No. 696,068. Patented Mar. 25, 1902.

D. J. MORGAN.

RAM.

(Application filed June 3, 1901.)

(No Model.) 3 Sheets—Sheet 1.

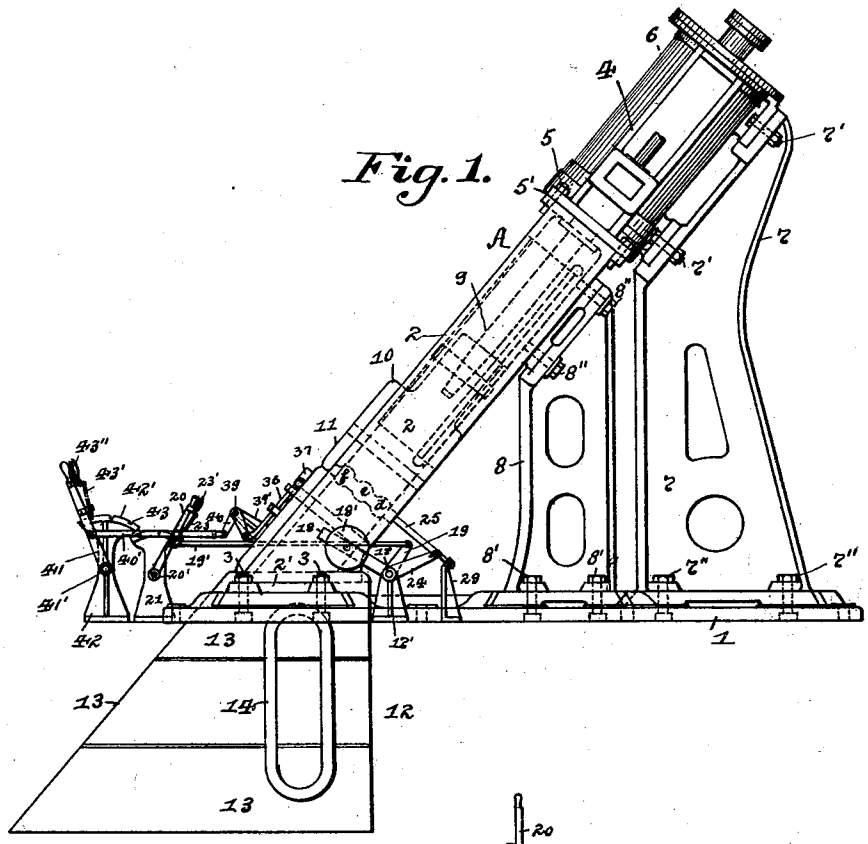


Fig. 1.

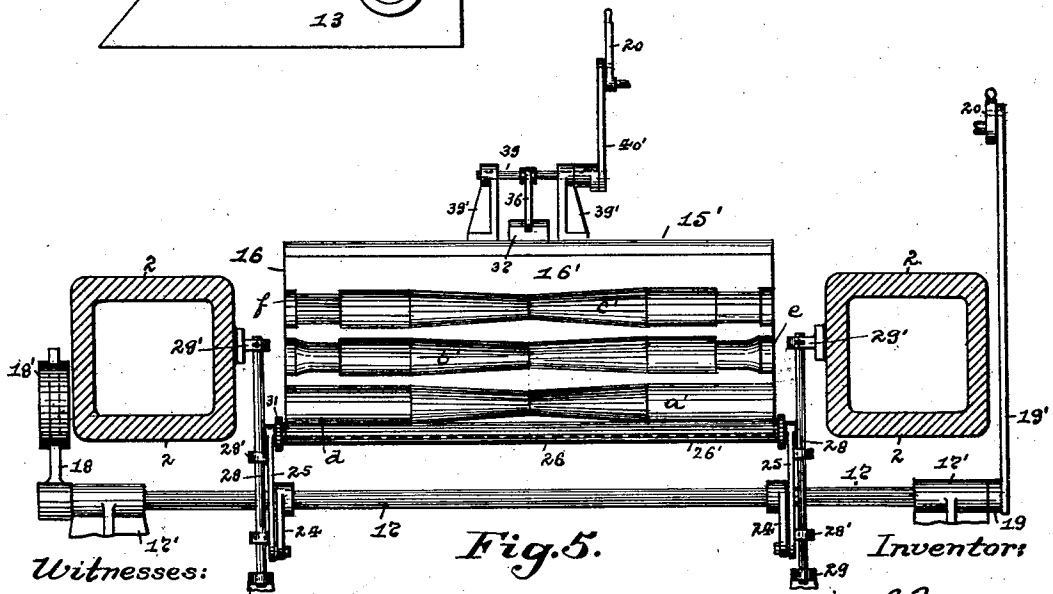


Fig. 5.

