(No Model.) 8 Sheets—Sheet 1.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 1.

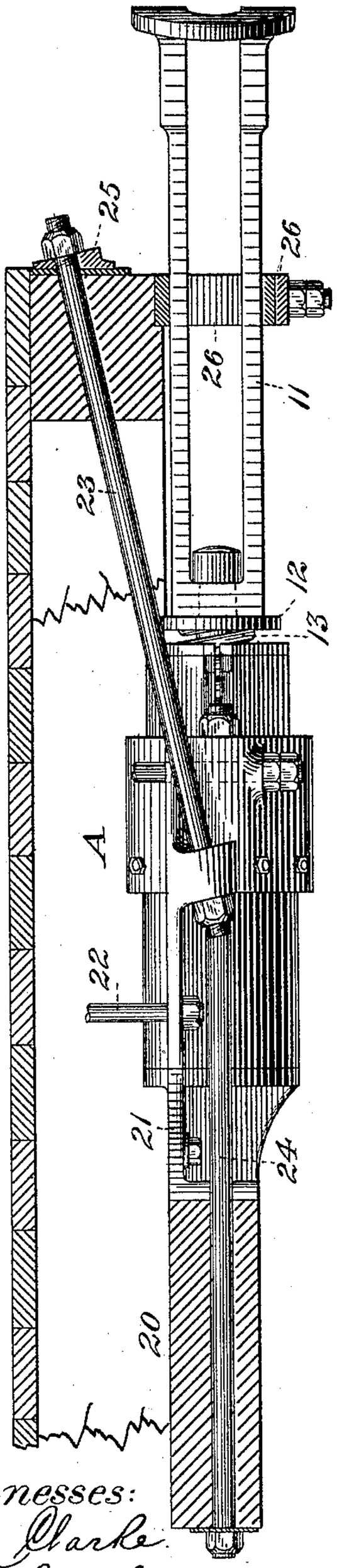
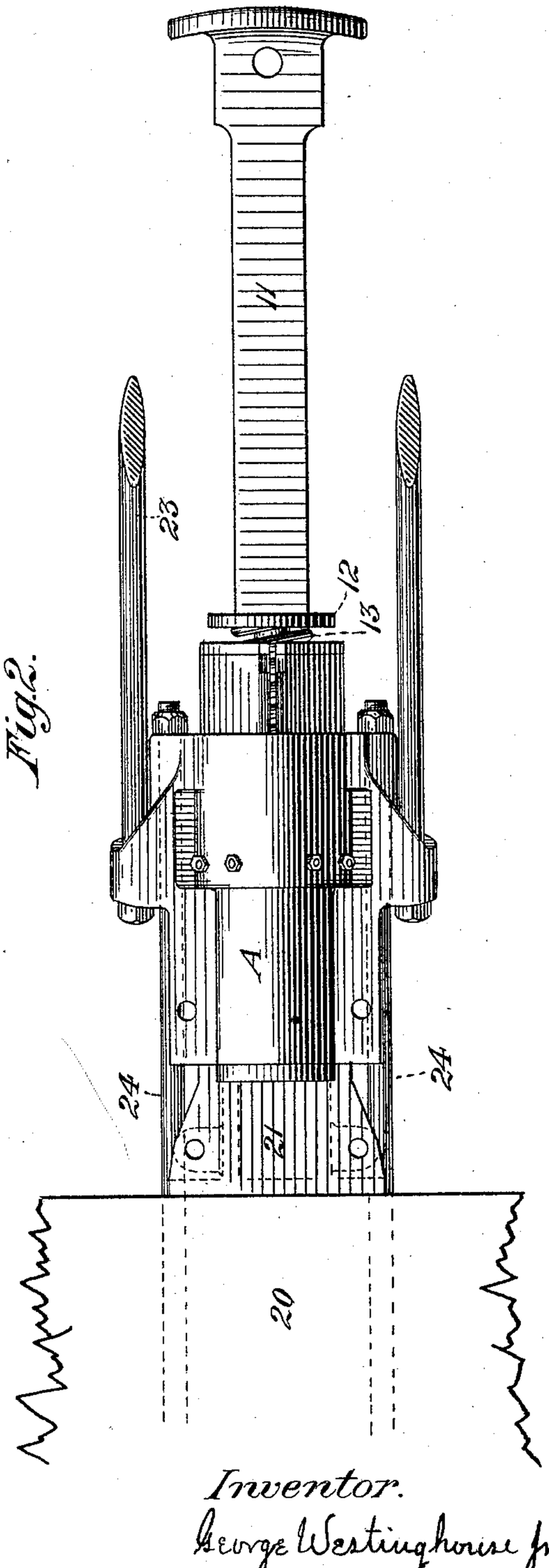


Fig. 2.



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(No Model.) 8 Sheets—Sheet 2.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 3.

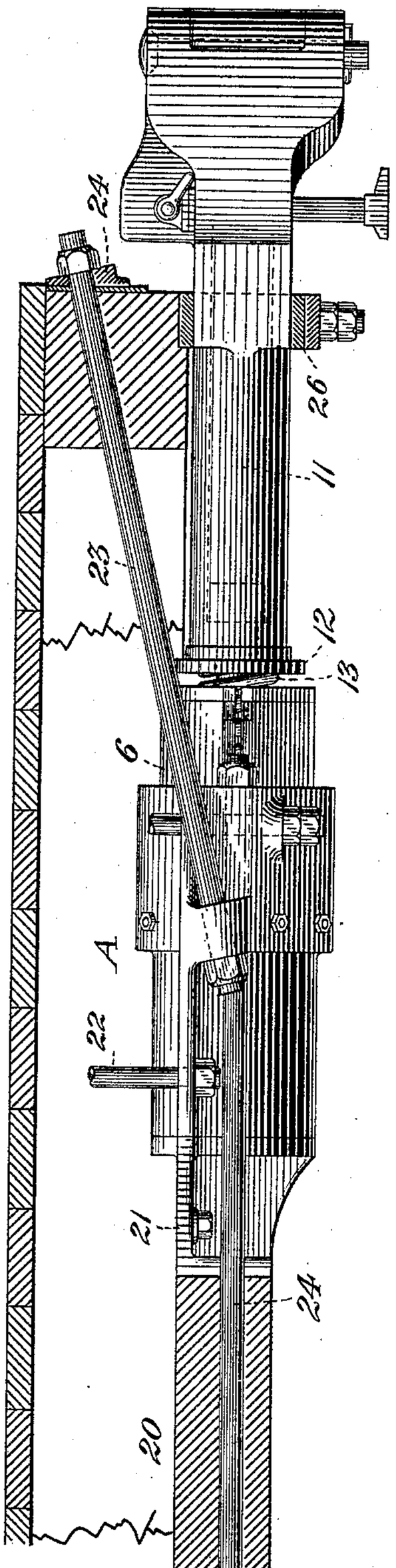
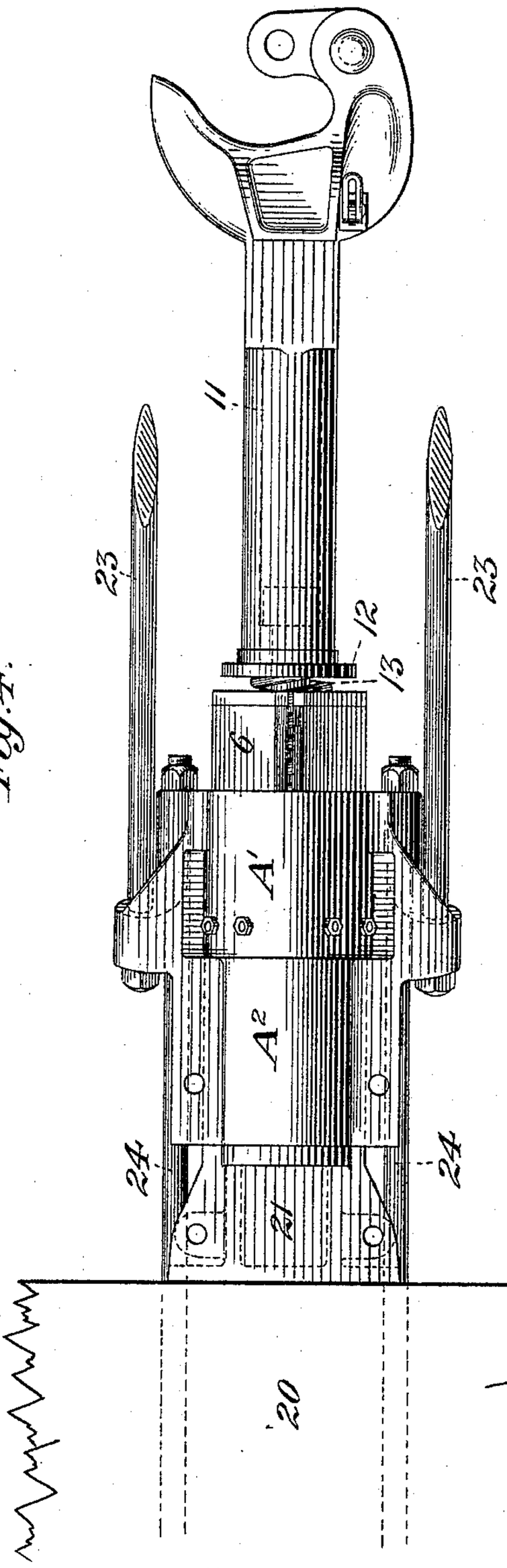


Fig. 4.



