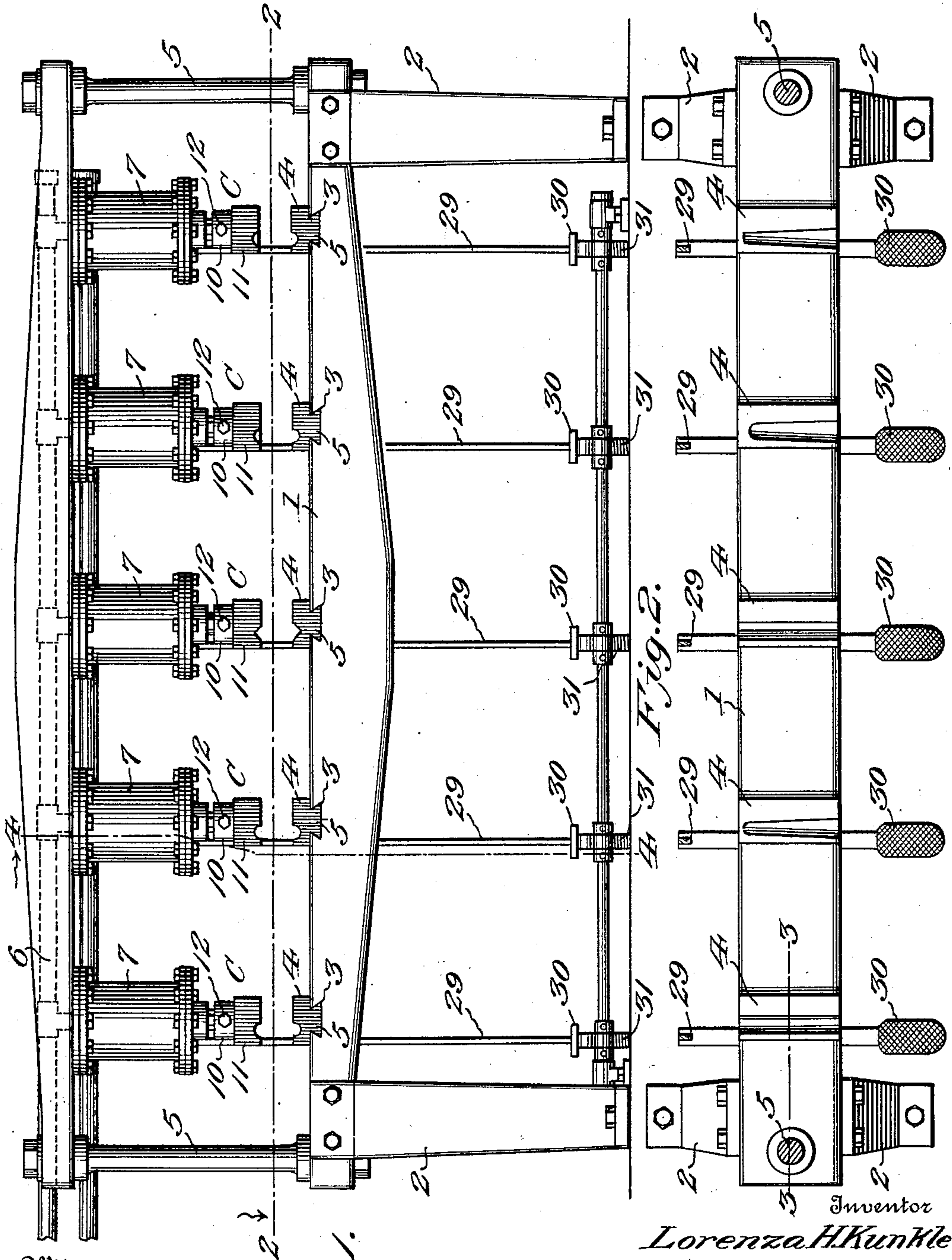


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 AUTOMATIC TOOL FORGING MACHINE.
 APPLICATION FILED NOV. 21, 1910.

999,661.

Patented Aug. 1, 1911.

