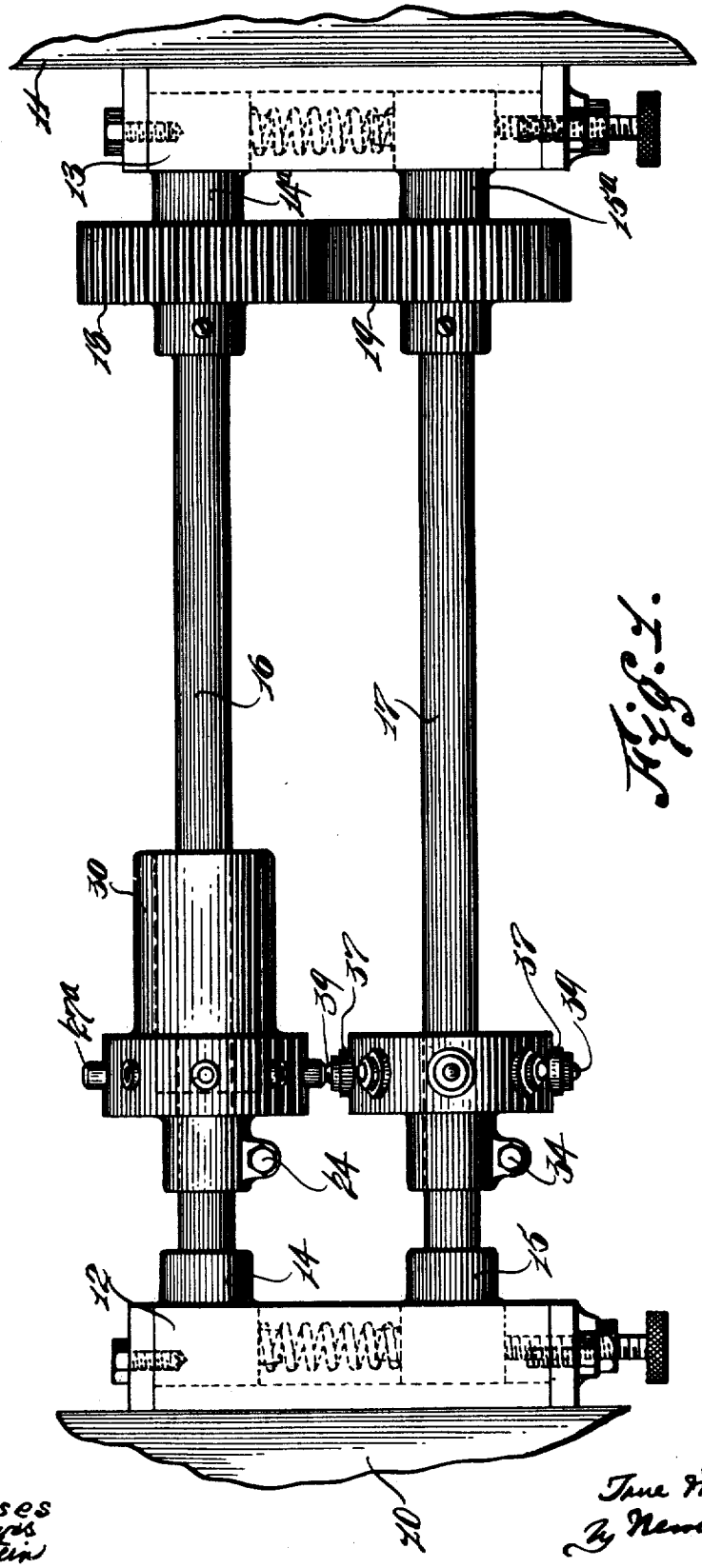


Fig. 1.

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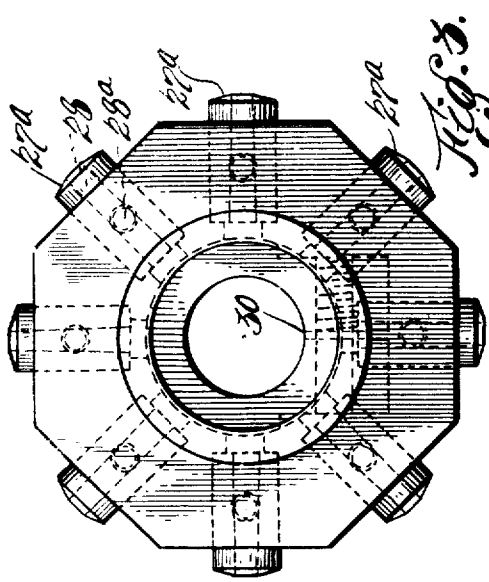


Fig. 3.