Witnesses:

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

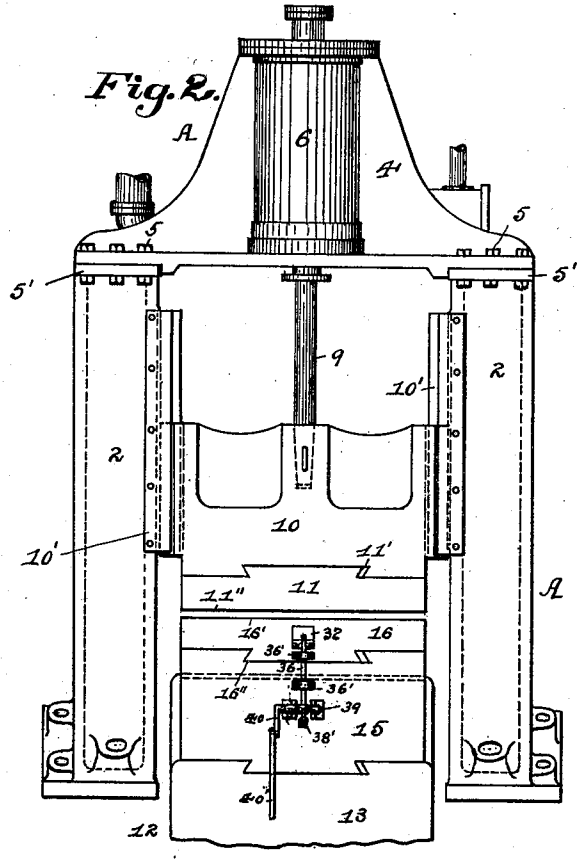


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



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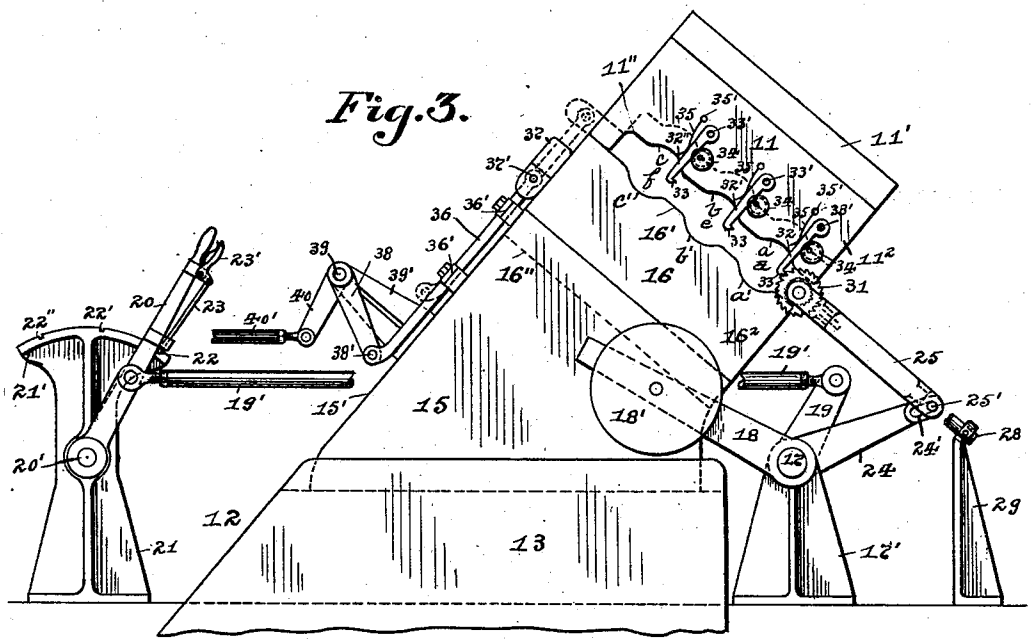
D. J. MORGAN.

