No. 740,421. PATENTED OCT. 6, 1903.

J. S. GOLDBERG.

BULLDOZER.

APPLICATION FILED NOV. 17, 1902.

NO MODEL. 6 SHEETS—SHEET 1.

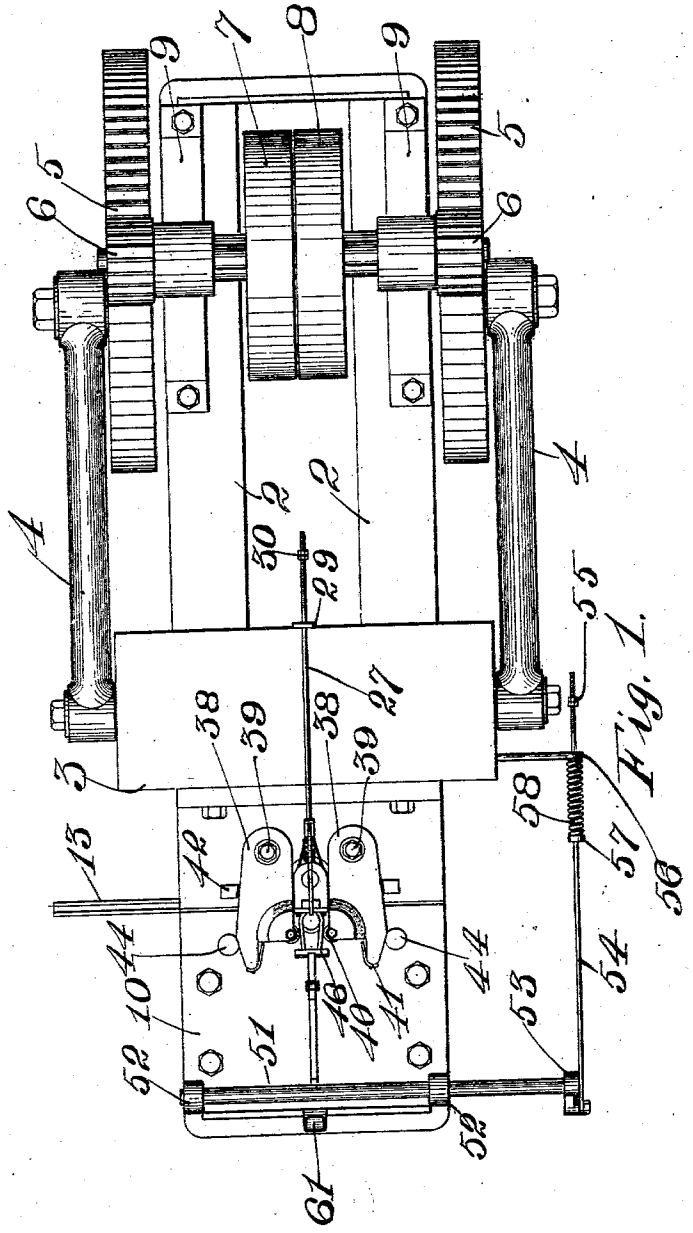


Fig. 1.

Witnesses
Lynn A. Williams
L. W. Novander.

