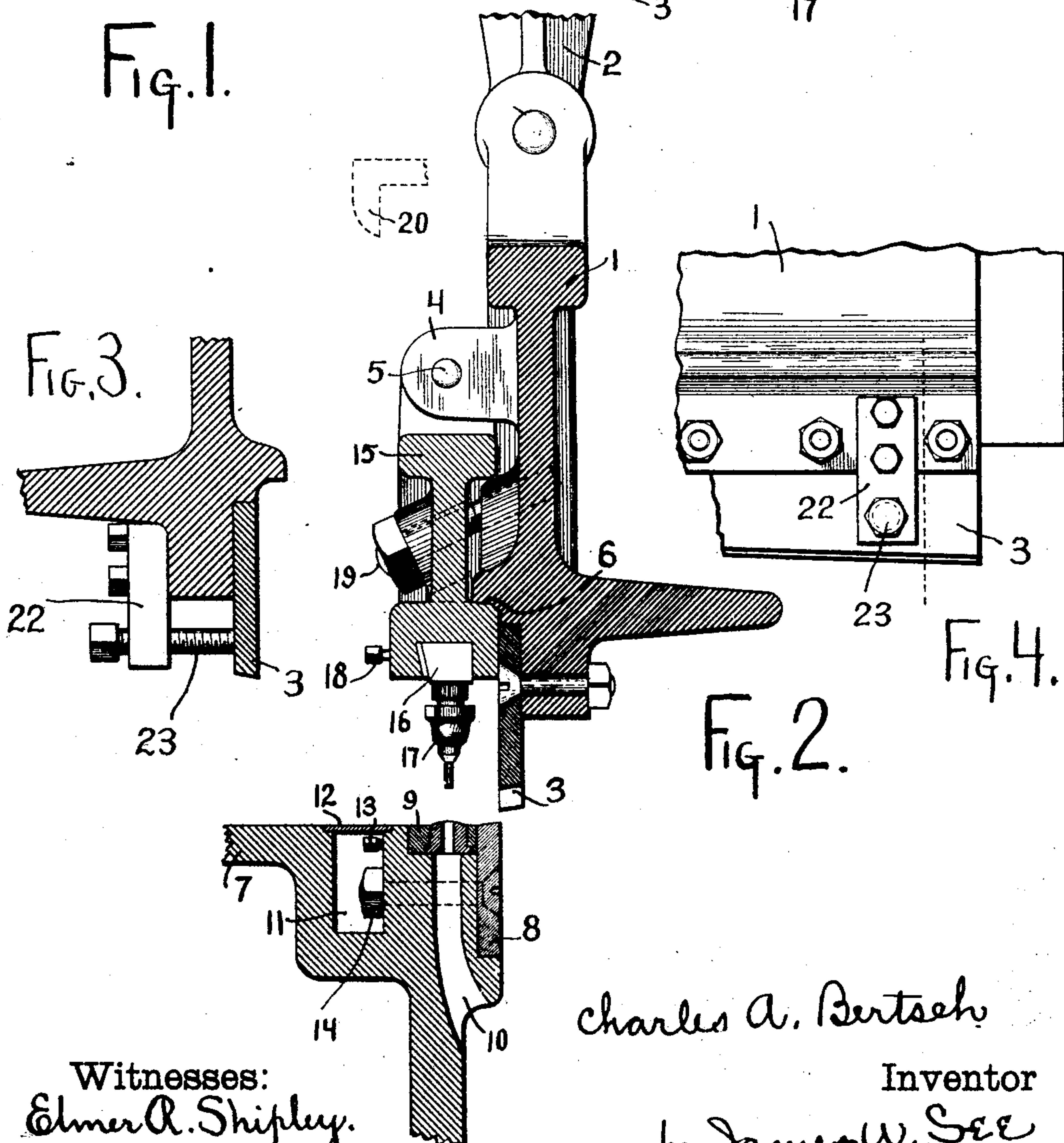