RAM.

(Application filed June 3, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.



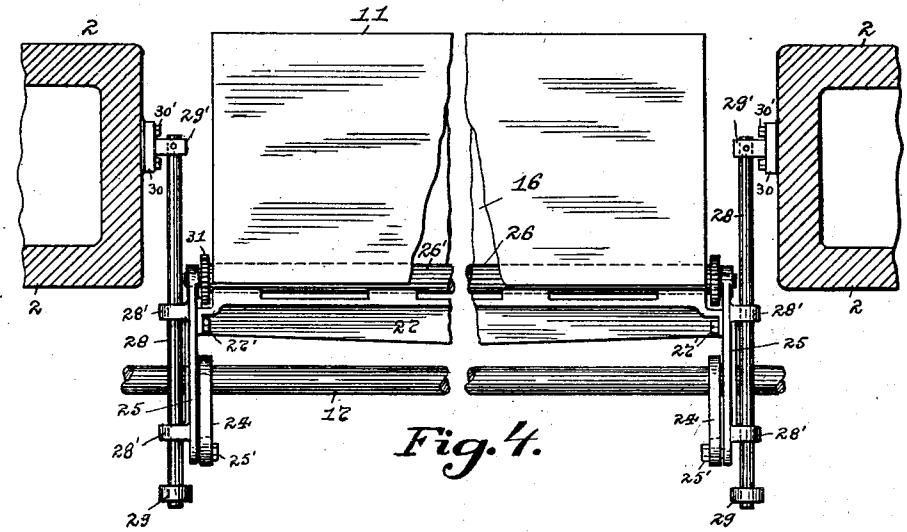


Fig. 4.

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UNITED STATES PATENT OFFICE.

DAVID J. MORGAN, OF PITTSBURG, PENNSYLVANIA.

RAM.

SPECIFICATION forming part of Letters Patent No. 696,068, dated March 25, 1902.

Application filed June 3, 1901. Serial No. 62,919. (No model.)

To all whom it may concern:

Be it known that I, DAVID J. MORGAN, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Rams; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to rams, and has special reference to steam rams or hammers for forming axles for railway, traction, and other cars.

The object of my invention is to provide a ram which is simple in its construction and operation and one which will do away with the laborious lifting of the bar or shaft during the hammering operation and at the same time one which will cheapen the cost of manufacturing such articles.

My invention consists, generally stated, in the novel arrangement, construction, and combination of parts, as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable other skilled in the art to which my invention appertains to construct and use the ram, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of my improved ram. Fig. 2 is a front view thereof. Fig. 3 is an enlarged side view of the lower portion of the ram. Fig. 4 is an enlarged top view of the portion shown in Fig. 3. Fig. 5 is a top view with the upper die removed and showing some of the parts of the apparatus for raising the metal. Fig. 6 is a view of the billet or bar. Fig. 7 is a view of the unfinished axle as made in the first pass of the dies. Fig. 8 is a view of the unfinished axle as made in the second pass of the dies, and Fig. 9 is a view of the finished axle as made in the third pass of the dies.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

My improved ram is shown at A and is provided with a bed-plate 1, from which and extending up at an angle are the columns 2, which are secured to said bed-plate 1 by means of bolts 3, passing through flanges 2′ on said columns 2. The upper ends of the columns 2 are connected to the head or cross-casting 4 by means of bolts 5, passing through flanges 5′ on said columns 2, and a cylinder 6 is formed in said head 4, to which steam is applied in any suitable manner. The head 4, with the cylinder 5 thereon, is connected to said columns 2 on the same angle as said columns and is supported by means of vertical standards 7, secured to said head 4 by bolts 7′ and secured to said bed-plate 1 by means of bolts 7″. Vertical standards 8 are also secured to said bed-plate 1 by bolts 8′ and are connected to said columns 2 by means of bolts 8″ for supporting said columns. Extending out from the cylinder 6 and on the same angle is the piston-rod 9, which is connected to the ordinary piston, (not shown,) operating within the cylinder 6, and to a cross-head 10, which travels on the same angle with the rod 9 and slides in guides 10′, secured to the columns 2. The upper die 11 is secured within the bottom of the cross-head 10, on the same angle therewith, by the usual dovetailed joint 11′ and is provided with the circular depressions or passes *a b c* on its lower face 11″ for engaging with the metal to be worked or operated upon. Between the columns 2 is the bed or foundation 12, which is formed of a series of metal blocks or castings 13 and secured together by a link 14, while extending up at an angle from the upper blocks 13 is the lower-die block 15 for supporting the lower die 16, which is secured therein by the usual dovetailed joint 16″ and is on the same angular plane as the upper die 11. The lower die 16 is provided on its upper face 16′ with the circular depressions *a′ b′ c′* for engaging with the metal to be worked or operated upon, and said passes *a′ b′ c′* being opposite the depressions *a b c* in the upper die 11 to form the passes *d e f* when the upper die 11 is lowered around the billet, bar, or shaft.

