W. MORAVA.

ELECTRIC RIVETER.

APPLICATION FILED JAN. 27, 1916.

1,251,266.

Patented Dec. 25, 1917.

2 SHEETS—SHEET 1.

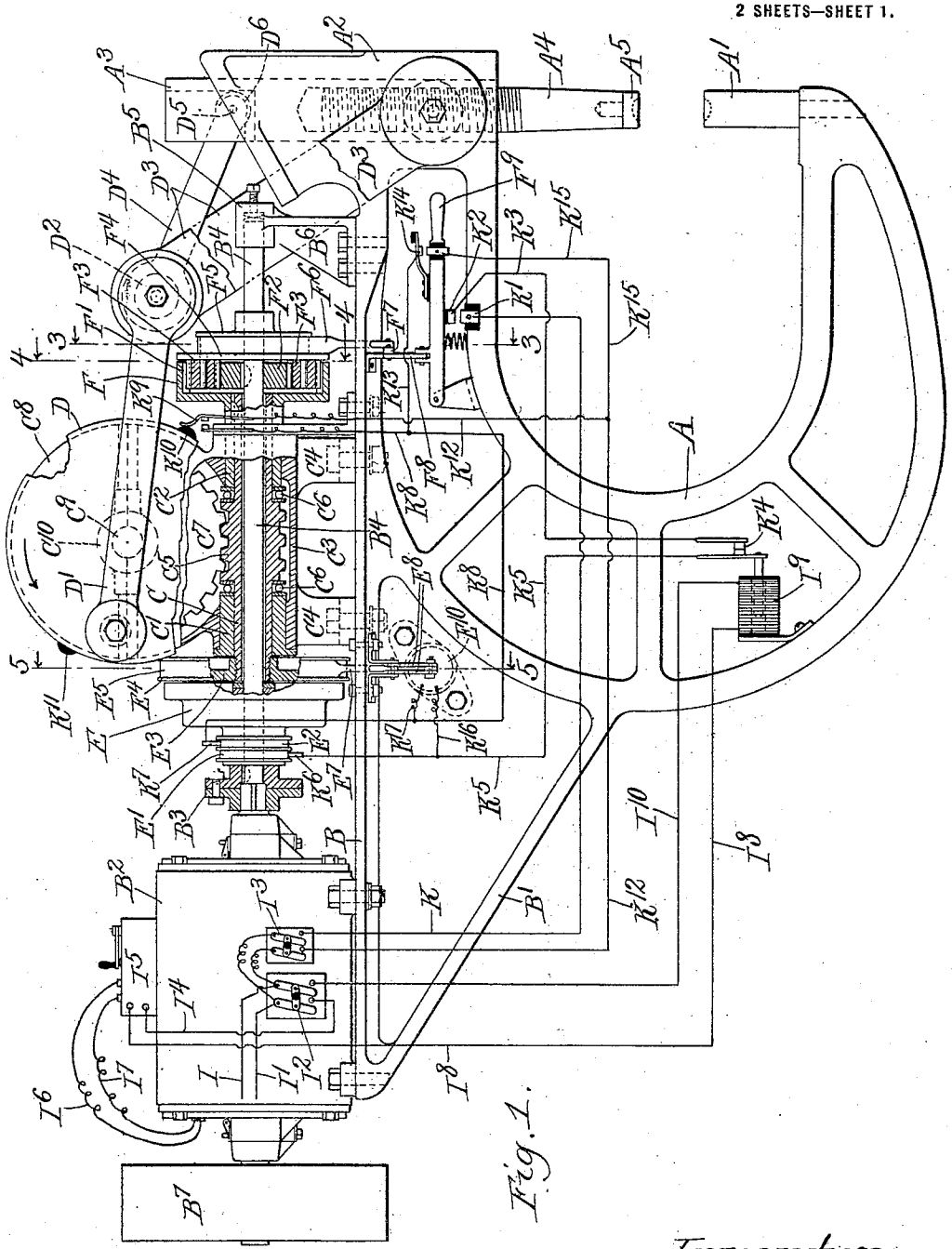

Fig. 1.