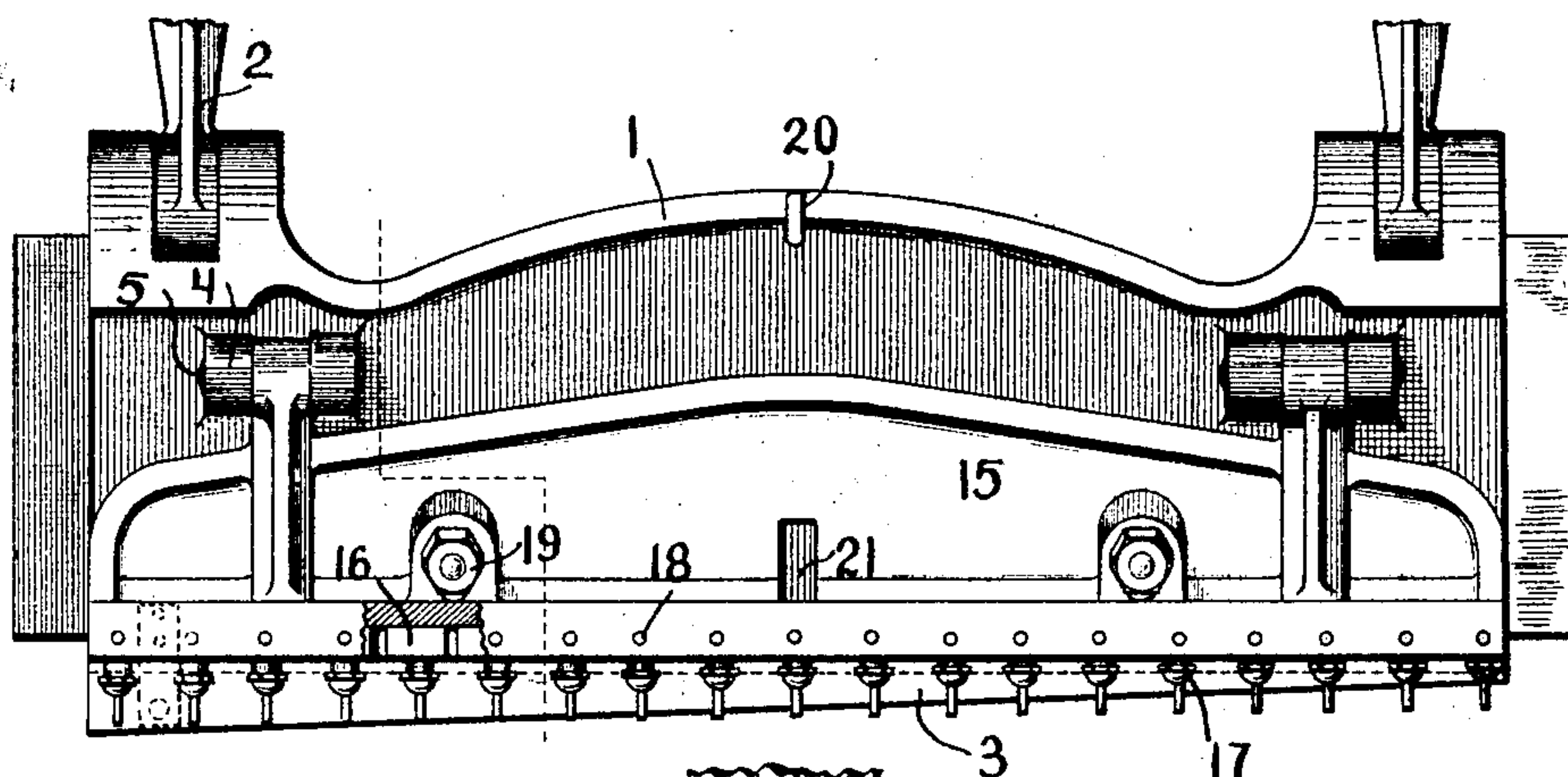