Supported and journaled in vertical standards or posts 17′ in the rear of the upper block 13 and lower-die block 15 is the cross-shaft 17, which is provided with an arm 18 at one end for carrying a weight 18′, while the opposite end is provided with an arm 19, which connects by means of a rod 19′ with a lever 20, pivoted at 20′ to a vertical standard 21, located in front of the upper block 13 and lower-die block 15 and provided with a circular top portion 21′, having notches 22 22′ 22″ therein for engaging with a spring-operated

dog or rod 23, carried on said lever 20 and operated by a handle 23′, pivoted thereto and to said lever 20. Connected to said cross-shaft 17 are the arms 24, which are provided with slots 24′ at their ends for engaging with a pin 25′ on one end of the supporting-plates 25, which extend up at right angles to the dies 11 and 16 and have journaled in their opposite ends a shaft 26, which is adapted to enter between the dies 11 and 16 and is provided with a series of flutes or serrations 26′ therein and throughout the length thereof for biting into the metal to be held thereby and supported thereon. A brace 27 is positioned in the rear of said shaft 26 and is secured to said plates 25 by means of bolts 27′. Lugs or guides 28′ are formed on the plates 25, through which a rod 28 passes, which is secured at one end in a vertical standard 29, while its opposite end is secured in a post 29′, connected to the inside faces of the columns 2 by bolts 30′, passing through flanges 30 on said posts 29′. Mounted around the serrated shaft 26 at each end thereof and beyond the side face 11″ and 16^2 of the dies 11 and 16 is the ratchet-wheel 31, which is adapted to be engaged by a series of pawls 32 32′ 32″, pivoted at 33′ on the side face 11″ of the upper die 11 and provided with hooks 33 at their engaging ends. Each of the pawls 32 32′ 32″ is adapted to rest against an eccentric or cam 34, secured to the faces 11″ of the upper die 11, and a leaf-spring 35, supported in a post 35′ on the face 11″, is adapted to bear against each of the pawls 32 32′ 32″.

Journaled in bearings 36′ on the front face 15′ of the lower-die block 15 is the rod 36, which has a block 37 pivoted at 37′ in the upper end thereof for entering between the dies 11 and 16, and the opposite end of said rod 36 is pivoted at 38′ to the end of an arm 38, extending down from a shaft 39, journaled in a bracket 39′, secured to and extending out from the front face 15′ of the die-block 15. The shaft 39 is also provided with another arm 40 thereon, which connects at its end with a rod 40′, extending to a lever 41, pivoted at 41′ to a vertical standard 42, located in front of the die-block 15 and provided with a circular top portion 42′ thereon, having a notch 43 therein for engaging with a spring-operated dog or bar 43′, carried on said lever 41 and operated by a handle 43″, pivoted thereto and to said lever 41.