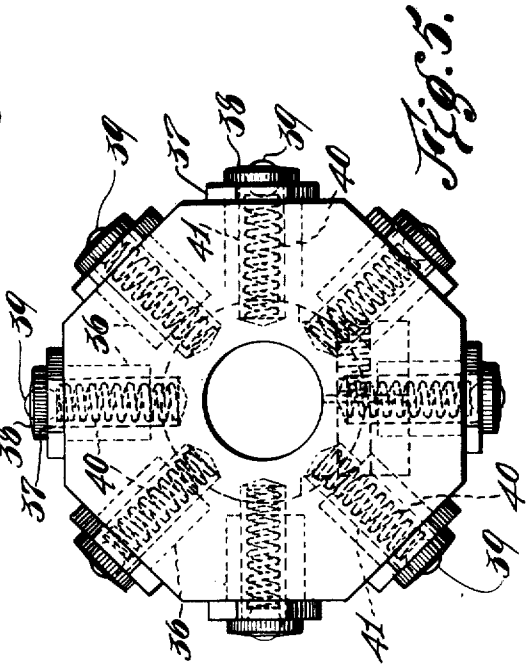


Fig. 5.

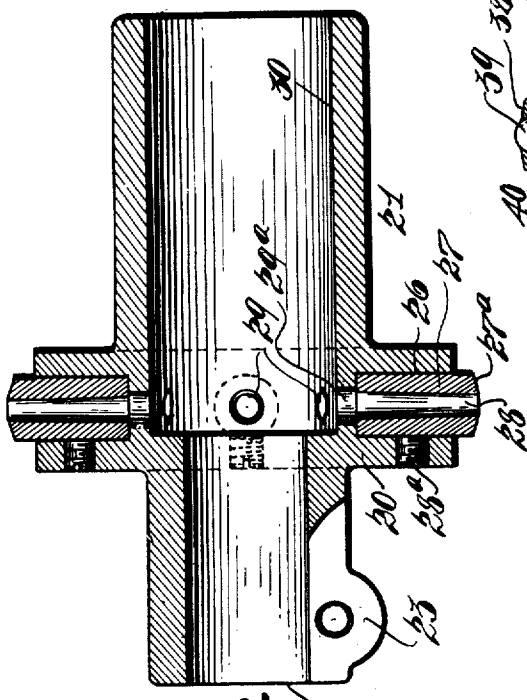


Fig. 2.

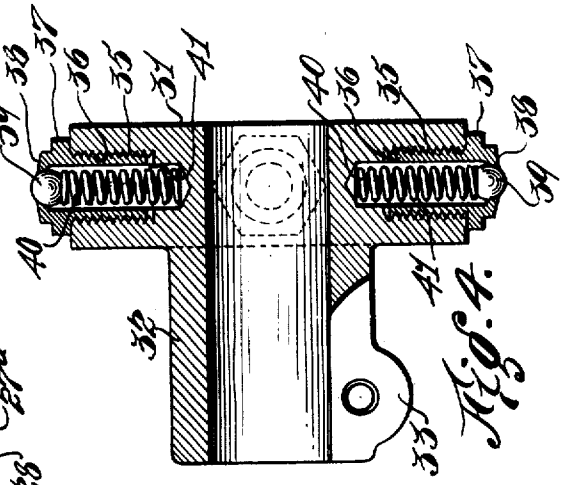


Fig. 4.

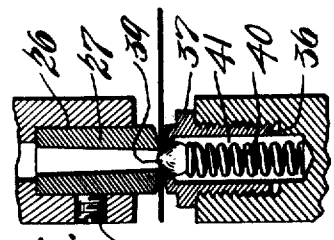


Fig. 6.

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UNITED STATES PATENT OFFICE.

TRUE M. AVERY, OF GLENS FALLS, NEW YORK.

PERFORATING-MACHINE.

1,180,102. Specification of Letters Patent. Patented Apr. 18, 1916.

Application filed June 26, 1915. Serial No. 36,453.

To all whom it may concern:

Be it known that I, TRUE M. AVERY, a citizen of the United States, residing at Glens Falls, New York, have invented certain new and useful Improvements in Perforating-Machines, of which the following is a clear, full, and exact description.

This invention relates to perforating machines for perforating sheet material, such as a web of paper.

Objects of the invention are to provide improved means for perforating a web of paper and to produce regular and clean cut perforations.

Other objects are to provide a practical efficient and substantial machine for perforating a web of paper.