Witnesses.
Edward T. Wray.
Esther Van Frank

Inventor
Wensel Morava.
by Parker & Carter
Attorneys.

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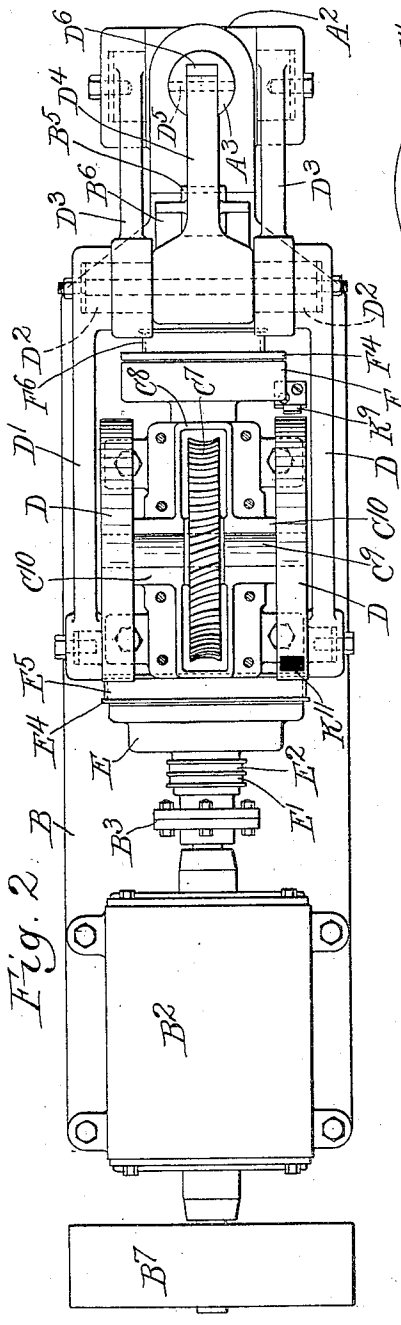

Fig. 2.

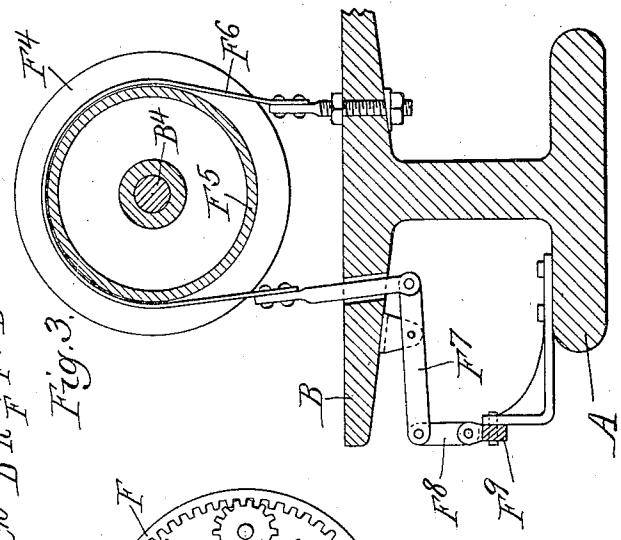

Fig. 3.

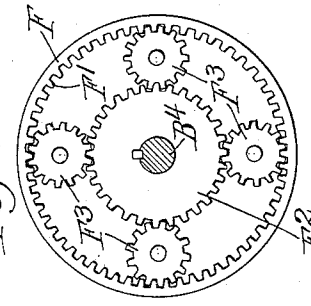

Fig. 4.