The use and operation of my improved ram is as follows: After power is applied to the cylinder 6 and the upper die 11 raised on its guides 10′ through the medium of the piston-rod 9, connected thereto and with the piston (not shown) in the cylinder 6, when the heated billet or bar (shown in Fig. 5) is inserted in the pass a' of the lower die 16 and rests against the serrated shaft 26, supported in the plates 25, connected to the arms 24 on the cross-shaft 17, while the pawl 32 on the upper die 11 catches in one of the teeth in the ratchet-wheel 31. By a continuation of the power to the cylinder 6 the upper die 11 is lowered, and the pass a in the lower face 11″ of the upper die 11 engages with the heated billet or bar in the pass a of the lower die 16 to press or hammer said billet or bar between the passes $a\,a'$, and the power being continued acts to raise and lower the upper die 11 to and from the lower die 16 for a sufficient number of times to hammer the billet or bar down to the required size or shape within the passes $a\,a'$. At each stroke of the piston within the cylinder 6 and as the upper die 11 is thus raised by the piston-rod 9, connected to such piston, the pawl 32 on the upper die 11 will act to turn the serrated shaft 26, and with it the billet or bar supported by the same, by the hook 33 on said pawl 32 catching in the teeth of the ratchet-wheel 31 on the shaft 26 and pulling the said wheel around until the said hook 33 is released from the teeth of said wheel 31, this being repeated at each stroke of the cylinder 6 and raising of the upper die 11 until the billet or bar is hammered down to the required shape and size to form the unfinished axle shown in Fig. 7. After this is accomplished and it is desired to move or lift the billet or bar to the depression b' the operator grasps the lever 41 and handle 43″, and pushing the same forward in the direction of the arrow, Fig. 1, will cause the bar 43′, connected to said lever 41 and handle 43″, to travel over the circular portion 42′ on the standard 42 until the lower end of said bar 43′ enters the notch 43 therein, and this will raise the rod 36 through the medium of the arm 38 on the shaft 39 being connected to the lower end of said rod 36 and the other arm 40 being connected to said lever 41 through the rod 40′. As the rod 36 is thus raised it will cause the block 37, pivoted at 37′ to the upper end thereof, to drop down or pass over the face 16′ of the lower die 16, so that when the upper die 11 is lowered or dropped down by its own weight the face 11″ of the upper die 11 will come in contact with the block 37, and so permit sufficient space being formed by the faces 11″ and 16′ of the dies 11 and 16 to enable the unfinished axle to be moved or lifted to the other depression b' in the lower die 16 by the serrated shaft 26. In order to move or lift the unfinished axle thus formed into the depression b' of the lower die 16, all that is necessary is for the operator to grasp the lever 20 and handle 23′ thereon and by pulling the same back until the lower end of the dog or rod 23, carried by said handle 23′ and lever 20, reaches and enters the notch 22′ in the circular top 21′ of the standard 21, supporting said lever 20, which will permit the rod 19′, connected to said lever 20 and to the arm 19 on the cross-shaft 17, to be drawn back. As the rod 19′ is thus drawn back the weighted arm 18, connected to cross-shaft 17, will be lowered, and the arms 24, connected to said shaft 17 and to the supporting-plates 25 for the serrated shaft 26, will be raised, and so permit said plates 25 to rise or move