These being among the objects of the present invention, the same consists of certain features of construction and combinations of parts to be hereinafter described and then claimed with reference to the accompanying drawings illustrating a desirable embodiment of the invention, and in which—

Figure 1 is a front elevation of so much of a perforating machine as is necessary to illustrate the invention; Fig. 2 is an enlarged longitudinal section of the punch head, punches and associated parts; Fig. 3 is an end elevation of the parts shown in Fig. 2 viewed from the right; Fig. 4 is a longitudinal section of the follower head, followers and concomitant parts; Fig. 5 is an end elevation of the parts shown in Fig. 4 viewed from the right; and Fig. 6 is a fragmentary section showing a coacting punch and opposing surface.

A suitable frame is provided which may comprise parts, such as 10, 11, on which is mounted a pair of guides 12, 13, said guides being directly opposite each other and supporting a pair of boxes 14, 14ª, and another pair of boxes 15, 15ª. These boxes are supported in any suitable and well-known manner, the boxes 14, 14ª, being stationary and the boxes 15, 15ª, being movable. The boxes 14, 14ª, support in the bearings thereof a rotary shaft 16, while the bearings of the boxes 15, 15ª, support a rotary shaft 17, said shafts being consequently parallel. The shafts are connected together for simultaneous rotation as by a pair of gears 18, 19, driven from any suitable source.

A head 20 is provided with a tubular extension 21 and is fixed rigidly on shaft 16 so as to rotate therewith by means of a split sleeve or hub 22, the lugs or ears 23 of which are secured together by a clamping screw 24. Said rotary head 20 is polygonal in shape and preferably has eight or a suitable number of faces, at each of which a perforating punch is located. To this end the said head 20 is provided with a series of radial sockets 26 which are spaced equidistantly apart, in a series extending around said head, and into said sockets are inserted a corresponding number of hard metal blocks or bushings 27 which constitute the perforating punches. The operating end of each punch is slightly tapered as at 27ª, such taper extending to the outer end of a duct or passage 28 so that a circular cutting edge is provided at this point. Each of the passages 28 preferably enlarges toward the inner end of the punch to a hole 29 at the bottom of the socket 26. Around each hole 29, the bottom of the socket forms a shoulder 29ª against which the inner end of the corresponding punch is set and held by means of a set screw 28ª. If the head 20 is octagonal there will consequently be eight punches mounted on said head. The holes 29 in said head lead into a chamber 30 within the extension 21, said chamber being of annular form when the head is mounted upon its shaft 16.

The shaft 17 carries at a point directly opposite the head 20 a head 31 which is provided with a split sleeve 32, the ears or lugs 33 of which are connected together by a clamping screw 34 whereby said sleeve and head may be clamped upon the shaft 17. Head 31 is also polygonal to provide a number of opposing points to the punches, corresponding in number with said punches. Said head 31 is provided with a series of radial screw-threaded holes 35 which are spaced apart equidistantly from each other, and into each of said holes is screwed a socket member 36 which is provided at its outer end with an annular shoulder 37 to seat upon the outer face of the head 31. The outer end of each socket member 35 is contracted as at 38, and against the seat formed by such contraction a ball 39 is adapted to be pressed. The balls 39 are made of very hard metal and are of a diameter such that they will be confined against the seats at 38 so as to protrude to a greater or less degree beyond them. The balls 39 constitute plungers or followers and they are urged against their seats by means of

helical springs 40 located in the sockets 41 of the socket members 35. The sockets 41 are of greater diameter than that of the balls contained therein, so as to provide a play space for each ball when it is pushed back against the action of the spring. There are therefore arranged upon the rotary head 31 which is directly opposite the rotary head 20, a series of follower balls 39 corresponding in number with the punches 27 and which are spaced apart the same distance as said punches. Consequently, when the shafts 16 and 17 are rotated, their simultaneous rotation will cause the successive opposition of the follower balls 39 to the punches. The balls or the equivalent provide spherical anvil-like surfaces against which the punches act in such way as to produce superior perforations.

In operation the paper or other sheet to be perforated is fed in any suitable manner between the rotary heads 20 and 31, and as one of the punches comes opposite its corresponding follower ball, the said ball will be depressed and moved away from its seat and the sheet perforated. When the punch leaves the said follower ball, the latter will be moved back to its seat by the action of its spring. The sockets 41 are preferably made of greater diameter than the follower balls so as to provide play spaces for said balls, which is desirable if the spacing between the punches should vary with respect to the spacing of the follower balls, as any ball depressed will accommodate itself to its punch and will be centered with respect thereto by a slight lateral movement. The punches being hollow, the punchings will be delivered into the punchings chamber 30 from whence they are discharged.

The invention is susceptible of modification, as parts may be omitted, parts added, and parts substituted without departing from the scope of the invention as claimed. For instance, in place of follower balls plungers may be substituted having spherical surfaces at their outer ends.