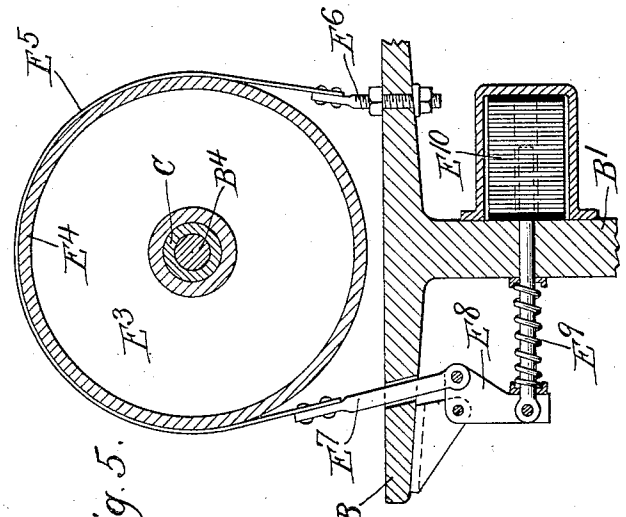

Fig. 5.

Witnesses.
Edward T. Wray.
Esther Van Frank

Inventor.
Wensel Morava.
by Parker & Carter
Attorneys

UNITED STATES PATENT OFFICE.

WENSEL MORAVA, OF CHICAGO, ILLINOIS.

ELECTRIC RIVETER.

1,251,266. Specification of Letters Patent. Patented Dec. 25, 1917.

Application filed January 27, 1916. Serial No. 74,542.

To all whom it may concern:

Be it known that I, WENSEL MORAVA, 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 Electric Riveters, of which the following is a specification.

My invention relates to improvements in electric riveting machines, and has for one object to provide a new and improved form of riveter wherein the riveting force is developed by an electric motor. Another object is to provide means for protecting the electric motor and associated riveted parts against too great over loads. Another object is to provide means for easily and conveniently manipulating the rivet driving mechanism and associated parts. Other objects will appear in the specification. My invention therefore is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a side elevation with parts in section.

Fig. 2 is a plan view.

Fig. 3 is a section along the line 3—3 of Fig. 1.

Fig. 4 is a section along the line 4—4 of Fig. 1.

Fig. 5 is a section along the line 5—5 of Fig. 1.

Like parts are indicated by like letters throughout the several figures.

Mechanical details.

A is the usual type of rigid jaw construction, on the lower member of which is mounted an anvil bar A^1. The upper member or part of the jaw carries a guide head A^2, in which is slidably mounted the plunger A^3, carrying a screw threaded adjustment therein, and a driving bar A^4 with a rivet forming head A^5 in opposition to the end of the anvil bar A^1.

B is a table supported partially on the upper side of the jaw A and partially on a bracket B^1 projecting rearwardly therefrom. At the rear end of this table is an electric motor B^2. This motor is rigidly connected by a coupling B^3 to a drive shaft B^4. This drive shaft is always in rotation when the motor is in rotation. Its forward end is supported in the bearing B^5 on a bracket B^6 on the table B. B^7 is a fly-wheel mounted on the motor shaft.

C is a sleeve rotatably mounted on the shaft B^4. This sleeve is rotatably mounted itself, in the two bearing sleeves C^1 C^2 in a house C^3 which house is supported on the table B by the legs C^4. The central portion of the sleeve C is formed into a driving worm C^5, and between each end of the worm and the bearing sleeves C^1 C^2 respectively is interposed a ball thrust bearing C^6.

The worm C^5 is in mesh with a worm-wheel C^7 in a casing C^8, which is supported on and projects above the casing C^3. The worm-wheel is mounted on and drives a shaft C^9, which shaft is carried in the bearings C^{10} in the casing C^8.

The two ends of the shaft C^9 project outwardly, the bearing C^{10} and carrying each a crank disk D. The two crank disks D have pivoted thereon the driving links D^1. These driving links D^1 are in turn pivoted on a knuckle pin D^2. This knuckle pin has also pivoted thereon, the two tension toggle links D^3 which are pivoted at their other ends, one on either side of the head A^2. Centrally disposed between these tension links and pivotally mounted on the knuckle pin D^2 is a thrust link D^4, which thrust link is pivotally mounted at its lower end on the plunger A^3, being pinned thereto as at D^5 to hold the parts in proper relation, and having a cylindrical thrust surface D^6 in engagement with the corresponding cylindrical surface of the plunger A^3 to take the thrust.