Inventor:
John S. Goldberg.
By Charles A. Brown
Attorney

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

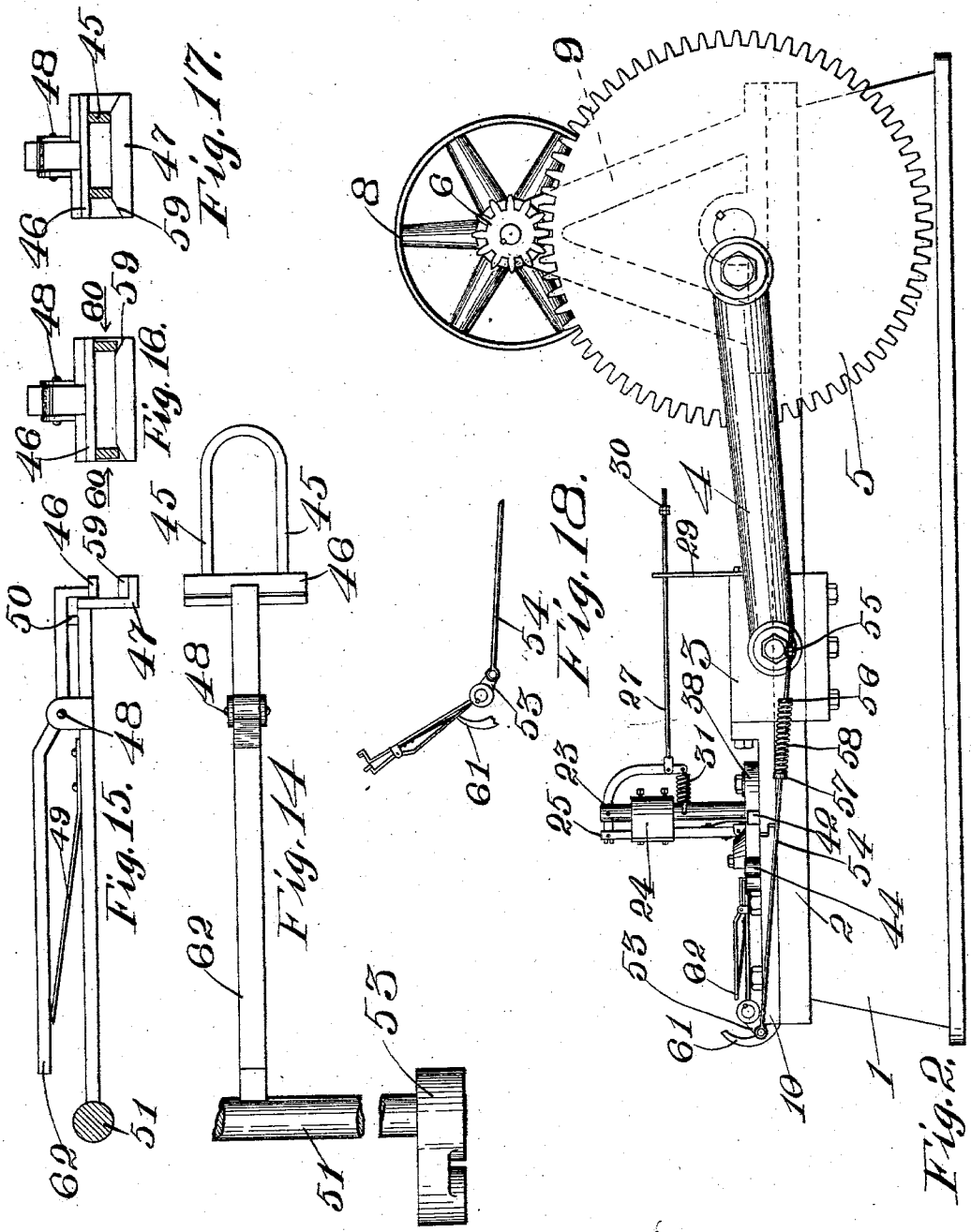
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NO MODEL. 6 SHEETS—SHEET 2.



Witnesses:
Lynn A. Williams
Harvey L. Hanson.

Inventor:
John S. Goldberg.
By Charles A. Brown
Attorney

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

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NO MODEL. 6 SHEETS—SHEET 3.