What I claim as new is:—

1. In a perforating machine, the combination of a perforating punch, an opposing follower ball, said punch being annular and of less diameter than said ball, means for supporting said punch, and means for supporting said follower ball resiliently.

2. In a perforating machine, the combination of an annular perforating punch, an opposing spherical surfaced follower, said punch being of less diameter than the spherical surface of said follower, means for supporting said punch, and means for supporting said follower resiliently.

3. In a perforating machine, the combination of a perforating punch, an opposing follower ball, means for supporting said punch, means for supporting said ball, provided with a socket in which said follower ball is located, the outer end of said socket being contracted to confine said follower ball, and means for cushioning said follower ball in said socket and to permit a lateral play and centering thereof with respect to said punch.

4. In a perforating machine, the combination of supporting means provided with a socket, and a resiliently supported hard metal ball in said socket, said socket being contracted at its outer end to confine and yet permit the protrusion of said ball, and having a play space for said ball of greater diameter than the same.

5. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, said punches being hollow and said support having a punchings discharge chamber leading from the inner ends of said hollow punches, a second rotary support carrying a plurality of cushioned followers corresponding to said punches, and means for causing the successive opposition of said followers to said punches.

6. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, a second rotary support carrying a plurality of cushioned follower balls corresponding to said punches, and means for causing the successive opposition of said follower balls to said punches.

7. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, a second rotary support provided with a plurality of sockets spaced similarly to the spacing of said punches, and resiliently supported follower balls in said sockets, said sockets being contracted at their outer ends to confine and yet permit the protrusion of said balls, and having play spaces for said balls, each of greater diameter than the confined ball.

8. In a perforating machine, the combination of a pair of geared shafts, a rotary support on one shaft having a punchings discharge chamber, a plurality of radial hollow punches mounted on said support, and the inner ends of which lead to said chamber, a second rotary support provided with radial screw-threaded holes, screw-threaded hollow plugs screwed into said holes and constituting sockets, follower balls in said sockets, said sockets being contracted at their outer ends to confine said balls, and having play spaces for said balls, each of greater diameter than the confined ball, and cushioning springs located in said sockets and acting on said balls to cause their protrusion from said sockets.

9. In a perforating machine, the combination of an annular perforating punch, an opposing spherical surfaced member, said punch being of less diameter than the spheri-

cal surface of said member, and means for supporting one of said parts resiliently.

10. In a perforating machine, the combination of an annular perforating punch, an opposing hard metal ball, said punch being of less diameter than said ball, and means for supporting one of said parts resiliently.

11. In a perforating machine, the combination of a perforating punch, an opposing follower, means for supporting said punch, means for supporting said follower, provided with a socket in which said follower is located, the outer end of said socket being contracted to confine said follower, and means for cushioning said follower in said socket and to permit a lateral play and centering thereof with respect to said punch.

12. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, said punches being hollow and said support having a punchings discharge chamber leading from the inner ends of said hollow punches, a second rotary support carrying a plurality of followers corresponding to said punches, means for causing the successive opposition of said followers to said punches so that one of said followers pairs with one of said punches, and means for cushioning one of the said opposing members of each pair.

13. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, a second rotary support carrying a plurality of cushioned followers corresponding to said punches, and means for causing the successive opposition of said followers to said punches.

14. In a perforating machine, the combination of a rotary support carrying a plurality of perforating punches, a second rotary support carrying a plurality of followers corresponding to said punches, means for causing the successive opposition of said followers to said punches so that one of said followers pairs with one of said punches, and means for cushioning one of the said opposing members of each pair.

15. In a perforating machine, the combination of a punch mounted on said support, a second support provided with a screw-threaded hole, a screw-threaded hollow plug screwed into said hole and constituting a socket, a follower ball in said socket, said socket being contracted at its outer end to confine said ball, and having a play space for said ball of greater diameter than the confined ball, and a cushioning spring located in said socket and acting on said ball to cause its protrusion from said socket.

Signed at Hudson Falls this 23 day of June, 1915.

TRUE M. AVERY.

Witnesses:
G. G. DURANT, Jr.,
K. A. FORCIER.

Correction in Letters Patent No. 1,180,102.

It is hereby certified that Letters Patent No. 1,180,102, granted April 18, 1916, upon the application of True M. Avery, of Glens Falls, New York, for an improvement in "Perforating-Machines," were erroneously issued to the inventor, said Avery, whereas said Letters Patent should have been issued to *The Union Bag & Paper Company, a corporation of New Jersey*, it being assignee of the *entire interest* in said invention as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of May, A. D., 1916.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.

Cl. 164—99.