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PATENTED NOV. 7, 1905.

C. A. BERTSCH.
PUNCHING AND SHEARING MACHINE.

APPLICATION FILED NOV. 28, 1904.



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CHARLES A. BERTSCH, OF CAMBRIDGE CITY, INDIANA.

PUNCHING AND SHEARING MACHINE.

No. 803,660.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed November 28, 1904. Serial No. 234,460.

To all whom it may concern:

Be it known that I, CHARLES A. BERTSCH, a citizen of the United States, residing at Cambridge City, Wayne county, Indiana, (post-office address Cambridge City, Indiana,) have invented certain new and useful Improvements in Punching and Shearing Machines, of which the following is a specification.

This invention pertaining to punching and shearing machines will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of the gate of a machine embodying my invention; Fig. 2, a vertical transverse section of the same and also of the table at the lower shear-blade; Fig. 3, a vertical transverse section of the shear-gate and its blade at a point near the low end of the latter, and Fig. 4 a rear elevation of the shear-gate at the low end of its blade.

My invention is founded on shearing-machines of well-known gate type in which the upper shear-blade is carried by a vertically-reciprocating gate; and the object of my invention is to provide the shear-gate with a punch-holder to coöperate with dies in the table which carries the lower shear-blade, so that the machine may be used for punching or shearing alternatively or for punching near the edge of a sheet and simultaneously trimming its edge.

In the drawings, 1 indicates the usual long gate of a gate shearing-machine to be mounted, as usual, for vertical reciprocation in housings; 2, the usual pitmen pivoted to the gate and typifying ordinary means by which vertical reciprocations are imparted to the gate; 3, the upper shear-blade, secured, as usual, to the lower front edge of the gate and having the usual rake; 4, hinge-lugs projecting outwardly from the front face of the gate; 5, pivot-pins carried by these lugs; 6, a downwardly-presenting shoulder on the front face of the gate below the hinge-pins; 7, the usual table for the support of the work being operated upon; 8, the lower shear-blade, mounted, as usual, at the rear of the table in position to coöperate with the upper shear-blade; 9, a series of dies seated in a longitudinal groove in the table in front of the lower shear-blade, which shear-blade in the example forms the rear wall for this groove; 10, ports extending downwardly and outwardly from

the floor of this groove to permit the discharge of wads from the dies; 11, a longitudinal groove in the table in front of the groove containing the dies; 12, a removable cover-strip for groove 11; 13, a series of set-screws passing through the partition between the two grooves, the heads of these screws being in groove 11 while their points impinge upon the dies; 14, the bolts securing the lower shear-blade to the table, the same passing through the rear portion of the table and into groove 11, where they are provided with nuts, the set-screws for holding the dies and the nuts for holding the lower shear-blade thus being accessible when cover 12 is removed; 15, a long punch-holder suspended from pivot-pins 5 and having upon its rear face an upwardly-presenting shoulder engaging under shoulder 6 of the gate, the lower edge of the punch-holder being longitudinally grooved for the reception of the punch-blocks; 16, the punch-blocks seated in the groove in the punch-holder, there being one block for each punch, and the cross-section of the blocks and their groove being preferably dovetailed or of similar section, wider at the top than at the bottom, so that independent of clamping means the punch-blocks are held in the groove; 17, the punches of any ordinary type projecting downwardly from the punch-blocks and in vertical plane to coöperate with the dies; 18, set-screws through the front wall of the groove in the punch-holder and engaging the punch-blocks and clamping them firmly in their groove, there being a sufficient number of these set-screws to provide for clamping the punch-blocks in various positions of adjustment or distribution, the same provision as to number of set-screws applying to the set-screws 13 for clamping the dies in their groove; 19, bolts clamping the punch-holder firmly against the front face of the gate, these bolts being so inclined as to draw the punch-holder upwardly, as well as rearwardly, and thus insure maintained contact at the shoulder 6 regardless of any lost motion there may be in the pivot-pins 5; 20, a latch upon the upper portion of the gate to secure the gate in position, with the punches projecting upward, this latch in the illustration having the form of a simple L-shaped button; 21, a mortise through the punch-holder in position to coöperate with the latch; 22, a block separably bolted to the rear of the shear-gate at the

lower end of the blade, and 23 a set-screw in the block bearing against the rear of shear-blade 3.

The dies may be in the form of blocks, fitting their groove in the table, or they may be separably inserted in the blocks, the latter plan being shown in the illustration. The punch-blocks are, in effect, merely large heads upon the punches, adapting them to the groove in the punch-holder; but it is desirable in practice to insert the punches separably in punch-blocks. In punching long rows of holes, for which purpose my machine is particularly designed, it is desirable to have the punches of the row varied in length, so as to avoid simultaneous punching, and the shanking of each punch into a punch-block provides for these varying lengths by simply varying the lengths of the shanks. As a general thing each punch and each die of the row will be individualized, thus permitting of adjustment of distance between holes and also for the convenient removal of individual punches and dies, such plan being obviously preferable to an integral row of punches or dies.