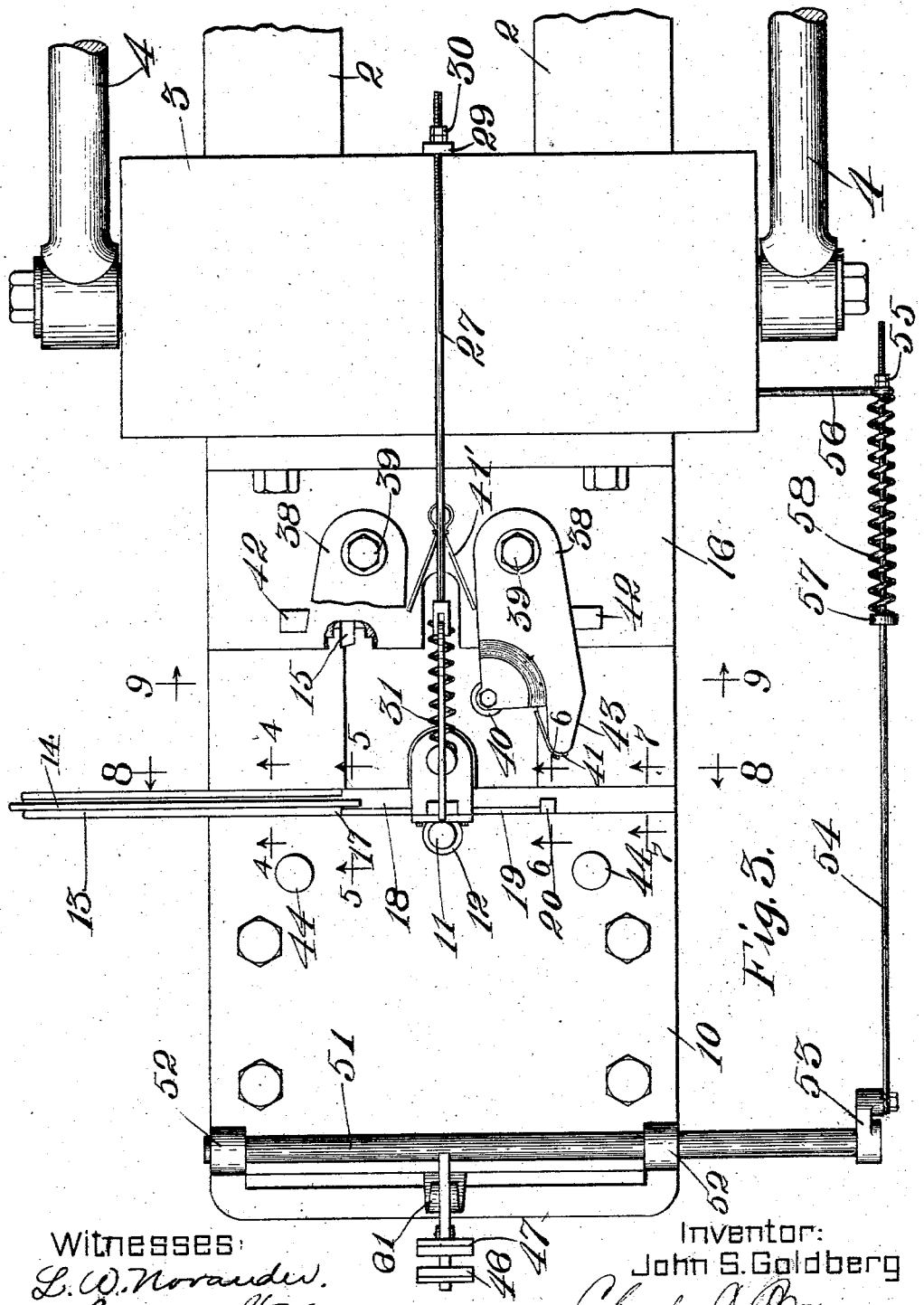


Fig. 3.

Witnesses:
L. O. Norander.
Lynn A. Williams

Inventor:
John S. Goldberg
Charles A. Brown
Attorney

By

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

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NO MODEL. 6 SHEETS—SHEET 4.

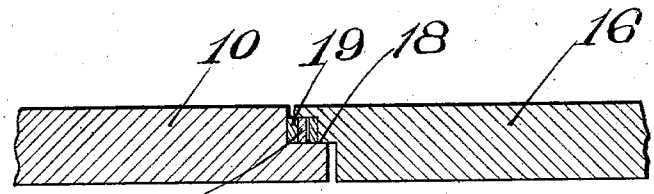


Fig. 4.

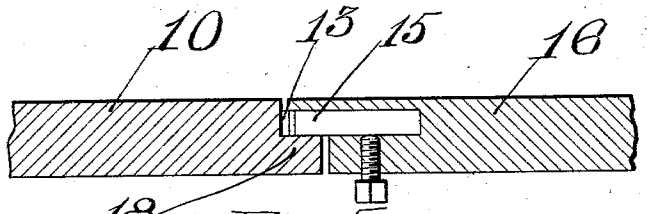


Fig. 5.

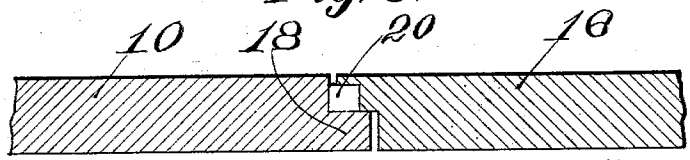


Fig. 6.

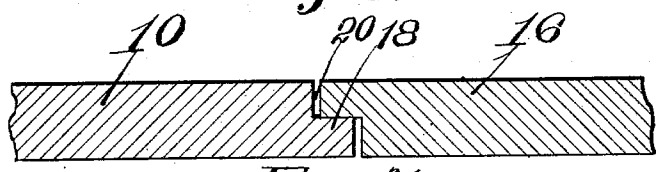


Fig. 7.

Witnesses:
L. W. Norander.
Lynn A. Williams

Inventor:
John S. Goldberg.
Charles A. Brown
Attorney

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

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NO MODEL. 6 SHEETS—SHEET 5.