along the rods 28 through the medium of the guides 28′. As the plates 25 are thus raised the serrated shaft 26, journaled in said plates, are carried with them, and so lift the unfinished axle resting against the shaft 26 from the depression *a′* through the space between the dies 11 and 16 to the depression *b′* in said lower die 16, the pawl 32 being freed from engagement or coming in contact with ratchet-wheel 31 on account of the upper die 11 being supported in the slightly-raised position by the block 37. The upper die 11 can then be raised by applying power to the cylinder 6, and while in its raised position the operator can grasp the lever 41 and handle 43″ to release the bar 43′ from the notch 43, and by drawing said lever and handle back the rod 36 will be lowered or pulled down through the medium of the arm 38 on the shaft 39 being connected to the lower end of said rod 36 and the arm 40 being connected to said shaft 39 and lever 41. As the rod 36 is thus lowered the block 37, pivoted at 37′ to the upper end thereof, will be drawn out from over the face 16″ of the lower die 16 to a position parallel with the front face of said die 16 and on a line with said rod 36, this being easily accomplished before the descent of the upper die 11, and as said die 11 is lowered the depression *b* therein will come in contact with the unfinished axle supported by the serrated shaft 26 in the depression *b′* of the lower die 16 and press or hammer the unfinished axle within the space *e*. When the die 11 is thus lowered, the hook 33 on the pawl 32′ will catch in the teeth of the ratchet-wheel 31, and as the die 11 is raised the hook 33 on the pawl 32′, engaging with the teeth of the wheel 31, will turn said wheel, and with it the serrated shaft 26 and the unfinished axle supported by said shaft 26 in the depression *b′*, until the hook 33 on the pawl 32′ is freed from the teeth of the ratchet-wheel 31 by the raising of the die 11, this being repeated at each stroke of the cylinder 6 and raising of the upper die 11 until the unfinished axle is hammered down between the pass *e*, formed by the depressions *b b′* in the dies 11 and 16, respectively, to the required shape and size, forming the unfinished axle shown in Fig. 8. After the unfinished axle has assumed the shape shown in Fig. 8 and it is desired to raise the same from the depression *b′* in the lower die 16 to the depression *c′* in the said die the rod 36 can be raised by the operations before described to permit the block 37 thereon to be drawn down over the face 16″ of the die 16, so that a space is formed between the dies 11 and 16 when said die 11 is dropped down onto the block 37, after which the serrated shaft 26 in the supporting-plates 25 can be raised from the cross-shaft 17 by the operations before described, and with it the unfinished axle from the depression *b′* through the space between the dies 11 and 16 to the depression *c′* in the lower die 16, after which the die 11 can be raised, and while in its raised position the block 37 can be withdrawn, so that the die 11 can descend and engage the unfinished axle in the depression *c′* by its depression *c* to press or hammer the same within the pass *f*, formed by these depressions *c c′* in the dies 11 and 16, respectively, while the pawl 32″ will catch in the teeth of the ratchet-wheel 31 by their hook 33, and when said die 11 is raised the hook 33 on said pawl 32″ will act to turn said wheel 31, and with it the serrated shaft 26 and unfinished axle supported thereby. The serrated shaft 26 and unfinished axle within the depression *c′* of the die 16 are thus turned slightly upon each stroke of the cylinder 6 and upon each raising of the die 11 by the pawl 32″ engaging with the wheel 31″ on the shaft 26, and at each lowering of the die 11 the unfinished axle within the depression *c′* of the lower die 16 is hammered to the desired form or finished shape, as shown in Fig. 9, by the depression *c* in the upper die 11 coming in contact with the unfinished axle within the depression *c′*, and when said unfinished axle is hammered down to its finished shape the upper die 11 is raised and the finished axle lifted from the depression *c′* in the lower die 16 by the usual or any suitable means. The leaf-spring 35 on the face 11″ of the upper die 11 pressing against the pawls 32, 32′, and 32″ acts to engage the hook 33 on the particular one of said pawls with the gear-wheel or ratchet-wheel 31, according to the position of the serrated shaft 26, so as to always allow one of the pawls to engage with the ratchet-wheel 31 at each downward stroke of the upper die 11 and turn the said ratchet-wheel and shaft 26 upon the raising of the said die 11. The pawls 32, 32′, and 32″ are shown in their lowest positions in order to give said shaft 26 quite a turn, and in case it is desired to decrease the turning of the shaft 26 the eccentrics or cams 34 on the die 11, engaging with the pawls 32, 32′, and 32″, can be turned so as to force out said pawls to enable the hooks 33 thereon to catch the teeth of the ratchet-wheel 31 farther up, and so lessen the turning of said shaft 26.

It will be evident that the pawls and ratchet-wheels can be used on both sides of the upper die and that various modifications in the construction and design of the various parts may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

It will thus be seen that my improved ram is simple in its construction and operation, and by its use the hard labor in handling and turning the metal within the dies is overcome, as the devices permit the metal to be easily and rapidly formed to finished shape and form various shapes other than axles. The parts are easily operated by any unskilled person, and when the metal is once within the dies no manual handling of the same is required or necessary until it is in finished form. The apparatus will do away with the crews and large number of workmen usually required

with the working of these rams, so that the cost of producing shapes by it is reduced to a minimum.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a ram, the combination of dies mounted on an angle, and means within or between the dies for supporting and turning the metal within said dies.

2. In a ram, the combination of dies mounted on an angle, a shaft within or between the dies for supporting the metal within said dies, and means connected to said shaft for turning the same and the metal.

3. In a ram, the combination of dies mounted on an angle, a serrated shaft within or between the dies for biting into and supporting the metal within said dies, and means connected to said shaft for turning the same and the metal.

4. In a ram, the combination of dies mounted on an angle, a shaft within or between the dies for supporting the metal within said dies, a gear-wheel on said shaft, and means connected to said gear-wheel for turning said shaft and the metal.