For ordinary punching near the edge of a sheet the shear-blade may be left in normal condition, and for certain classes of work the shear-blades and punching devices may cooperate in punching a sheet and simultaneously trimming its edge. In case punching is to be done so far from the edge of a sheet as to be interfered with by the action of the shear-blades the upper shear-blade may be temporarily removed from the gate. When shearing alone is to be done, then bolts 19 are released and the punch-holder is turned on its pivot-pins so as to bring the punches upward, in which position the punch-holder is to be latched. For light machines the punch-holder is easily turned into and out of working position, and no counterbalancing is needed.

In any gate-shear it is practically essential that in order to secure the proper shearing action one end of the upper shear-blade must be lower than the other, and it is also desirable that the portion of the gate against which the shear-blade bolts extend as far downward on the shear-blade as is practicable in order to give firm support to the blade. With the lower edge of the gate thus projecting downwardly to excess degree at one end a difficulty would be presented when the use of the shear-blade is temporarily abandoned and the machine employed with tools inserted in the punch-holder. I overcome this defect by making the lower edge of the gate level, as indicated by the dotted lines in Fig. 1, no portion of this edge projecting so far down as to strike a sheet being punched or otherwise worked on by tools in the punch-holder at some distance from the back edge of the sheet. In short, I make the lower edge of the gate

level and extend it as far down as is consistent with its not striking sheets of the maximum thickness to be operated upon by tools in the punch-holder. The raking or shearing character for the blade is gotten by making the blade considerably wider at one end than at the other. The result of this construction is that the upper shear-blade projects downward from the gate a greater distance at one end than at the other. In some cases this superior downward projection of the upper shear-blade might result in an inadequacy of rearward support for the blade at such low end, and I overcome this possible weakness by separably bolting the block 22 to the rear of the gate and then bringing its set-screw 23 to a nice bearing on the rear of the shear-blade to form a strut and thus furnish a substitute for the omitted downwardly-projecting portion of the gate at the lower end of the shear-blade. When the upper shear-blade is removed for the purpose of employing the punch-holder, the presence of the block 22, if left upon the shear-gate, would obviously not interfere with the working of the machine upon material not requiring the full width of the machine—that is to say, sheets of less than full width might be passed through the machine in spite of the presence of the strut-block. The presence of the block in case it is left permanent upon the shear-gate therefore tends to limit to a certain extent the width of work which the machine can work on with tools in the punch-holder; but by making the strut-block separable from the shear-gate, as illustrated, the block may be removed in case it is desired to utilize the full width of the machine or to utilize any capacity of the machine which the presence of the strut-block would lessen.

I claim as my invention—

1. In a punching and shearing machine, the combination, substantially as set forth, of a table, a lower shear-blade carried thereby, a gate, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies carried by the table in front of the lower shear-blade, a punch-holder secured against the face of the gate and arranged for movement to and from operative position, and punches carried by the punch-holder to cooperate with the dies.

2. In a punching and shearing machine, the combination, substantially as set forth, of a table, a lower shear-blade carried thereby, a gate having a downwardly-presenting shoulder on its face, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies carried by the table in front of the lower shear-blade, a punch-holder hinged against the face of the gate and having a shoulder engaging the shoulder of the gate and arranged for pivotal movement to and from operative position, and punches carried by the punch-holder to cooperate with the dies.

3. In a punching and shearing machine, the combination, substantially as set forth, of a table, a lower shear-blade carried thereby, a gate having a downwardly-presenting shoulder on its face, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies carried by the table in front of the lower shear-blade, a punch-holder secured against the face of the gate and having a shoulder engaging the shoulder of the gate and arranged for movement to and from operative position, bolts securing the punch-holder against the face of the gate and arranged at an angle so as to draw said shoulders into contact, and punches carried by the punch-holder to cooperate with the dies.