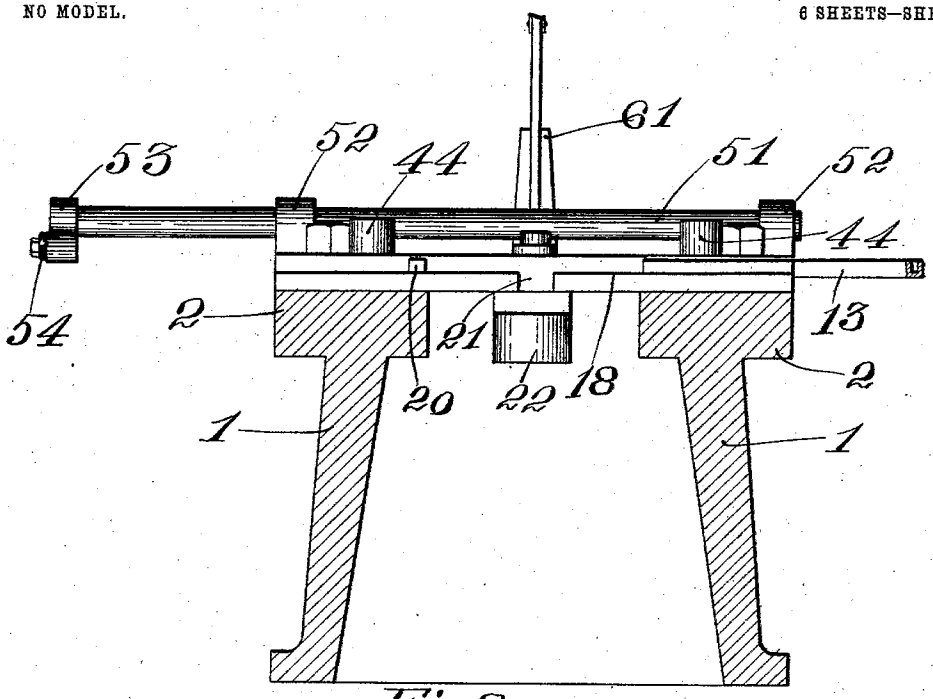


Fig. 8.

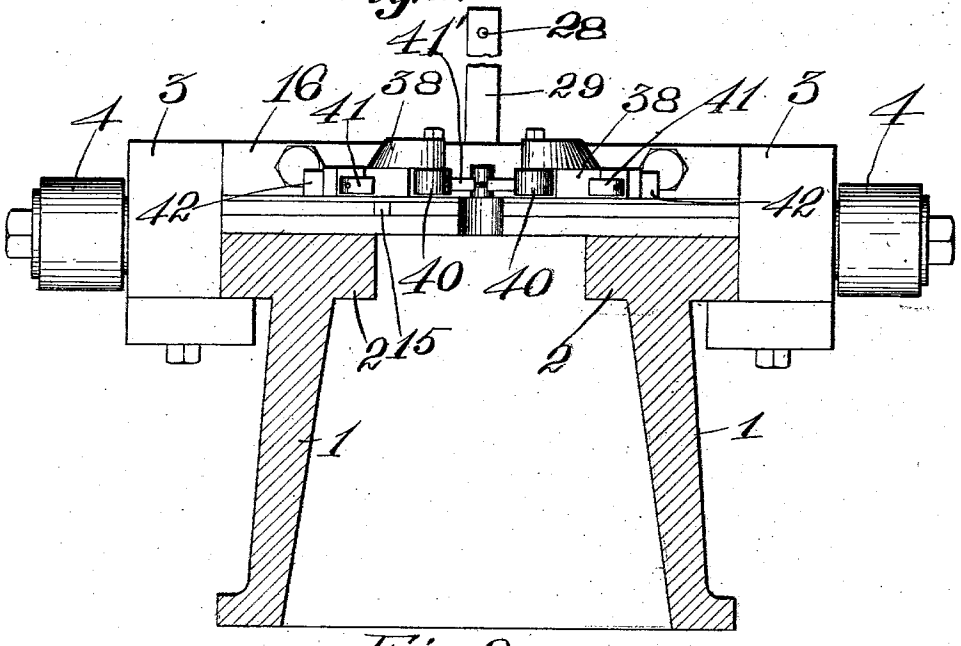


Fig. 9.

Witnesses:
L. W. Novander
Lynn A. Williams

Inventor:
John S. Goldberg.
By Charles A. Brown
Attorney

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

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J. S. GOLDBERG.

BULLDOZER.

APPLICATION FILED NOV. 17, 1902.

NO MODEL. 6 SHEETS—SHEET 6.

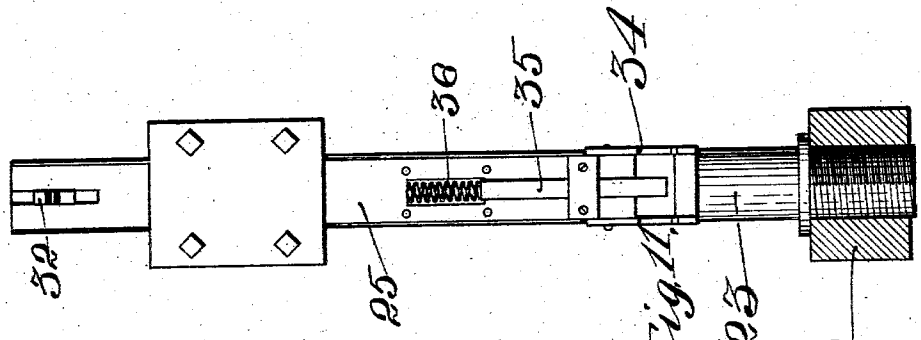


Fig. 11.