2 SHEETS—SHEET 1.



Witnesses

Wm. Baggett
Edwin L. McKee

Fig. 1.

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 Lorenza H. Kunkle

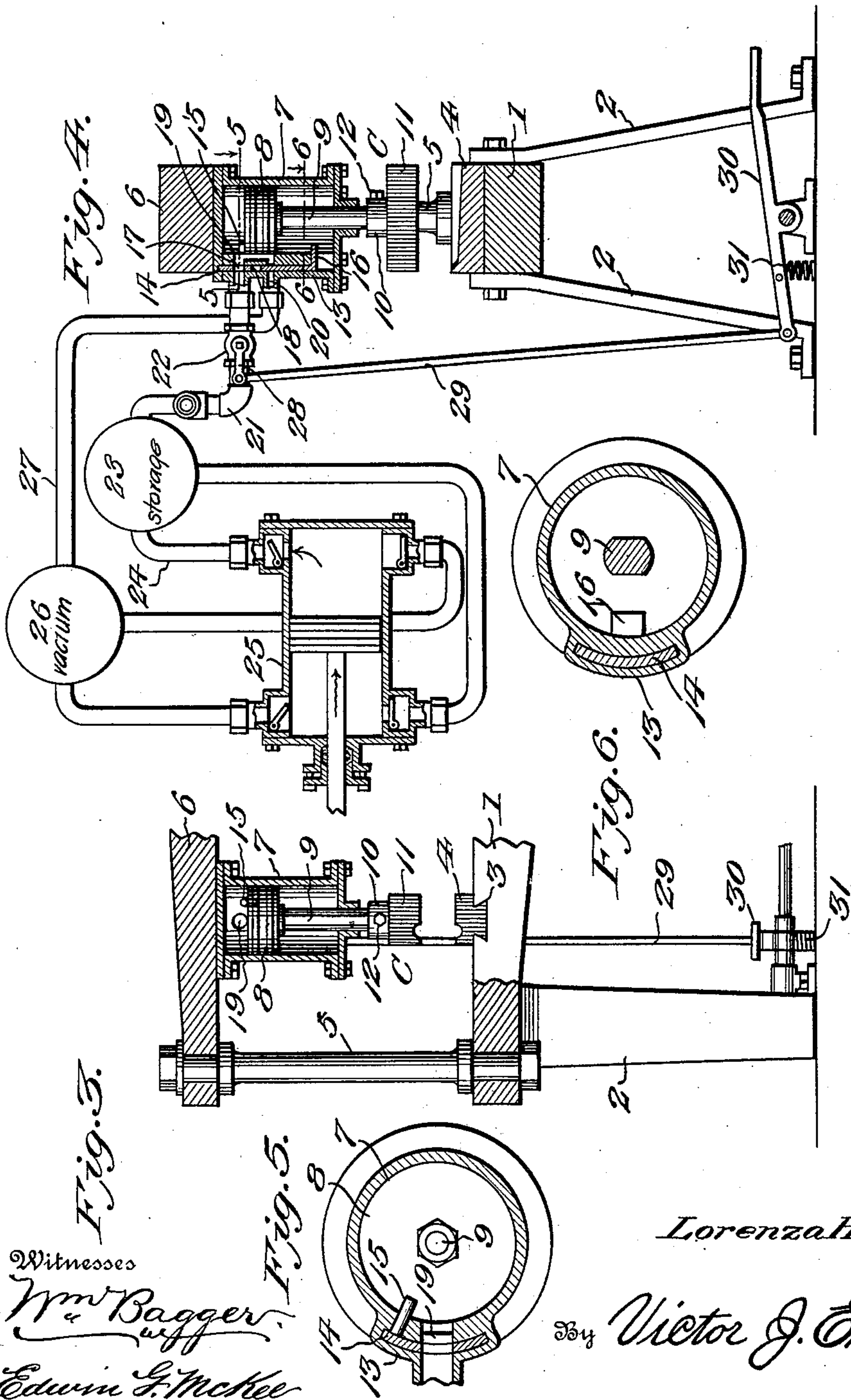
By *Victor J. Evans*
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UNITED STATES PATENT OFFICE.