Witnesses:
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(No Model.) 8 Sheets—Sheet 3.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

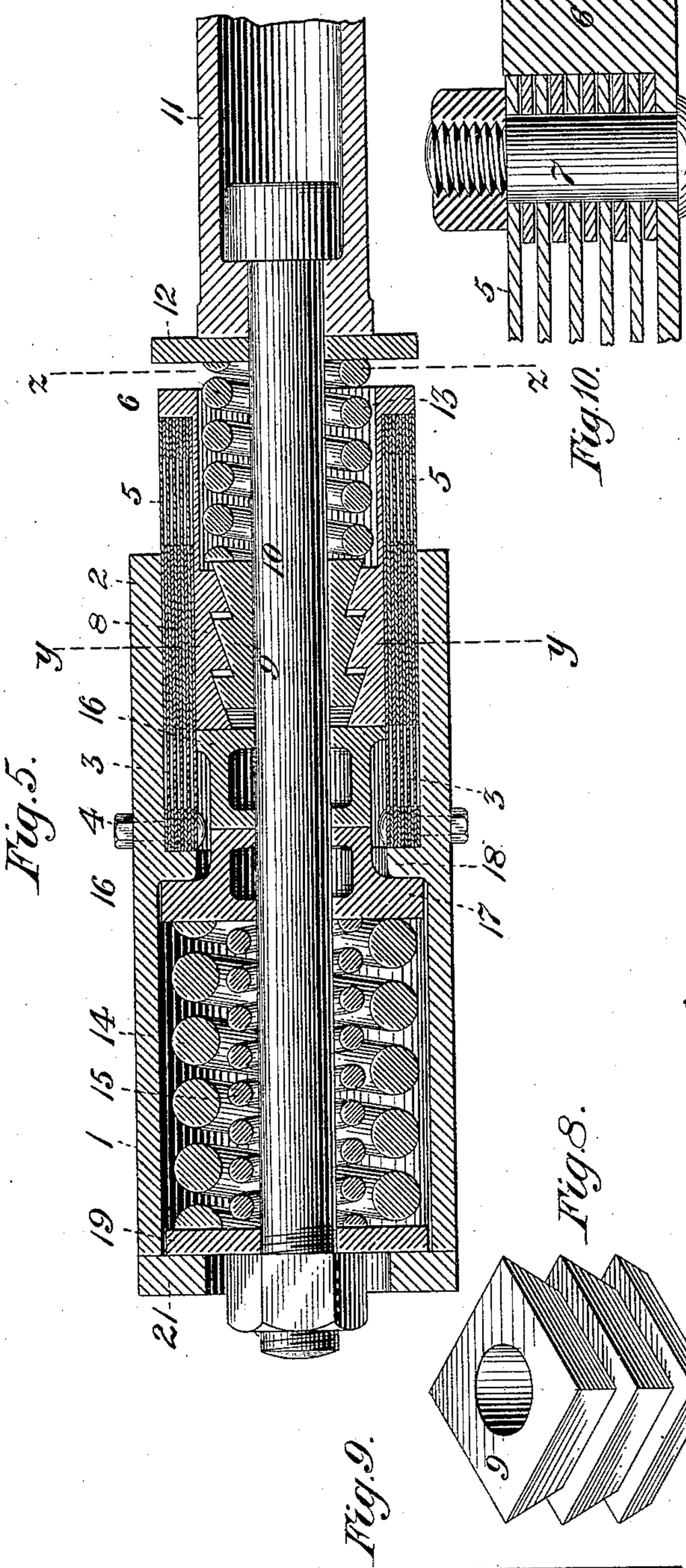

Fig. 5.

Fig. 10.

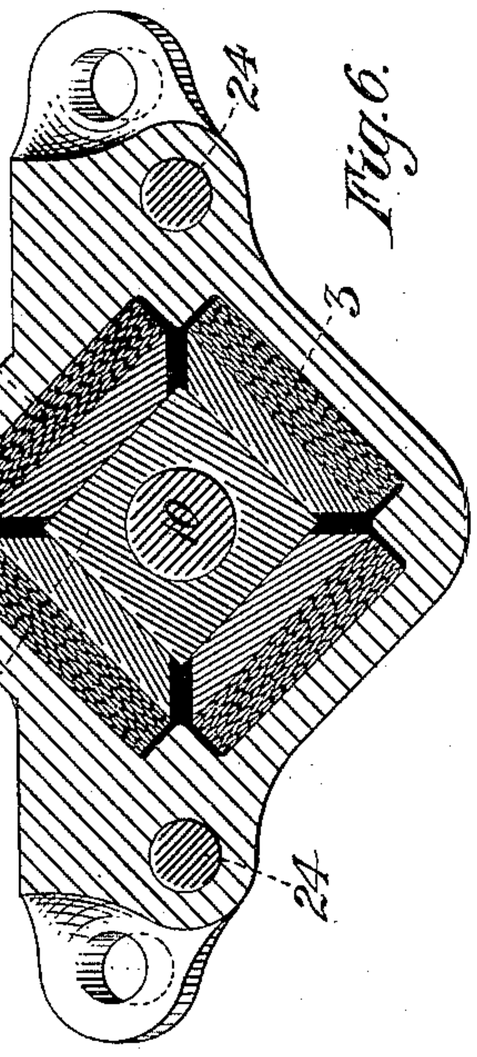

Fig. 6.

Fig. 8.

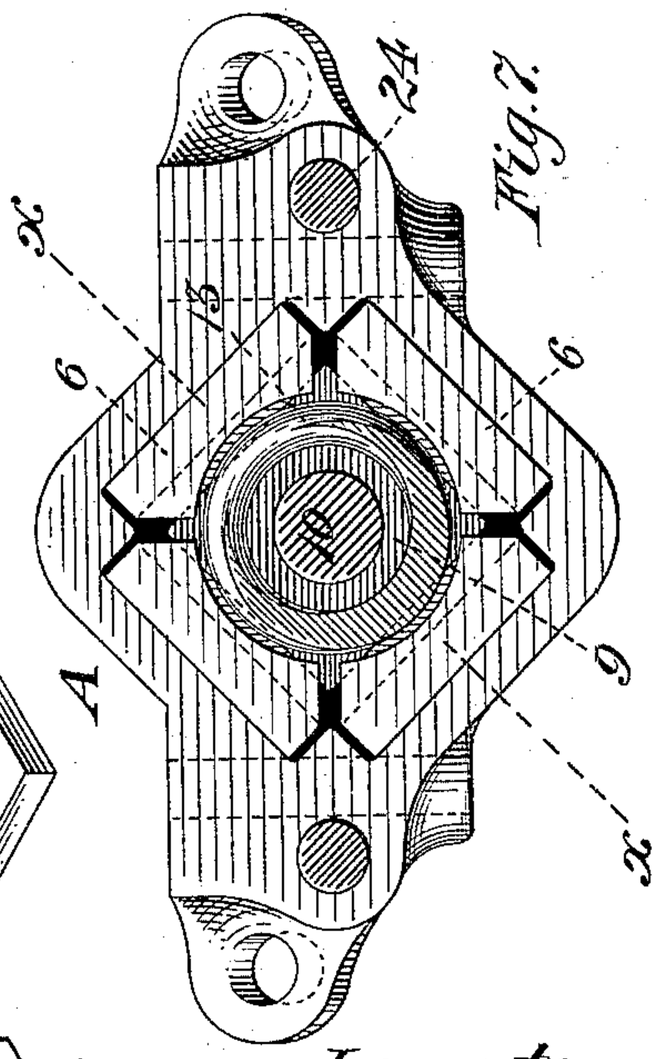

Fig. 7.

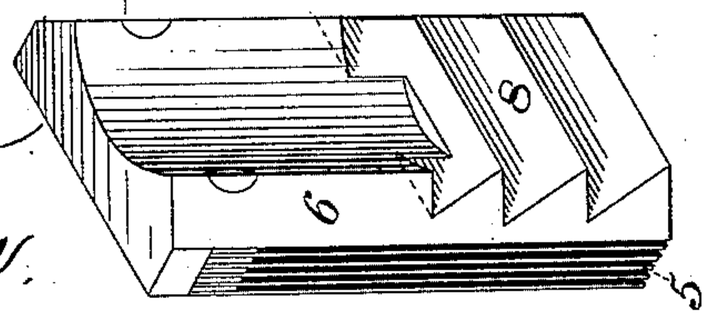

Fig. 9.

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(No Model.)