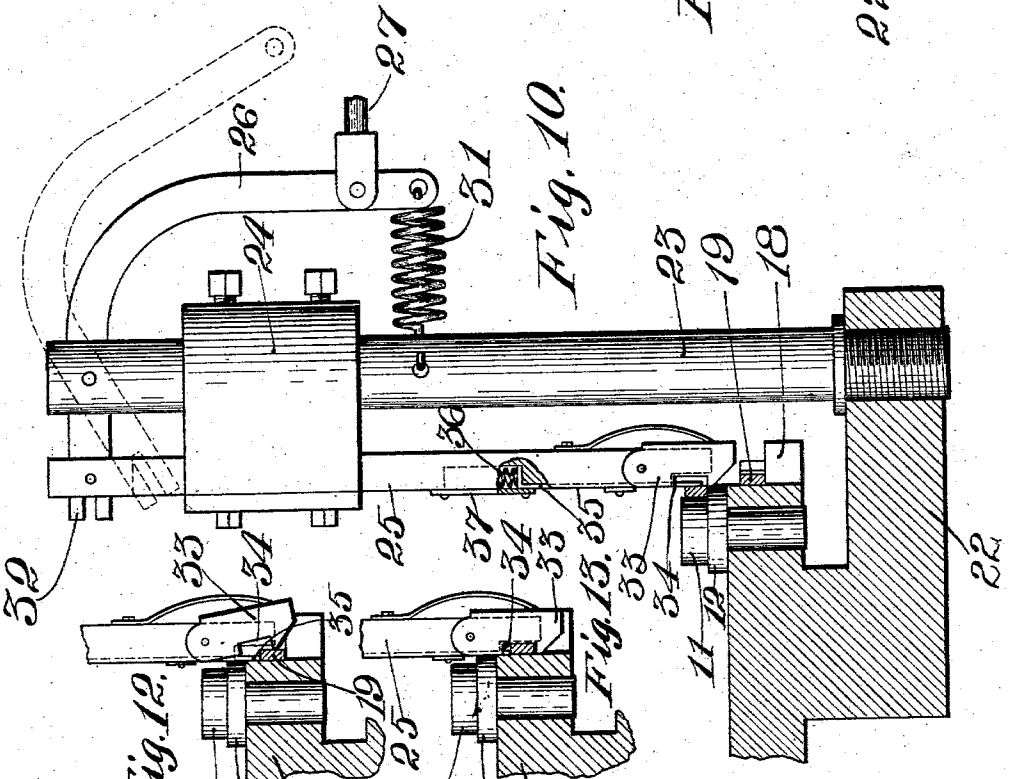


Fig. 10.

Fig. 12.

Fig. 13.

Witnesses:
L. W. Novander.
Lynn A. Williams

Inventor:
John S. Goldberg.
By Charles A. Brown
Attorney

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

No. 740,421. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

JOHN S. GOLDBERG, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

BULLDOZER.

SPECIFICATION forming part of Letters Patent No. 740,421, dated October 6, 1903.

Application filed November 17, 1902. Serial No. 131,711. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. GOLDBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Bulldozers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to automatic forming machinery, and more particularly to that class of machinery commonly known as "bulldozers."

In various manufacturing industries it is frequently desirable to shape or form certain parts of a manufactured product out of a bar or sheet of metal which the market furnishes in straight lengths. In general my invention contemplates the provision of a machine which will automatically transform such "blank" bar or plate into pieces of the desired conformation. While machines intended for such work have been common, they have frequently given trouble on account of their complication or because of weakness of various parts, unavoidable with such machines as hitherto constructed.

Prominent objects of my invention have been to provide a machine which on account of its simplicity and openness shall be free from inherent weakness and to provide a machine which shall be durable, efficient, reliable, easy of operation, and generally satisfactory.

While my invention may be applied to a large class of machines used for forming or bending blank metal, I shall particularly describe an embodiment thereof peculiarly adapted for bending U-shaped magnets, such as are used for the permanent magnets in magneto-generators used in telephone practice. In this preferred embodiment of my invention I provide upon the frame of the machine a die conforming somewhat roughly to the inside of the bend of the U. Means are provided for cutting proper lengths of the blank steel bar and for carrying the cut blanks to a point opposite the aforementioned die where the two projecting ends of the blank are engaged by a pair of bending-jaws carried upon a reciprocating cross-head. These jaws force the ends of the bar around the die into the desired U shape. As the steel used for permanent magnets has considerable spring, I find it desirable to press the two ends closer together than is desired in the finished magnet, and when the pressure is removed they spring out into the proper position. Means are further provided to automatically pick up the finished magnets from the die upon the retraction of the bending-jaws and to carry the same to any convenient receptacle or to drop them in a heap at a desired point.

My invention will be best understood by reference to the accompanying drawings, illustrating the preferred embodiment thereof, in which—

Figure 1 is a plan view; Fig. 2, a side elevation. Fig. 3 is an enlarged plan view showing details of construction. Figs. 4, 5, 6, and 7 are partial sections taken, respectively, on lines 4 4, 5 5, 6 6, and 7 7 of Fig. 3 and clearly illustrating part of the cutting and guiding mechanism. Fig. 8 is a sectional view taken on line 8 8 of Fig. 3. Fig. 9 is a sectional view taken on line 9 9 of Fig. 3. Figs. 10, 11, 12, and 13 are views illustrating the construction and operation of a preferred mechanism for lifting cut blanks into position to be operated upon by the forming mechanism. Figs. 14, 15, 16, 17, and 18 are views showing the operation of a preferred device for conveying the formed magnets from the die.