LORENZA H. KUNKLE, OF ALTOONA, PENNSYLVANIA.

AUTOMATIC TOOL-FORGING MACHINE.

999,661.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed November 21, 1910. Serial No. 593,488.

To all whom it may concern:

Be it known that I, LORENZA H. KUNKLE, a citizen of the United States of America, residing at Altoona, in the county of Blair and State of Pennsylvania, have invented new and useful Improvements in Automatic Tool-Forging Machines, of which the following is a specification.

This invention relates to machines for forging chisels, drills and other tools of a like description, and it has for its object to produce a machine of this character including a plurality of dies and hammers coacting therewith, said hammers being operable by means of compressed air or other fluid pressure, such as steam, and the parts of the invention being arranged for coöperation in such a manner that a blank handled by one operator may at a single heat be forged into a tool of the desired description.

A further object of the invention is to simplify and improve the arrangement of the dies and the hammers to produce a convenient and efficient organized machine.

Further objects of the invention are to simplify and improve the general construction and operation of a machine of the character described.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement of parts which will be hereinafter fully described and particularly pointed out in the claim.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifications within the scope of the claim may be resorted to when desired.

In the drawings,—Figure 1 is a front elevation of a machine constructed in accordance with the invention. Fig. 2 is a horizontal sectional view taken on the plane indicated by the line 2—2 in Fig. 1. Fig. 3 is a vertical sectional detail view taken on the

line 3—3 in Fig. 2. Fig. 4 is a vertical transverse sectional view taken on the line 4—4 in Fig. 1. Figs. 5 and 6 are sectional detail views, enlarged, taken on the lines 5—5 and 6—6 in Fig. 4.

Corresponding parts in the several figures are denoted by like characters of reference.

The frame of the improved machine comprises a bridge beam 1 supported at the ends thereof by legs or uprights 2, 2, said bridge beam being preferably trussed or reinforced upon its underside and provided upon its flat upper face with transverse dovetailed recesses 3, 3 for the reception of dies 4, 4, the undersides of which are provided with dovetailed projections 5 to engage the recesses 3, thus enabling the said dies to be mounted very securely in position but in such a manner as to enable said dies to be readily interchanged for other dies of a different shape.

The bridge beam 1 is provided with uprights 5, 5 rising from the ends thereof and supporting a cap beam 6 which may likewise be trussed or reinforced and upon the underside of which a plurality of cylinders 7 are mounted or supported in registry with the die receiving recesses 3 in the bridge beam. Each of said cylinders contains a piston 8 having a stem 9 that extends through the head at the lower end of the cylinder and carries a hammer 10 with which a die 11 is associated, it being understood that the die 11 may be either integral with or suitably connected with the hammer, the latter being detachably connected with the piston stem 9 by means of a set screw or in any other convenient manner. It will be seen that the die 11 and the hammer 10 combine to form a striking element which, as a whole, is designated by C, said striking element being detachably associated with the piston stem 9.

Each of the cylinders 7 has associated therewith a valve chest 13 wherein a slide valve 14 is mounted for reciprocation, said slide valve being provided with laterally extending lugs 15, 16 that lie in the path of the upper and lower ends of the piston, thereby causing the said valve to be actu-

ated by the reciprocation of said piston. The valve 14 is provided with ports or apertures 17, 18 adapted to register with the inlet port 19 and the exhaust port 20, respectively. The inlet port 19 communicates through a pipe 21 having a stop valve 22 with a storage reservoir 23 for compressed air or other fluid; said reservoir being in turn connected by a pipe 24 with pump 25. Said pump is connected with and adapted to exhaust the air from a vacuum chamber 26 which is connected by a pipe 27 with the exhaust port 20 of the cylinder. Any ordinary single or double acting pump may be used to compress and exhaust the fluid whereby the piston is reciprocated in the cylinder. It will also be understood that a single pump with appended storage and vacuum chambers may be utilized to furnish motive power for any desired number of cylinders.