8 Sheets—Sheet 4.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

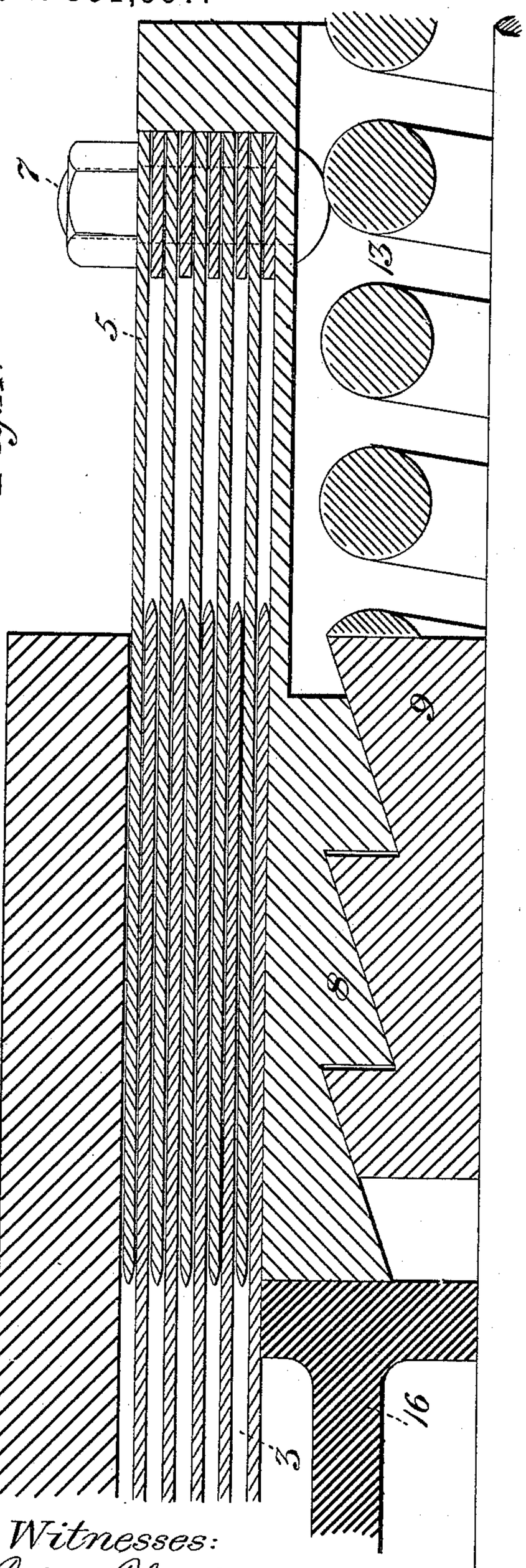

Fig. 11.

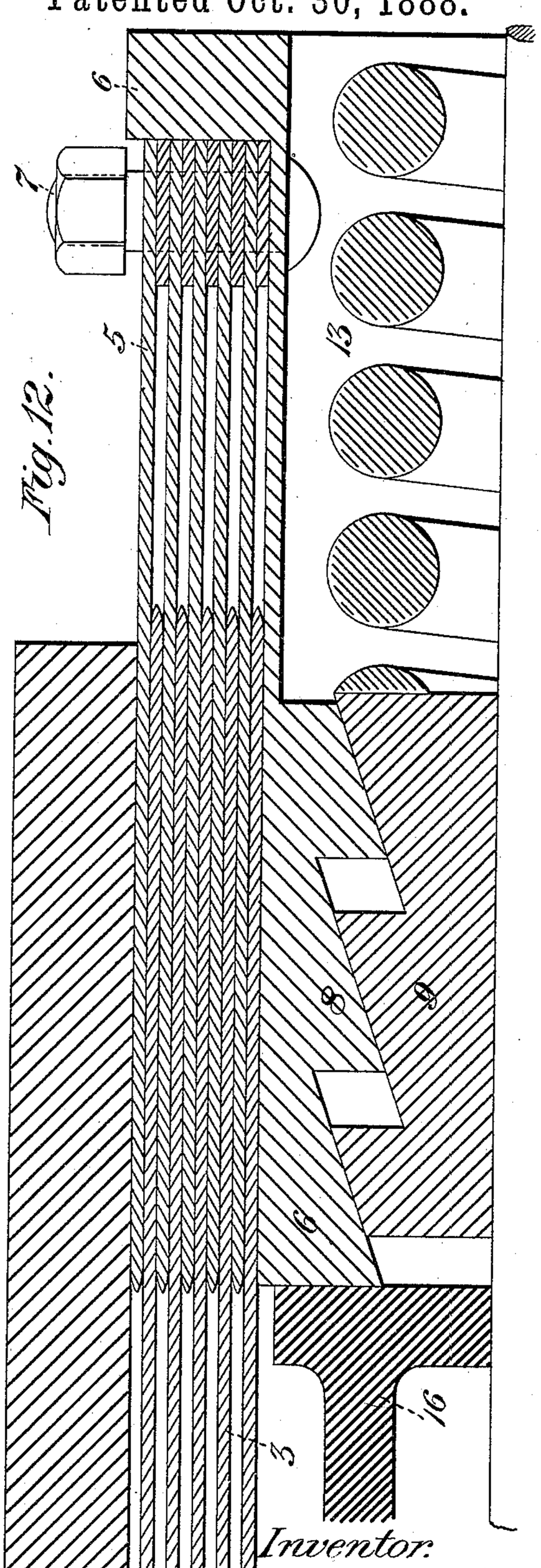

Fig. 12.

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(No Model.)

8 Sheets—Sheet 5.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 13

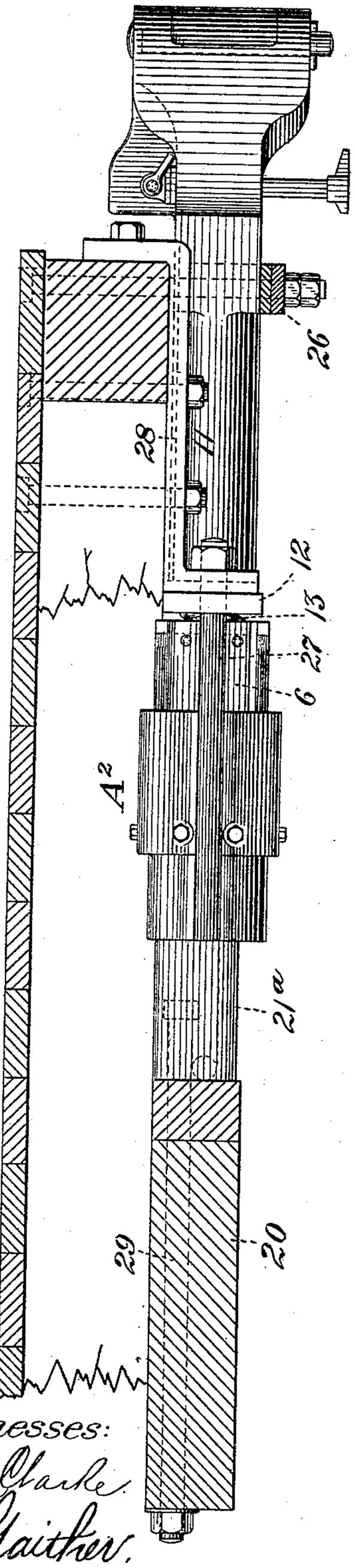
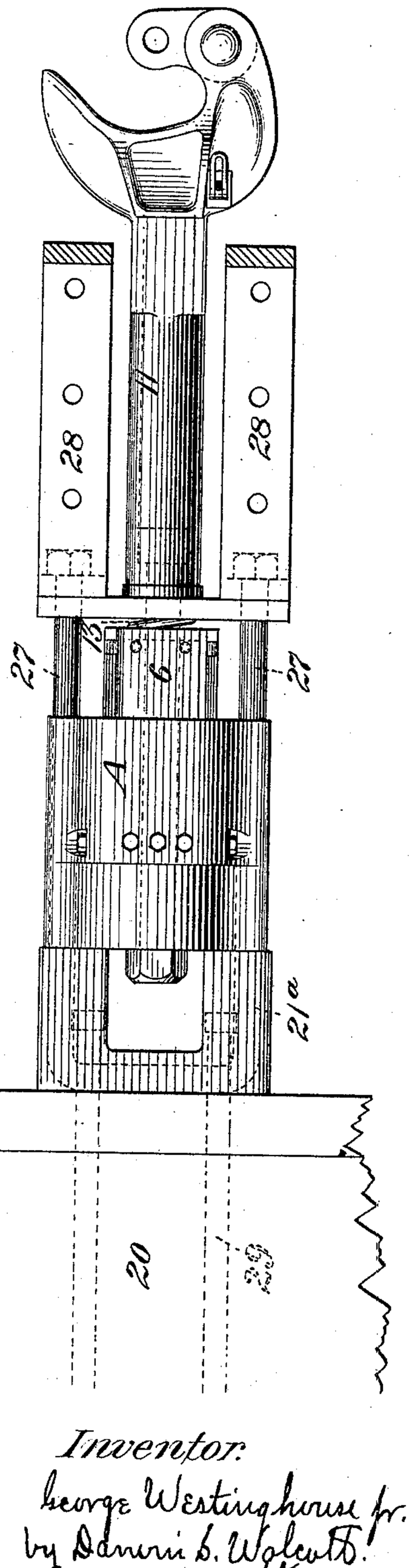


Fig. 14.



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(No Model.) 8 Sheets—Sheet 6.

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BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 15.