4. In a punching and shearing machine, the combination, substantially as set forth, of a table, a lower shear-blade carried thereby, a gate having a downwardly-presenting shoulder on its face, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies carried by the table in a groove in front of the lower shear-blade, a punch-holder secured against the face of the gate and having a shoulder engaging the shoulder of the gate and arranged for movement to and from operative position, and punches carried by the punch-holder to cooperate with the dies.

5. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge and provided with a first longitudinal groove forward of said shear-blade and a second longitudinal groove forward of the first one, a gate having a downwardly-presenting shoulder on its face, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies seated in the first-mentioned groove in the table, set-screws through the partition between the two grooves in the table, a punch-holder secured against the face of the gate and having a shoulder engaging the shoulder of the gate and arranged for movement to and from operative position, and punches carried by the punch-holder to cooperate with the dies.

6. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge and provided with a first longitudinal groove forward of said shear-blade and a second longitudinal groove forward of the first one, a gate having a downwardly-presenting shoulder on its face, an upper shear-blade carried by the gate and cooperating with the lower shear-blade, a series of dies seated in the first-mentioned groove in the table, set-screws through the partition between the two grooves in the table, bolts for securing the lower shear-blade to the table having nuts in the second groove thereof, a punch-holder secured against the shoulder of the gate and

arranged for movement to and from operative position, and punches carried by the punch-holder to cooperate with the dies.

7. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge, a gate, an upper shear-blade secured to the gate and projecting below the same, a block separably secured to the gate at the rear of the upper shear-blade, and a strut extending between said block and upper shear-blade.

8. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge, a gate, an upper shear-blade secured to the gate and projecting below the same, a block separably secured to the gate at the rear of the upper shear-blade, and an adjustable strut extending between said block and upper shear-blade.

9. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge, a gate, an upper shear-blade secured to the gate and projecting below the same, a block separably secured to the gate at the rear of the upper shear-blade, and an adjustable screw-strut extending between said block and upper shear-blade.

10. In a punching and shearing machine, the combination, substantially as set forth, of a table carrying a lower shear-blade at its rear edge, a gate, an upper shear-blade secured to the gate and projecting below the same and having its lower edge at an angle to the table, a block projecting downwardly from the gate at the rear of the lower end of the upper shear-blade, and a strut extending between said block and the upper shear-blade.

11. In a sheet-metal-working machine, the combination, substantially as set forth, of a table, a lower shear-blade carried thereby, a gate, an upper shear-blade separably mounted on the gate and cooperating with the lower shear-blade, tool-holding devices provided in the table forward of said upper shear-blade, and a tool-holder secured against the face of the gate and arranged for movement to and from operative position thereon.

12. The combination of a table, a shear-blade carried thereby, a die carried by said table, a reciprocable gate, a shear-blade carried thereby, a punch-holder carried by said gate, and means for moving said punch-holder out of operative position.

13. The combination of a table, a shear-blade carried thereby, a die carried by said table, a reciprocable gate, a shear-blade carried thereby, a punch-holder pivoted to said gate, and a latch for retaining said punch-holder in inoperative position.

14. The combination of a table, a shear-blade carried thereby, a die carried by said table, a reciprocable gate, a shear-blade carried thereby, a punch-holder, pivotal connec-

tions between said punch-holder and said gate, and additional means for securing said punch-holder to said gate in operative position.

15 15. The combination of a table, a shear-blade carried thereby, a die carried by said table, a reciprocable gate, a shear-blade carried thereby, a punch-holder pivoted to said gate, a bolt for securing said punch-holder to said gate in an operative position, and a latch
10 for retaining said punch-holder in inoperative position.

16. The combination of a table, a shear-blade thereon, a plurality of dies carried by said table, a reciprocable gate, a shear-holder
15 carried thereby, a punch-holder movably

mounted on said gate, a shoulder on said gate, and a member on said punch-holder adapted to engage said shoulder.

17. The combination of a table, a shear-blade thereon, a plurality of dies carried by
20 said table, a reciprocable gate, a shear-holder carried thereby, a punch-holder movably mounted on said gate, a shoulder on said gate, and clamping means for securing engagement
25 between said shoulder and said corresponding member on the punch-holder.

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