In accordance with my invention I provide a frame 1, having a pair of slides 2 2, adapted to permit the reciprocation of the cross-head 3. This cross-head is operated by a pair of connecting-rods 4 4, connected with crank-pins on the gears 5 5, which are driven through the agency of pinions 6 6 and the tight mate 7 of the loose pulley 8, all of which rotating mechanism is mounted in suitable frames 9 9, secured to the frame of the machine. To the other end of the frame 1 is secured a plate 10, in which is inserted the die 11, about which the blanks are to be bent. This die has a shoulder 12 to prevent the bars from dropping down upon the plate 10.

A trough 13, through which the blank bar 14 is fed into the machine, extends outwardly from one side of the plate and inwardly to the point at which the blanks are cut off by the shear 15, which is carried by a table 16, secured to the reciprocating cross-head. It will be seen that the end 17 of the trough forms one of the two shears necessary for the cutting operation. A projecting ledge 18 extends from the plate 10 and forms a bed upon which may rest the cut blanks 19. When the machine is running, an operator pushes the blank bar in through the trough until the end of the bar strikes the stop 20, which is placed so as to properly regulate the length of the cut blanks. The shear 15 then comes forward and, in connection with its companion 17, shears off the proper length of bar to form the finished magnet. The shears leave the cut blank on the ledge 18 in the position shown in Fig. 3.

While I have shown means for automatically cutting off proper lengths of material to form the cut blanks, it will be apparent that such blanks might have been previously cut and then put into the machine by hand or feeding mechanism.

As best shown in Fig. 8, a notch 21 is cut in the ledge, which permits the catch of the lifting mechanism to come down and pick up the blank.

Referring more particularly to Figs. 10, 11, 12, and 13, it will be seen that the plate 10 is provided with an extension 22, adapted to support the upright column 23 of the lifting device. Near its upper end this column carries a block 24, which provides a slide for the reciprocating lifting-rod 25. A lever 26 is actuated by a rod 27, whose farther end rides in a hole 28 in a bar 29, projecting upwardly from the cross-head. When the cross-head is near the back end of its stroke, this bar engages the lock-nuts 30 on the rod 27, thereby pulling this lever backward against the tension of the spring 31 until the cross-head reaches the back end of its stroke. It will be seen that as this rod is retracted the slotted end 32 of the lever will be forced downward with the connected lifting-rod 25. The lower end of the lifting-rod is provided with a spring-catch 33, having a notch 34, adapted to fit the cut blank resting upon the ledge 18. The front and lower corner of this catch is beveled, so that as the lifting-rod forces it downward the catch will slip back and around the blank, as shown in Fig. 12, until the rod reaches the lower end of its stroke, when the catch will spring back into its normal position, thus engaging the cut blank, as shown in Fig. 13.

It will be seen that the front and lower part of the lifting-rod is provided with a sliding way adapted to accommodate the sliding detent 35, which is normally held down by a spring 36, set in a recess of the lifting-rod and there retained by a cover-plate 37, which in Fig. 11 has been removed to more clearly show the spring. Normally the lower end of this detent comes down about as far as the lower edge of the notch 34, as shown in Fig. 11; but as the lifting-rod comes down to pick up the blank this detent strikes the top of the blank and is forced upward against the pressure of the spring 36, thus securely holding the blank while the lifting-rod moves upward into its normal position, due to the forward motion of the cross-head 3, which allows the rod 27 to come forward. The blank is thus carried upward until its lower edge is level with the shoulder 12 on the die 11, when the lifting-rod stops.

Upon the table 16 are pivoted two bending-jaws 38 38, having a limited turning motion about the studs 39 39. Each jaw is provided with a forming-roller 40 and a spring 41, adapted to center a blank in case it has slipped to one side. A spring 41′ presses these jaws outward against the stops 42 42. As the cross-head comes forward the rollers 40 40 strike the blank on either side of the die 11 and carry it from the catch of the lifting-rod over against one side of the die and then press the two ends forward, thus forming a U-shaped piece. It will be seen that the forwardly-projecting ends of the bending-jaws are beveled off at 43 43, and as these parts come forward they are engaged by the pins 44 44 in the plate 10 and the jaws pressed inward. This inward motion is imparted to the rollers just after they pass the center of the die 11, thus causing the ends of the U to be bent inward, as shown in Fig. 1. As the cross-head recedes and the pressure of the rollers is removed the formed magnet springs out into shape, the two limbs 45 45 becoming parallel, as shown in Fig. 14. When the jaws are retracted, there is often a tendency for the rollers to pull the formed magnet back off the die. This is prevented by the detent 35, which drops down as soon as the blank has been carried from the lifter by the impact of the bending-jaws. Its position is well shown in Fig. 10, where it will be seen that the metal of the magnet fits snugly into the space between the die and the detent.