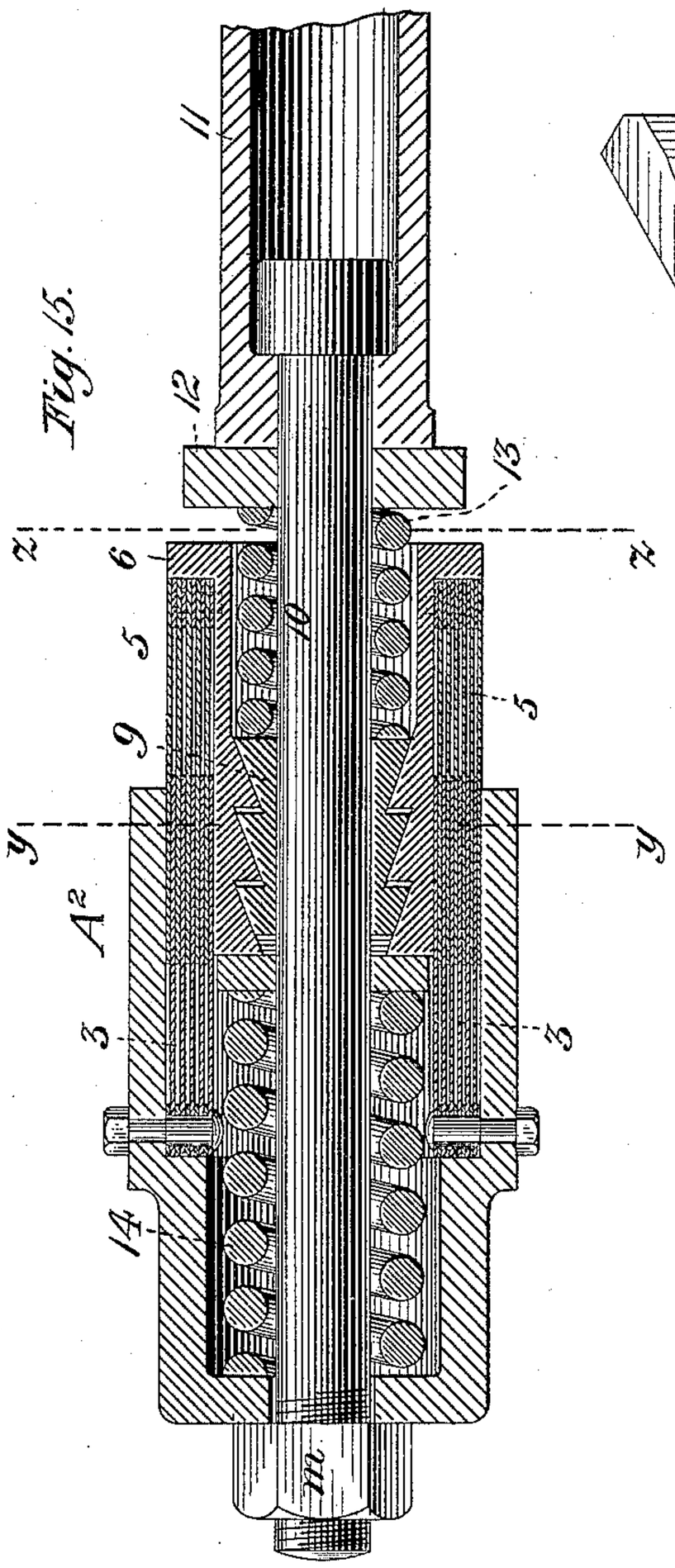


Fig. 18.

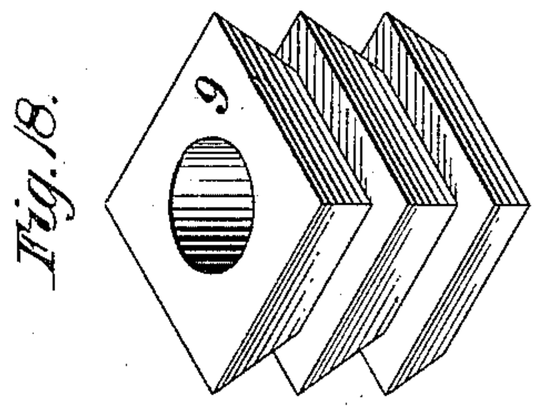


Fig. 19.

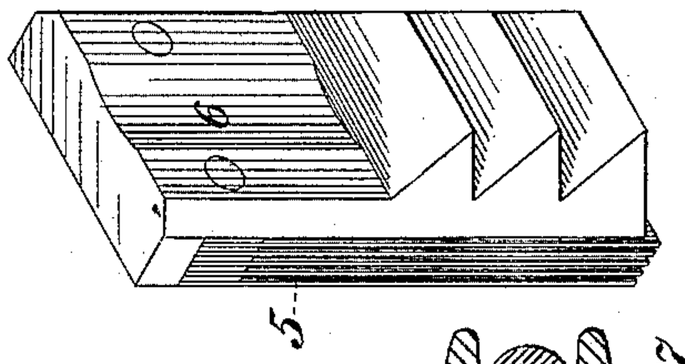


Fig. 17.

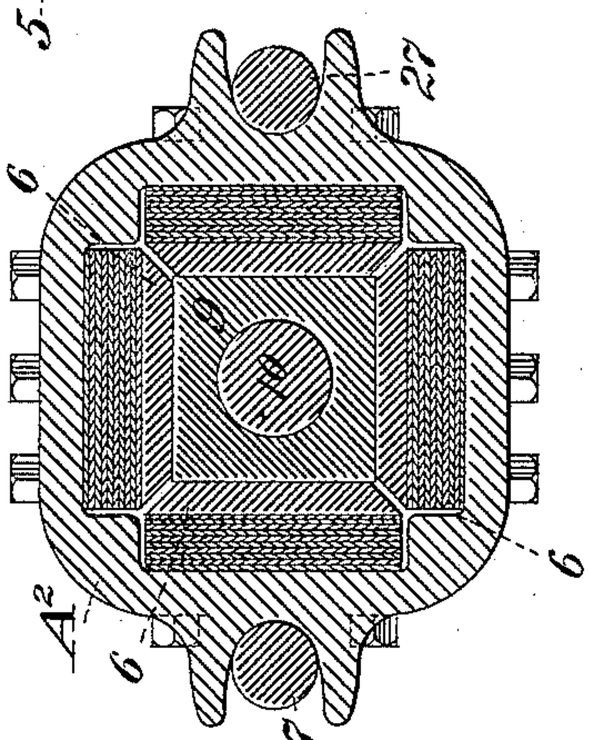
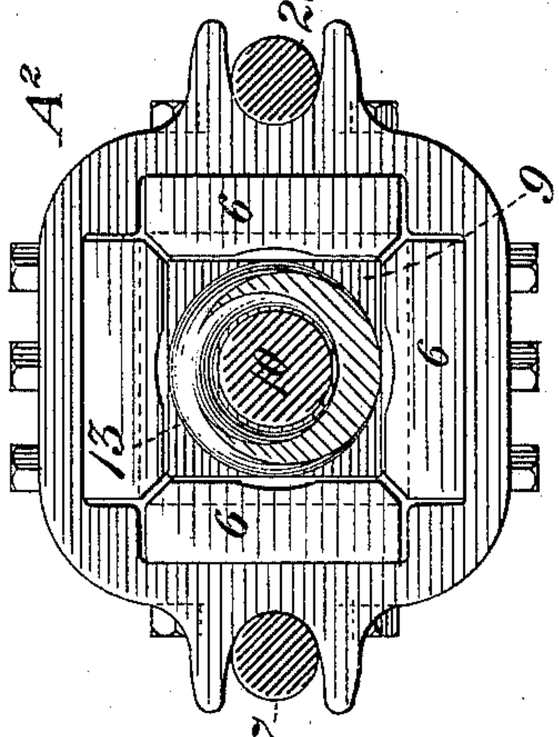


Fig. 16.



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8 Sheets—Sheet 7.

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BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 20.