5. In a ram, the combination of dies mounted on an angle, a shaft for supporting the metal within the dies, a ratchet-wheel on said shaft, and a pawl on one of said dies for engaging with said ratchet-wheel to turn said shaft and metal.

6. In a ram, the combination of dies mounted on an angle, a shaft for supporting the metal within the dies, a ratchet-wheel on said shaft, and a spring-operated pawl on one of said dies for engaging with said ratchet-wheel to turn said shaft and the metal.

7. In a ram, the combination of dies mounted on an angle, a shaft for supporting the metal within the dies, a ratchet-wheel on said shaft, a pawl on one of said dies for engaging with said ratchet-wheel to turn said shaft and the metal, and an eccentric on said die engaging with the pawl to vary the turning of said shaft and metal.

8. In a ram, the combination of an upper die mounted on an angle and having depressions therein, a lower die mounted on the same angle as the upper die and having depressions therein, means for supporting and turning the metal within the depressions in the lower die, and means for raising the metal from one depression to another in the lower die.

9. In a ram, the combination of an upper die mounted at an angle and having depressions therein, a lower die mounted on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, and means connected to said shaft for raising the metal from one depression to another in the lower die.

10. In a ram, the combination of an upper die mounted at an angle and having depressions therein, a lower die mounted on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around said shaft, and means connected to said plates for raising the shaft and with it the metal from one depression to another in the lower die.

11. In a ram, the combination of an upper die mounted at an angle and having depressions therein, a lower die mounted on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around said shaft, a cross-shaft, and means connected to said plates and cross-shaft for raising the first-named shaft and with it the metal from one depression to another in the lower die.

12. In a ram, the combination with columns of an upper die mounted at an angle between said columns and having depressions therein, a lower die mounted between said columns on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around said shaft, a cross-shaft having arms thereon connected to said plates, and a lever connected to said cross-shaft for raising the first-named shaft and with it the metal from one depression to another in the lower die.

13. In a ram, the combination of an upper die mounted at an angle and having depressions therein, a lower die mounted on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around said shaft, a cross-shaft having arms thereon connected to said plates, a weighted arm on said cross-shaft, a rod connected to an arm on said cross-shaft, and a lever connected to said rod for raising the first-named shaft and with it the metal from one depression to another in the lower die.

14. In a ram, the combination with columns, of an upper die mounted at an angle between said columns and having depressions therein, a lower die mounted between said columns on the same angle as the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around said shaft, means connected to said plates for raising the shaft and with it the metal from one depression to another in the lower die, and means connected to said plates and to said columns for permitting said plates to slide from one position to another.

15. In a ram, the combination with columns, of an upper die mounted at an angle between said columns and having depressions therein, a lower die mounted between said columns on the same angle with the upper die and having depressions therein, a shaft for supporting and turning the metal within the depressions in the lower die, plates journaled around

said shaft, means connected to said plates for raising the shaft and with it the metal from one depression to another in the lower die, guides on said plates, and a rod connected to said columns and to a standard for engaging with said guides to permit said plates to slide from one position to another.

16. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, and means for engaging with said dies to hold the same open while the metal therein is being raised.

17. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, and means for engaging between said dies to hold the same open while the metal is being raised.

18. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, a movable block adapted to enter between said dies to hold the same open while the metal therein is being raised, and means for inserting and withdrawing the block.

19. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, a bar, a movable block pivoted to said bar and adapted to enter between said dies to hold the same open while the metal therein is being raised, and means connected to said rod for inserting and withdrawing said block.

20. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, a bar, a movable block pivoted to said bar and adapted to enter between said dies to hold the same open while the metal therein is being raised, a shaft having an arm thereon connected to said bar, and a lever connected to said shaft for raising and lowering said bar to insert and withdraw said block.

21. In a ram, the combination of dies mounted on an angle, means for supporting and turning the metal within the dies, means for raising the metal within the dies, a bar, a movable block pivoted to said bar and adapted to enter between said dies and hold the same open while the metal therein is being raised, a shaft having an arm thereon connected to said bar, a rod connected to said shaft by an arm, and a lever connected to said rod for turning said shaft to raise and lower said bar and insert or withdraw said block.

In testimony whereof I, the said DAVID J. MORGAN, have hereunto set my hand.

DAVID J. MORGAN.

Witnesses:
J. N. COOKE,
J. L. TREFALLER, Jr.