It will be apparent that if the formed magnets are removed from the die and the blank rod fed in through the trough the machine will indefinitely repeat the operations above described. Each time the cross-head comes forward the shears will cut off a length of the steel rod, and at the same time a blank will be bent around the die to form a magnet, and each time the cross-head is retracted the sheared-off blank will be raised into position to be bent around the die.

In the preferred embodiment of my invention I further provide mechanism for removing the formed magnets from the die, although it will be apparent that this could well be done by an attendant. I provide what is virtually a pair of tongs having upper and lower jaws 46 and 47, respectively. A hinge-joint is provided at 48 and a spring 49 to hold the

jaws together. A stop 50 is also provided, which limits the closure of the jaws to a position shown in Fig. 15. The lower jaw extends forward and is rigidly secured to a shaft 51, mounted in bearings 52 upon the plate 10. At one end this shaft is provided with a crank 53, adapted for engagement with one end of a rod 54, whose other end is provided with a pair of adjustable lock-nuts 55 and which is adapted to slide through the eye of an eyebolt 56, screwed into the side of the cross-head 3. A collar is secured to the rod at 57, and a coiled spring 58 is interposed between the eye of the eyebolt and this collar. In the position shown in Fig. 1 this spring is under compression, which forces the rod forward, thus tending to turn the shaft 51, so as to press the lower jaw 47 down upon the plate 10. The lower jaw has such thickness that its upper side is only slightly higher above the plate 10 than the shoulder 12 of the die 11, and it should be further noticed that this lower jaw is beveled off at the corners 59 59. When the cross-head and its associated bending mechanism is in its forward position, the jaws of the tongs are in such a position, as best shown in Fig. 1, that as the two limbs 45 45 are bent around the die they will strike the beveled corners of the lower jaw, and thus be guided in between the jaws of the tongs, which open slightly to accommodate the magnet and at the same time grip it firmly on account of the pressure of the spring 49. The operation of the jaws during the reception of the limbs of the magnet is well shown in Fig. 16, where the limbs are shown in section just as they strike the beveled corners and where the direction of their motion is indicated by the arrows 60 60, and in Fig. 17, where the limbs are shown after they have been released by the bending mechanism. When the cross-head reaches the back end of its stroke, the eye of the eyebolt engages the lock-nuts 55 and imparts sufficient motion to the rod 54 to turn the shaft 51 and the associated tongs up into the position shown in Figs. 3 and 18. A stop 61 is cast upon the plate 10 in such position that when the tongs reach this upper position shown the projecting arm 62 of the upper jaw will strike the stop, thus effectively opening the tongs and permitting the formed magnet to drop to the floor at the front end of the machine. As the cross-head again comes forward the tongs are brought down to the plate 10 to receive another formed magnet.

While I have particularly shown and described but one embodiment of my invention, it will be apparent to those skilled in the art that many changes may be made without departing from the spirit of my invention, and I do not, therefore, wish to limit myself to the precise mechanism disclosed; but,

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a sliding lifting-rod, a spring-catch, and means associated with said cross-head for effecting the movement of said lifting-rod, substantially as described.

2. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a sliding lifting-rod, a spring-catch, a detent carried upon said lifting-rod, and means associated with said cross-head for effecting the movement of said lifting-rod, substantially as described.

3. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of means for conveying said cut lengths to a forming-die, means for bending said cut lengths into a desired shape, and gripping means for receiving and conveying said shaped lengths from said forming-die, substantially as described.

4. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of means for bending said cut lengths into a desired shape, and gripping means for receiving and conveying said shaped lengths from the said bending means, substantially as described.

5. In a bulldozer, the combination with means for bending cut lengths of a blank bar into a desired shape, of gripping means for receiving and conveying said shaped lengths from said bending means, substantially as described.

6. In a bulldozer, the combination with means for bending cut lengths of a blank bar into a desired shape, of a pair of tongs for conveying said shaped lengths from said bending means, substantially as described.

7. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a reciprocating cross-head, bending mechanism carried upon said cross-head, whereby cut lengths of a blank bar are bent into a desired shape, gripping means for receiving and conveying said shaped lengths from said die, and mechanism associated with said cross-head for releasing said gripping means, substantially as described.

8. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a reciprocating cross-head, bending mechanism carried upon said cross-head whereby cut lengths of a blank bar are bent into a desired shape, a pair of tongs for conveying said shaped lengths from said die, and mechanism associated with said cross-head for operating said conveying means, substantially as described.

9. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a reciprocating cross-head, bending mechanism carried upon said cross-head

whereby cut lengths of a blank bar are bent into a desired shape, a pair of tongs for conveying said shaped lengths from said die, a rotatable shaft carrying said pair of tongs, means associated with said cross-head for causing rotation of said shaft, and means for causing the opening of said tongs to dislodge such shaped lengths, substantially as described.

10. In a bulldozer, the combination with a pair of shears for cutting off lengths from a blank bar, of means for bending said cut lengths into a desired shape, and gripping means for receiving and conveying said shaped lengths from said bending means, substantially as described.