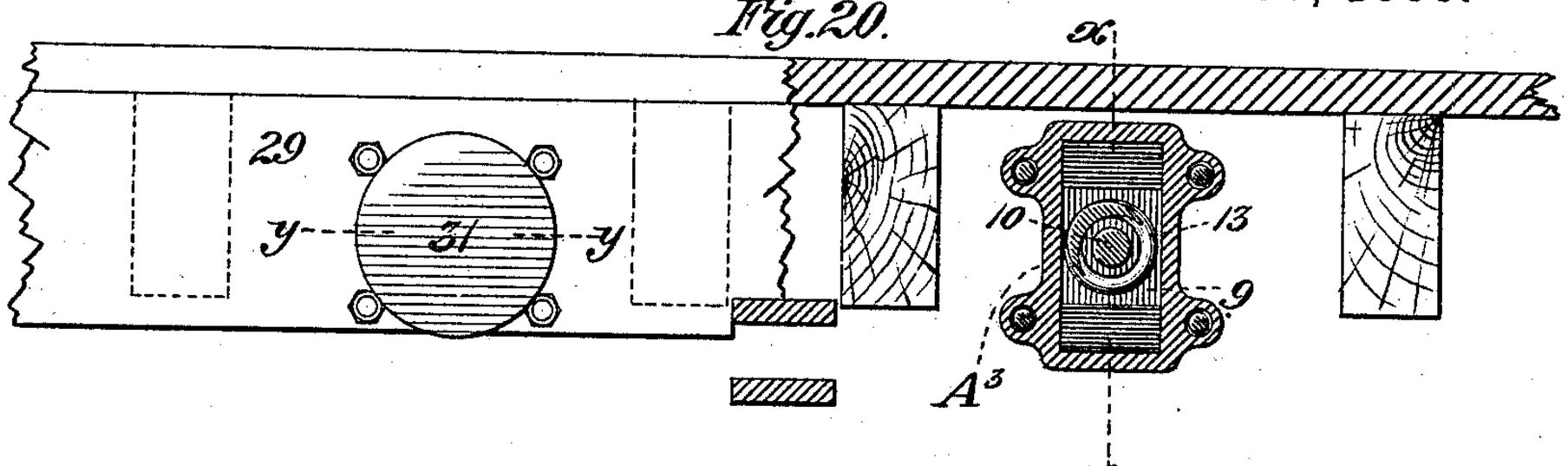
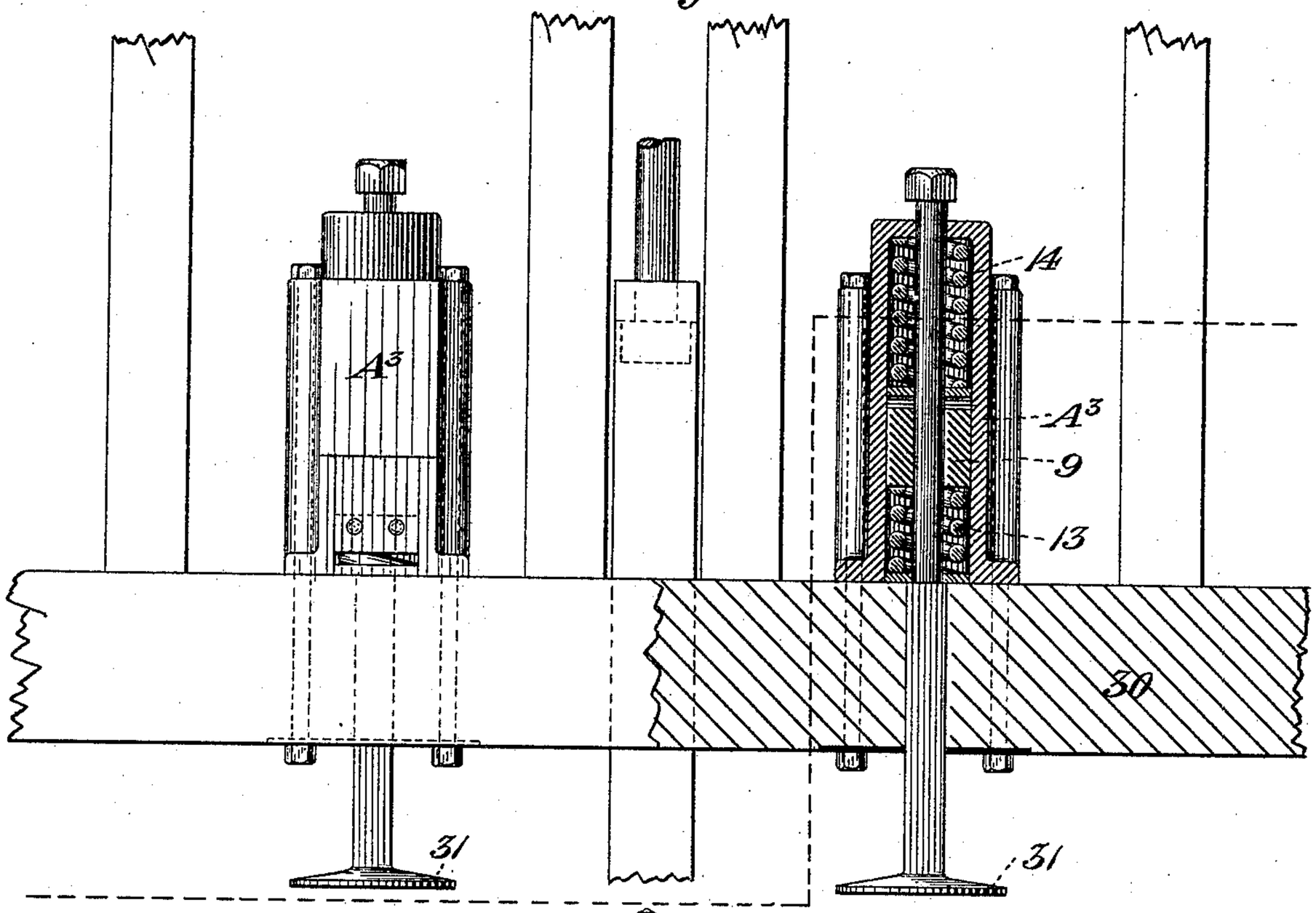


Fig. 21.



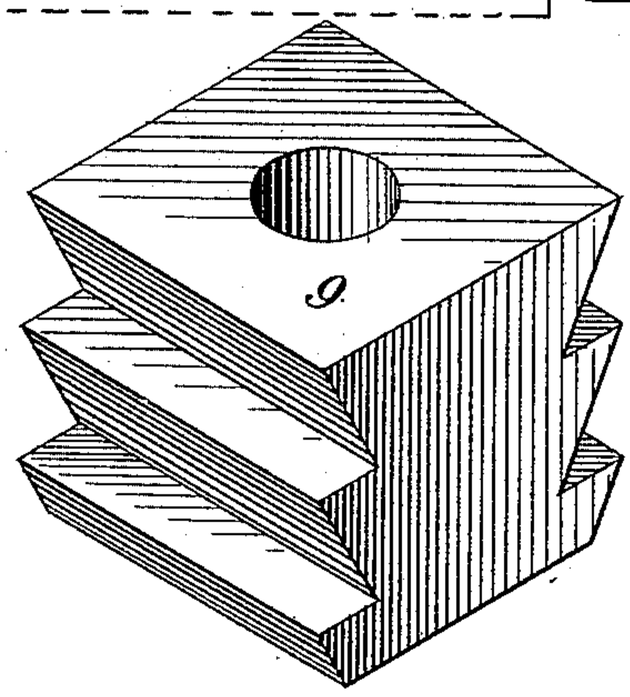


Fig. 22.

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(No Model.) 8 Sheets—Sheet 8.

G. WESTINGHOUSE, Jr.

BUFFING APPARATUS.

No. 391,997. Patented Oct. 30, 1888.

Fig. 25.

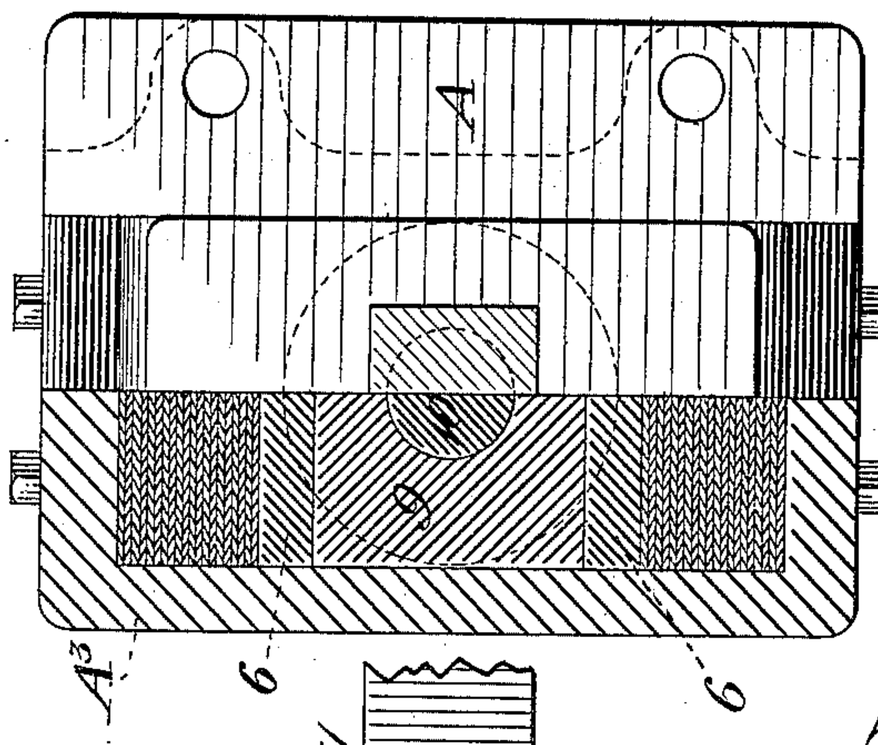


Fig. 26.