Each of the stop valves 22 is provided with a lever 28 which is connected by a link 29 with a foot lever 30 whereby said valve may be actuated. Each foot lever is preferably actuated by a spring 31 whereby it is moved to a valve closing position. By placing his foot upon the treadle of the foot lever, the operator may open any one of the valves 22, thereby placing the cylinder with which such valve is associated in communication with the source of supply of motive fluid.

In the construction of this machine the piston stems carrying the striking elements C are preferably made non-circular, so as to maintain the dies of the striking elements in perfect alinement with the die members 4 supported upon the bridge beam 1 of the machine. It will also be understood that the die members supported upon the bridge beam and the coöperating striking members carried by the piston stems constitute a complete set of dies whereby a suitable blank may be gradually converted into a tool of any desired description, the evolution of the finished tool from the original blank being accomplished by the successive operation of as many dies as may be required for the purpose, each die being composed of a stationary member 4 and a striking element C. The operator, carrying the blank by means of suitable tongs or holders, moves from one die to another, successively subjecting the blank to the action of the several dies until the forging operation is completed, this being accomplished at a single heat. After being subjected to the operation of the finishing die the blank is subjected to a tempering operation which, however, is no part of the present invention.

In the hand forging of tools of various kinds the operator requires the assistance of a helper, and the forging operation is necessarily a comparatively slow one, frequently requiring several heats. By means of the

improved machine herein described a single operator may greatly increase the output which will also be found to be of a superior and uniform quality. By depressing the treadle 30 the operator opens the valve 22, thus placing the upper end of the cylinder associated with the treadle in communication with the storage reservoir 23 through the ports 17, 19, causing the piston to be forcibly depressed by the fluid pressure on the reservoir 23. When the piston approaches the downward limit of its movement it encounters the projection 15 of the valve 14, which latter is thus moved to place the ports 18, 20 in registry while the ports 17, 19 are mutually obstructed, thus placing the upper end of the cylinder in communication with the vacuum chamber 26, whereby the air or fluid above the piston will be exhausted, causing the piston and parts connected therewith to be projected upwardly by the pressure of the air below the piston. When the piston approaches the upward limit of its movement, it will engage the projection 15 of the slide valve 14, shifting the latter to place the ports 17, 19 in registry, thus impelling the piston downwardly, the reciprocatory movement of the piston being continued as long as the valve 22 is open.

The improved machine, moreover, is not merely useful for the purpose of forging new tools, but also for the purpose of restoring and sharpening tools that have been in use for some time.

Such tools as rock drills, chisels and the like may be quickly and effectively resharpened by the improved machine at a very trifling expense.

It will be understood that while this invention has been described as a tool forging machine, the use thereof is not necessarily limited, but the machine may be utilized for a variety of purposes which will readily suggest themselves.

It will also be seen that the machine is practically automatic in its operation, the only action required to be performed by the operator beyond placing the article to be operated upon the lower die member being to depress the foot lever whereby the valve controlling the admission of the motive fluid is operated. It follows that the work may be readily accomplished by a single operator without the assistance of a helper.

Having thus described the invention, what is claimed as new, is:—

In a tool forging machine, a frame including a bridge beam and a cap beam, a die member supported detachably upon the bridge beam, a cylinder supported upon the cap beam and having a chest provided with inlet and exhaust ports, a slide valve movable in the chest and having apertures adapted to register with the inlet and the exhaust ports, a piston mounted for reciproca-

tion in the cylinder, lugs extending from the
valve and lying in the path of the piston, a
pump, a storage reservoir connected with the
outlet of the pump, a vacuum reservoir con-
5 nected with the inlet of the pump, a duct
connecting the vacuum chamber with the ex-
haust port of the cylinder, a valved duct
connecting the cylinder inlet with the stor-

age reservoir, and a foot lever to control the
valve of said duct.

In testimony whereof I affix my signature
in presence of two witnesses.

LORENZA H. KUNKLE.

Witnesses:

WM. BAGGER,

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."