11. In a bulldozer, the combination with a shear rigidly secured to the frame of the machine, of a second shear having a reciprocating motion, whereby suitable lengths of a blank bar are cut off, means for bending said cut lengths into the desired shape, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

12. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, movable bending-jaws whereby said cut blanks are cut into a desired shape, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

13. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

14. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws pivotally carried by said cross-head, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

15. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws pivotally carried by said cross-head, means for controlling the turning motion of said jaws, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

16. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws pivotally carried by the said cross-head, beveled corners upon said jaws, pins rigidly secured to the frame of the machine in such position as to engage said beveled corners, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

17. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting a turning of said jaws, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

18. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, beveled corners upon said jaws, pins rigidly secured to the frame of the machine in such position as to engage said beveled corners to effect turning of said jaws, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

19. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to cut off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, beveled corners upon said jaws, pins rigidly secured to the frame of the machine in such position as to engage the said beveled corners to effect turning of said jaws, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

20. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, mechanism operated by said cross-head, whereby said cut lengths are placed in position to be acted upon by said die and said jaws, and gripping means for conveying said shaped lengths from said bending means, substantially as described.

21. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a sliding lifting-rod, a spring-catch, means associated with said cross-head for effecting the movement of said lifting-rod, and means for conveying said shaped lengths from said bending means, substantially as described.

22. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a

sliding lifting-rod, a spring-catch, a detent carried upon said lifting-rod, means associated with said cross-head for effecting the movement of said lifting-rod, and means for conveying said shaped lengths from said bending means, substantially as described.

23. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine with a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting a turning of said jaws, and mechanism for lifting and holding said cut lengths in position to be acted upon by said die and said jaws, substantially as described.

24. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, a sliding lifting-rod, a spring-catch, and means associated with said cross-head for effecting a movement of said lifting-rod, substantially as described.

25. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, a sliding lifting-rod, a spring-catch, a detent carried upon said lifting-rod, and means associated with said cross-head for effecting a movement of said lifting-rod, substantially as described.

26. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine with a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting a turning of said jaws, means whereby said cut lengths are placed in position to be acted upon by said die and said jaws, and gripping mechanism for conveying shaped lengths from said die, substantially as described.

27. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, a sliding lifting-rod, a spring-catch, means associated with said cross-head for effecting a movement of said lifting-rod, and means for conveying shaped lengths from said die, substantially as described.

28. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, a sliding lifting-rod, a spring-catch, a detent carried upon said lifting-rod, means associated with said cross-head for effecting a movement of said lifting-rod, and means for conveying shaped lengths from said die, substantially as described.

29. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws whereby said cut lengths are bent into a substantially U shape, a sliding lifting-rod, a spring-catch, and means associated with said cross-head for effecting the movement of said lifting-rod, substantially as described.

30. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws whereby said cut lengths are bent into a substantially U shape, a sliding lifting-rod, a spring-catch, a detent carried upon said lifting-rod, and means associated with said cross-head for effecting movement of said lifting-rod, substantially as described.

31. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from a

blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, whereby said cut lengths are bent into a substantially U shape, a sliding lifting-rod, a spring-catch, means associated with said cross-head for effecting the movement of said lifting-rod, and means for conveying said U-shaped lengths from said die, substantially as described.

32. In a bulldozer, the combination with a die rigidly mounted upon the frame of the machine, of a shear rigidly mounted upon the frame of the machine, a reciprocating cross-head, a second shear mounted upon said cross-head and adapted in conjunction with said first shear to shear off lengths from the blank bar, bending-jaws pivotally carried by said cross-head, forming-rollers mounted upon said jaws, means for effecting the turning of said jaws, whereby said cut lengths are bent into a substantially U shape, a sliding lifting-rod, a spring-catch, means associated with said cross-head for effecting the movement of said lifting-rod, a detent carried upon said lifting-rod, and means for conveying said U-shaped lengths from said die, substantially as described.

33. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a mechanism operated by said cross-head for lifting and holding said cut lengths in position to be acted upon by said die and said jaws, substantially as described.

34. In a bulldozer, the combination with means for cuttingo ff lengths from a blank bar, of a die rigidly mounted upon the frame of the machine, a reciprocating cross-head, bending-jaws carried by said cross-head, a vertical sliding rod, mechanism associated with said rod for gripping said cut lengths, and means for raising said rod whereby the cut lengths are placed in position to be acted upon by said die and said jaws, substantially as described.

35. In a bulldozer, the combination with means for cutting off lengths from a blank bar, of a die mounted upon the frame of the machine, a reciprocating cross-head, bent jaws carried by said cross-head, means for gripping said cut lengths, and means for raising said lengths into position to be acted upon by said die and said jaws, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of November, A. D. 1902.

JOHN S. GOLDBERG.

Witnesses:
HARVEY L. HANSON,
CHARLES J. SCHMIDT.