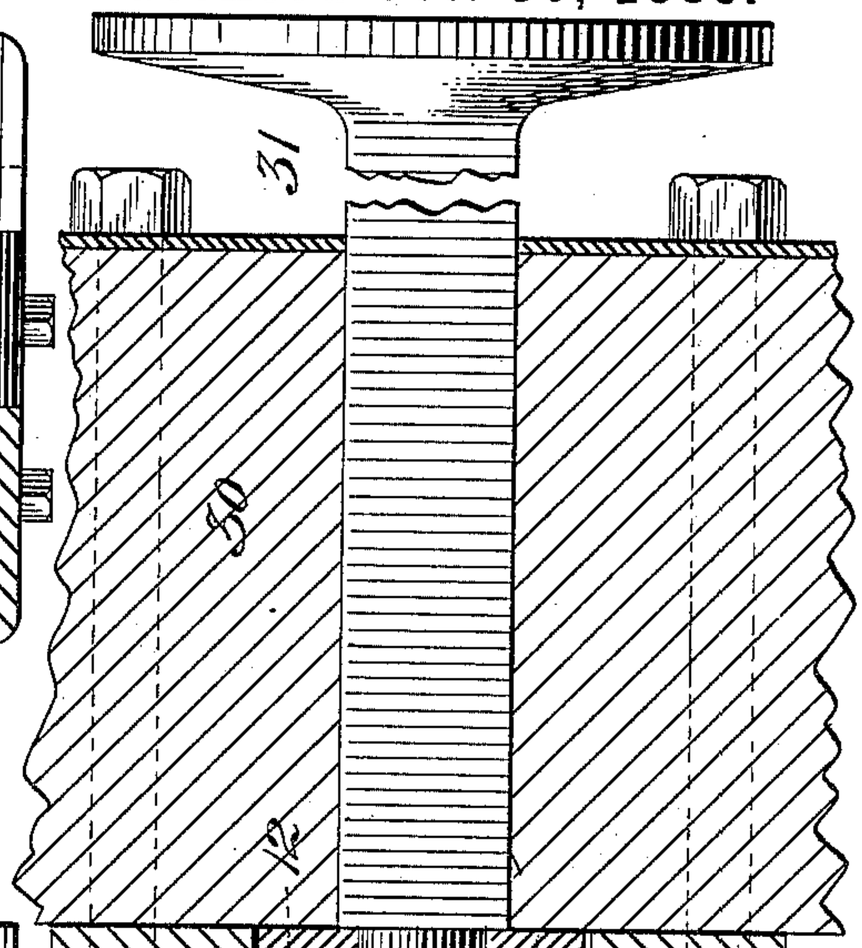


Fig. 23.

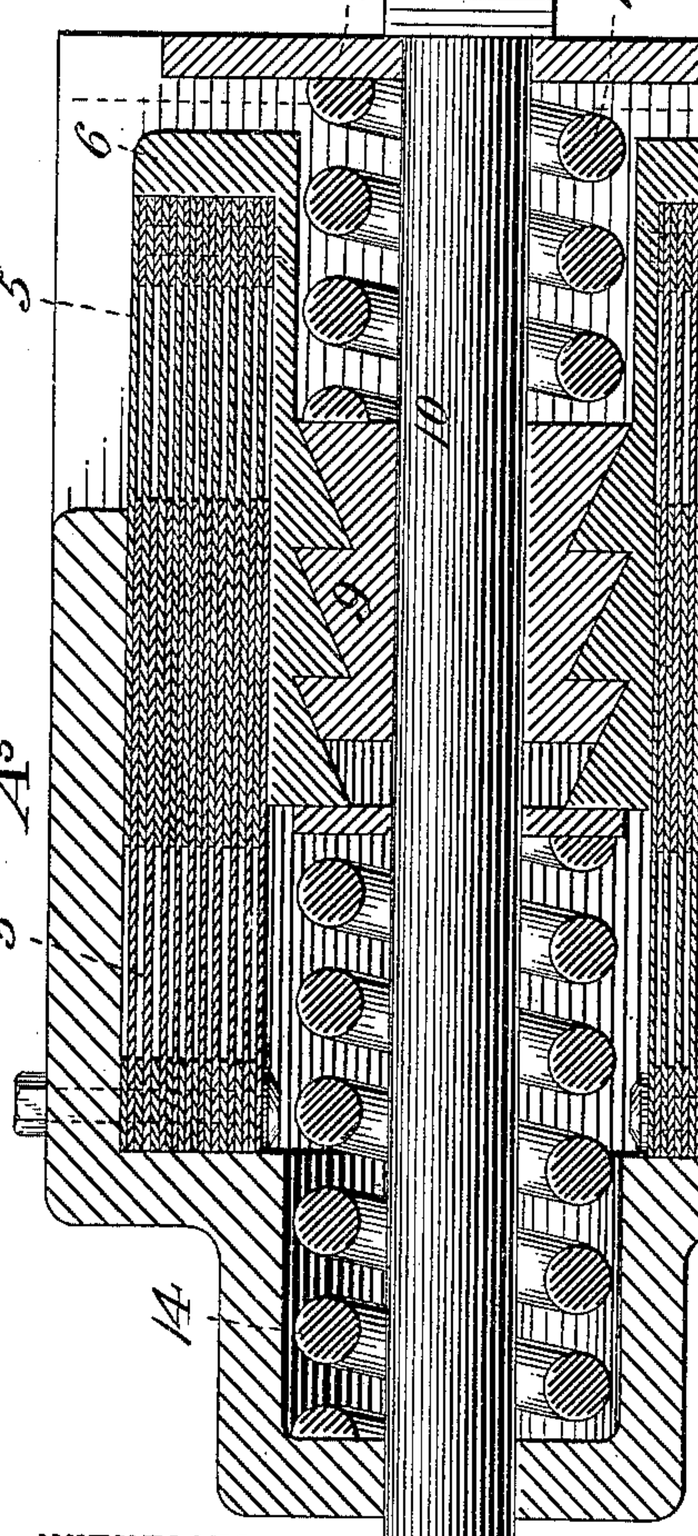
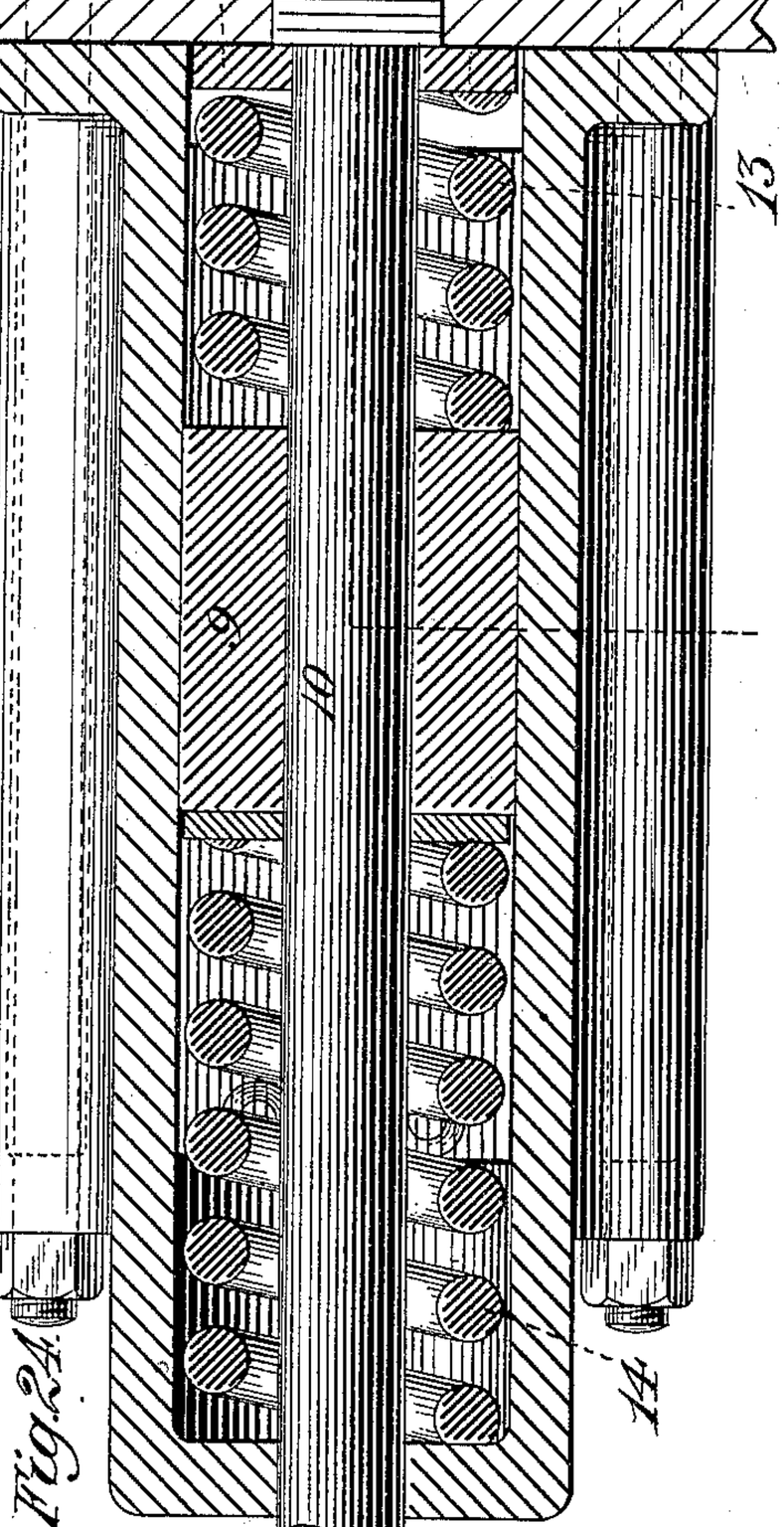


Fig. 24.



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UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

BUFFING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 391,997, dated October 30, 1888.

Application filed June 6, 1888. Serial No. 276,208. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, Jr., a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Buffing Apparatus, of which improvements the following is a specification.

My present invention relates to certain improvements in buffing apparatus designed to be interposed between a stationary and movable body, or between two bodies approaching each other either from opposite directions or between two bodies moving in the same direction, but at different rates of speed; and the invention has for its object a construction of buffing apparatus, whether applied to the draw-bars or buffers of cars, or for other purposes, wherein a frictional resistance is employed, either in combination with a spring resistance or alone, for the purpose of modifying the momentum and impact of the meeting or separating bodies.

In the accompanying drawings, forming a part of this specification, Figures 1 and 2, Sheet 1, are views in side elevation and top plan of the ordinary coupler having my improved buffing device applied thereto. Figs. 3 and 4, Sheet 2, are similar views showing my invention applied to the Janney type of coupler. Fig. 5, Sheet 3, is a sectional elevation of my improved buffing mechanism, the section being taken on the line *x x*, Fig. 7. Figs. 6 and 7 are transverse sections on the lines *y y* and *z z*, Fig. 5, respectively. Figs. 8 and 9 are perspective detail views of the wedge-block and one of the carriers. Fig. 10 is a sectional detail view showing the manner of securing the friction-plates. Figs. 11 and 12, Sheet 4, are sectional views on the same plane as Fig. 5, showing a portion of the buffing apparatus on an enlarged scale, the mechanism being in normal position in Fig. 11 and under compression in Fig. 12. Figs. 13 and 14, Sheet 5, are views in side elevation and plan showing the form of my apparatus designed for tension and compression applied to the Janney type of coupler. Figs. 15 to 19, inclusive, on Sheet 6, are similar to Figs. 5 to 9, Sheet 3, showing the tension and compression form of apparatus. Fig. 20 shows a portion of the end of a car, one of the buffers of which is shown in section, having my frictional resistance applied thereto. Fig. 21 is a plan and sectional view of the devices shown in Fig. 20. Fig. 22 is a perspective view of the wedge-block. Figs. 23 and 24 are sectional views on the lines *x x* and *y y*, Fig. 20, of the frictional apparatus for the buffers on an enlarged scale; and Fig. 25 is a view, partly in end elevation and partly in section, of the buffer mechanism.

Referring to the construction shown in Figs. 1 to 10, inclusive, the buffing mechanism is arranged within a casting, A, the rear or left-hand end, 1, Fig. 5, thereof being cylindrical, and the opposite end, 2, being rectangular, as shown in Figs. 6 and 7. The inner walls of the rectangular portion are recessed, as shown, for the reception of a series of plates, 3, held in their places by bolts 4, distance-strips being arranged between adjacent plates. In order that a certain freedom of movement of the plates may be allowed, the portion of the bolt 4 passing through the plates is made somewhat larger than the remaining portion thereof, thereby forming a shoulder constructed to bear against the wall of the casting and prevent the plates from being tightly clamped together, the enlarged portion being somewhat longer than the combined thickness of the plates 4 and the distance-blocks. Between each of the plates 3 of each of the series are arranged similar plates, 5, having their outer ends bolted to carrier-blocks 6, said plates 5 being separated by distance-strips, as above described in connection with the plates 3, said plates and strips being bolted to the carriers 6 by bolts 7, constructed similar to the bolts 4, or by rivets. The distance-strips between the plates 3 and those between the plates 5 are made of a thickness slightly less than the thickness of the plates 3 and 4, so as to permit of the plates 3 and 4 moving toward each other, as herein described, without any appreciable flexure thereof.

In the construction shown in Figs. 1 to 9, inclusive, I employ four sets of plates, 3, and a corresponding number of carriers 6, with their sets of plates 5. On the inner ends of the carriers 6 are formed a series of wedge-like or inclined faces, 8, which engage with correspondingly-shaped faces formed on the

sides of the wedge-block 9. (See Fig. 8.) Through this wedge-block passes the draft-pin 10, connected to the draw-bar or coupler 11 at its outer end, and between the outer end of the wedge-block and a follower-plate, 12, at the end of the coupler is arranged a spring, 13, of a length sufficient when the apparatus is in normal position, as shown in Fig. 5, to extend from the front end of the wedge-block 9 to a point beyond the carrier-block 6. This spring 13 is made of a sufficient strength to afford a considerable resistance as against the inward movement of the draft-pin. Although I prefer to interpose a follower-plate between the draw-pin and the spring, as hereinbefore stated, it is evident that the end of the draw-bar or coupler may be made of sufficient size or the buffing apparatus may be so proportioned as to effect all the functions, as hereinafter stated, of the plate 12.

In the cylindrical end 1 of the casting A, I arrange a set of spiral springs, 14 and 15, of the form ordinarily used for the draw-gear of cars. Between the outer ends of the springs 14 and 15 and the rear end of the carrier 6 is arranged a buffing-block, 16, which may be formed of one or two pieces, as desired, said buffing-block serving not only to transmit motion from the carrier-block 6 to the springs 14 and 15, but also as an abutment against which said springs bear when tension is applied to the draft-pin 10, said buffing-block being provided with outwardly-projecting flanges 17, arranged to engage shoulders 18, formed at the ends of the cylindrical portion 1 of the casting. At the left-hand end of the spiral springs 14 and 16 is arranged a draw-plate, 19, to which the draft-pin 10 is so connected as to pull said plate against the springs 14 and 15 when tension is applied to the draft-pin. Between the timber 20, that carries the center plate of the car, and the rear end of the casting A is interposed a casting, 21, serving to resist the action of the springs when they are compressed by the rearward movement of the draw-bar 11.

The casting A is supported by bolts 22, serving to secure it to the longitudinal center sills of the car, said bolts being re-enforced as against any rearward movement of the casting by the diagonally-arranged bolts 23, which pass through the timber head of the car, and by bolts 24, which re-enforce the bolts 22 as against any outward movement of the casting when tension is exerted upon the draw-bar or coupler.

The operation of the apparatus as hereinbefore described is substantially as follows: When tension is exerted upon the draw-head coupler for the purpose of pulling the car along, the draft-pin, through its connection with the draft-plate 19, compresses the springs 14 and 15, the forward end of said springs bearing against the block 16, which in turn bears against the shoulder 18 of the casting A. During this exertion of tension upon the draft-pin the casting A is held as against forward movement by the bolts 22 and 24, arranged as above described. When, however, pressure is applied to the draw-head or coupler, either by the same coming in contact with the draw-head or coupler of an adjacent car or with a stationary object, which pressure or force is often excessive and destructive not only to the draft-rigging of the car, but also to the car itself, the first inward movement of the draw-bar, and with it the follower-plate 12, compresses the spring 13 until the follower-plate 12 comes in contact with the forward ends of the carrier-blocks 6. In this connection it should be stated that the spring 13 is constructed to afford as great a preliminary resistance to the inward movement of the draw-head as the size of the apparatus will admit. The compressive force exerted upon the spring 13 is communicated to the wedge-block 9, thereby forcing said block inward or to the left in Fig. 5, and by reason of the engagement of its inclined faces with the correspondingly-shaped faces of the carriers 6 said carriers are forced outward, thereby tightly compressing the interwoven or alternately-arranged plates 3 and 5 between said carriers and walls of the casting A. If a greater inward pressure is exerted upon the draw-head than is required to compress the spring 13, the follower-plate 12 will come in contact with the forward ends of the carrier-blocks 6, and will tend to force said blocks inward and to cause the plates 5 to slide between the plates 3; but such sliding motion is resisted by the enormous friction produced by the compression of the plates 3 and 5. In case the inward force acting upon the draw-bar is sufficient to overcome the combined resistance of the spring 13 and the friction resistance presented by the plates 3 and 5, the inner ends of the carriers will in their movement push the block 16 to the left in an inward direction, which movement of the block 16 will be resisted by the springs 14 and 15. Hence it will be seen that in case of a severe shock or blow being imparted to the draw-bar said shock is first modified or checked by the tension of the spring 13, then by the frictional resistance of the plates 3 and 5, and then or simultaneously with such frictional resistance by the springs 14 and 15.

The degree or amount of frictional resistance exerted by the plates 3 and 5 to any inward movement of the carriers is dependent not only upon the tension of the spring 13, but also upon the angle or degree of inclination of the engaging-faces of the carriers and wedge-block, as will be readily understood. These faces of the carriers and wedge-block are preferably made of such an inclination as regards their line of movement that when the wedge-block is relieved of the inward pressure of the spring 13 said block will move forward automatically and assume its normal position, as shown in Figs. 5 and 11. The relative position of the wedge-block, carriers, and friction-plates 3 and 5 when an excessive pressure has been ap-

plied to the spring 13 is clearly shown in Fig. 12. As soon as the draw-head is relieved of the inwardly-acting force, the carriers and plates 5 are returned to normal position by the releasing action of the springs 14 and 15, acting through the block 16, it being understood that the wedge-block has first returned to its normal position, as above stated, thereby relieving the plates 3 and 5 of the compressive force placed thereupon by the movement of the carrier.

The amount of frictional resistance presented by the plates 3 and 5 when forced together is dependent upon the area of surface of the two sets of plates 3 and 5 in contact with each other and the compressing force exerted upon said plates by the action of the wedge 9. Hence it will be readily understood that by changing the angle or inclination of the engaging-faces of the wedge-block and carriers and by increasing the number of plates the frictional resistance can be greatly increased—as, for example, in the drawings I have shown five plates in each of the sets. By making each of said plates of half the thickness and doubling the number of plates double the frictional resistance can be obtained without altering the angle of the engaging-faces of the wedge-block and carriers, and by slightly increasing the angle of said inclined faces of the wedge-block and carriers to the line of movement of the wedge-block the compressive action exerted by said wedge-block when the latter is shifted inwardly will be increased, thereby still further increasing the frictional resistance exerted by the plates 3 and 5. The plates 3 and 5 can be made of steel, iron, or any other suitable material, and as the apparatus is so constructed that those plates come into action only when an extraordinary blow is given to the draw-head the wear upon these plates will be comparatively small.

In order to get an increasing resistance as the carriers 6 are forced inwardly, the side walls of the portion 2 of the casting A may be made inclined, so that a wedging action will take place when the carriers and plates 5 are forced inward, such wedging, acting through the inclined faces of the carriers and wedge-block, would cause the wedge-block to move forward to the right in Fig. 5 as the carriers 6 move in, thereby giving a greater compression to the spring 13, though it will probably be found in practice that it is more advantageous and economical to give an equal pressure to the spring 13 from the time the carriers begin their inward movement until the end of such movement, except such variations as may result from the resistance of the springs 14 and 15.

Referring to Figs. 1 and 3, it will be seen that the bolts 23 for convenience are threaded at each end, and that on the front of the end timber of the car there is placed a wrought-iron plate, 25, against which a washer having a beveled face is arranged, in order to provide a fair bearing for the nuts. At the same time the strap 26, which is usually employed for the purpose of holding the draw-bar in its place, is held in its position by bolts which pass entirely through the front timber, thereby giving the greatest possible strength in resistance to the action of the whole apparatus. It will be noticed that the bolts 23 and the bolts 22, as well as the casting 21 and the timber 20, all act together in offering resistance when a great inward force is applied to the draw-bar.

The apparatus hereinbefore described and illustrated in Figs. 1 to 9, inclusive, is designed to modify and limit the inward movements only of the draw-head by the employment of frictional resistance. In Figs. 13 to 19, inclusive, Sheets 5 and 6, is illustrated a form of apparatus wherein provision is made for the modification and limitation by frictional resistance of both inward and outward movements of the draw-head or coupler.

The casting A is arranged to slide upon parallel rods 27, (see Figs. 13, 14, 17, and 18,) having their rear ends secured to the casting 21 and its front ends to the brackets 28, which are firmly bolted to the timbers of the car, as shown. The casting 21 is secured to the center bearing-timber, 20, by bolts 29, as shown in Figs. 13 and 14. If a tensional force be applied to the draw-head while the several parts of the apparatus are in the position shown in Fig. 15, the draft-pin 10, which is in engagement with the casting A, will draw said casting along the rods 27, thereby compressing the spring 13, and through the medium of said spring forcing the wedge block to the left, or, rather, the movement of the casting causes, through the medium of spring 14, the carriers 6 to move to the right in Fig. 15, sliding over the wedge-block and being forced outwardly by the engagement of their inclined faces with those of the wedge-block, thereby forcing the plates 3 and 5 tightly together. As soon as the forward ends of the carriers come in contact with the follower-plate 12, which is also arranged to slide upon the bars 26 and interposed between the spring 13 and the rear ends of the draw-bar and brackets 28, any further movement of the casting A to the right will cause the plates 3 to slide along the plates 5, the spring 14 being at the same time compressed between the rear end of the casting and the bearing-block 16, interposed between the rear ends of the carriers 6 and the front end of the spring 14.

When the draw-head is subjected to an inwardly-acting force, the operation of the apparatus is similar to that described in connection with the form of apparatus shown in Figs. 1 to 9, and hereinbefore fully set forth.

As shown in Figs. 20 to 25, inclusive, Sheets 7 and 8, my invention is equally applicable to the buffers of cars. The casting A, which is preferably rectangular in cross-section, is bolted to the buffer beam 30, as shown in Figs. 21 and 24, and within this casting is arranged the operating mechanism. This mechanism is

substantially similar to that shown in Figs. 15 to 18, inclusive, and hereinbefore described, except that only two sets of friction-plates and two carriers are employed, the wedge-block being correspondingly constructed. As the buffer apparatus is to be employed only in modifying and limiting an inwardly-acting force, the casting A is stationary, the buffer 31 being movable, as described in connection with the draw-head 11 in the construction shown in Figs. 1 to 9.

It is obvious that any number of carriers and sets of friction-plates may be employed, and that the cross-sectional shape of the friction-plates, carriers, and wedge-block may be changed or modified as desired.

If desired, the draw-head may be made to shift the wedge 9 without the intervention of the spring 13, in which case the angles of the inclined faces of the wedge and carriers must be such as to prevent too great pressure on the plates 3 and 5.

In the preferred organization and operation of the apparatus described the spring 13, when acted on compressively, and during the time the follower-plate 12 and carriers 6 are approaching each other or coming into engagement, so acts as to shift the wedge block or blocks 9 sufficiently to bring the intercalating or overlapping plates into the desired tightness of contact, so that as thereafter the described movement is continued such plates shall slide on and between each other with a degree or amount of frictional resistance as may be required, but preferably without any, or, if any, with but comparatively little increase of such resistance by an increase of tightness of gripping-contact of the plates on each other, though the latter feature may be employed, as already stated, if desired; and it is believed to be better to so proportion and shape the devices that the greater part, or at least a considerable part, of the work of arresting motion should be done by the frictional resistance of the plates, partly for the reason that on the cessation of the motion there is no such violent or dangerous rebound as occurs when springs are the sole reliance for that purpose; and it is a generally-admitted fact that oftentimes the rebound is more dangerous and destructive than the original impact, and the feature of improvement thus referred to is one of great practical value.

The main characteristic features of my invention are two mechanical devices or members parts of which overlap or intercalate with each other and suitable means—as, for example, an incline or wedge or a series of wedges—operating transversely to the general direction of movement, so as to clamp together more or less tightly, as desired, such intercalating or overlapping parts. The number of such "parts" or "plates," as I have termed them, may be varied at pleasure, though it will be readily understood that there must be at least one on one of the members and two on the other in order to get the transverse clamping effect described; but for this purpose the interior wall of the box or case A, which contains the plate or plates, and the outer or back face of the carrier 6, when the arrangement is as illustrated in Figs. 11 and 12, become frictional resistance-surfaces, and, mechanically considered, become plates or the equivalents thereof for the purposes of the present invention. It will also be noted that the first or preliminary movement of the operative power will force the frictional members into operative relation with each other, and it will be further noticed that I provide first a resilient resistance, which is immediately supplemented by a frictional resistance, and that the latter is, when desired, re-enforced by a second resilient resistance.

I am aware that it is not new to interpose between the independently-movable ends of a mechanical device, as in the Webster patent, No. 8,496, of 1851, springs and inclines, so that as one member moves relatively to the other the springs shall travel up or down the inclines. This construction of the Webster patent is hereby disclaimed. It does not contain any transverse clamping action of any kind, nor any intercalating parts capable of being clamped.

I claim herein as my invention—

1. In a buffer mechanism, the combination of two parts or members, one capable of some longitudinal motion toward or from the other, intercalating or overlapping frictional resistance-plates between the two, and a suitable wedge-like clamping mechanism operative in a direction transverse to the line of draft or resistance for forcing the plates of the opposite members into the desired frictional engagement, substantially as set forth.

2. In a buffer mechanism, the combination of two parts or members, one capable of some longitudinal motion toward or from the other, intercalating or overlapping frictional resistance-plates between the two, and a suitable wedge-like clamping mechanism automatically operative in a direction transverse to the line of draft or resistance for forcing the plates of the opposite members into the desired frictional engagement, substantially as set forth.

3. In a buffer apparatus, the combination of two parts or members, one capable of some longitudinal motion toward or from the other, intercalating or overlapping plates between the two, a wedge-like clamping mechanism operative in a direction transverse to the line of draft or resistance for forcing the plates of the two members into the desired frictional engagement, and a spring for actuating the clamping mechanism, substantially as set forth.

4. In combination with the ordinary spring or springs and with the draft or resistance mechanism of a buffer apparatus, automatically-operative frictional resistance mechanism, consisting of a stationary member, a movable member, interposed intercalating or overlapping plates, a transversely-acting wedge-like clamping mechanism, and a spring for

actuating the clamping mechanism, substantially as set forth.

5. In a buffer apparatus, the orderly arrangement in the line of operation of, first, a spring adapted to perform the double function of a resistance-spring and a clamp-actuating device; second, two frictional resistance members and a transversely-acting wedge-like clamping mechanism, and, third, buffer-springs such as are usually employed in such mechanisms, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEO. WESTINGHOUSE, JR.

Witnesses:
W. D. UPTEGRAFF,
DARWIN S. WOLCOTT.