E is the driving portion of an electromagnetic clutch. It is rigidly mounted on and always rotates with the shaft B^4 and is provided with slip-rings E^1 E^2 whereby electric current is supplied to the clutch. E^3 is the driven portion of this clutch and it is rigidly mounted on the sleeve C so as to always rotate with it. About the outer periphery of this member E^3 is a clutch-rim E^4. A brake belt E^5 is anchored at one end to the table B by means of the bolt E^6 and at the other end terminates in a rod E^7, slidably mounted in the table B and pivoted below the table to a lever E^8, which lever is adapted to be normally thrust outwardly by the spring E^9 to tighten the brake on the wheel. E^{10} is a solenoid, which when excited by a suitable electric current resists the spring E^9 and releases the brake.

F is a planetary gear housing keyed to the sleeve C. It is internally toothed as at F^1. F^2 is a gear concentric with the internal gear F^1 and keyed to the shaft B^4. F^3 are

planetary gears in mesh both with the gear F^1 and the gear F^2. They are each of them rotatably mounted on a plate F^4 which closes the housing F. This plate F^4 carries a brake drum F^5 and a brake band F^6 anchored at one end on the table B, is passed around this drum and through the table B to the lever F^7 upon which it is pivoted. The lever F^7 is connected by means of a link F^8 to a hand lever F^9 pivoted on the upper part of the jaw member A so that an upward movement of the hand lever will tend to lock the brake F^6 upon the brake drum F^5 holding the planetary gears F^3 against rotation and causing the uninterrupted rotation of the gear F^2 to rotate the planetary pinions and thus the internal gear which by this arrangement will be reversed in the usual manner.

Electrical details.

I, I^1 the two line wires. They terminate at the two point switch I^2, which switch is as indicated in parallel with a similar two point switch I^3. The current for the motor passes through the switch I^2 and for the clutch and associate parts it passes through the switch I^3. From the switch I^2 leads a conductor I^{10} leads back to the switch I^2 from conductor I^6 leads to the motor B^2. The return conductor I^7 leads to the starting box I^5 and the conductor I^8 leads from the starting box to the solenoid I^9 whence a conductor I^{10} leads back to the switch I^2 from, thus, when the switch I^2 is closed and the starting box has been operated, the motor operates on a closed circuit included in which is the solenoid I^9. This solenoid is a part of a circuit breaker, which circuit breaker is peculiar in that an over load on the motor operates the solenoid not to break the motor circuit but to break the clutch circuit now to be described.

A conductor K leads from the switch I^3 to the terminal K^1. A terminal K^2 is in opposition to the terminal K^1 on the lever F^9. The conductor K^3 leads therefrom to a switch K^4. This switch is controlled by a solenoid of circuit breaker I^9. A conductor K^5 leads from this switch to a brush K^6 in opposition to the slip-ring E^1 on the clutch E. A brush K^7 is in engagement with the slip-ring E^2, and a conductor K^8 leads therefrom to the switch K^9. This switch K^9 is adapted to be broken by either one of the two buttons K^{10} K^{11} on one of the disks D. A conductor K^{12} leads from the switch K^9 back to the switch I^3. A short circuit is formed by the conductor K^{13} which leads from the conductor K^8 to the switch K^{14} on the lever F^9, and a conductor K^{15} leads therefrom to the conductor K^{12} so that even when one of the buttons K^{10} K^{11} has broken the circuit at the switch K^9, the operator may by manipulating the switch K^{14} close that circuit, thereupon the spring shown normally keeps the switch open. K^{16} K^{17} are conductors leading respectively from the conductors K^5 K^8 to actuate the solenoid E^{10}, which is thereby arranged in parallel with the clutch E so that the solenoid is always energized when the clutch is in operation, and is always dead when the clutch is dead.

It will be evident while everything shown in my drawings is an operative device, still many changes might be made both in size, shape and arrangement of parts without departing materially from the spirit of my invention.

The use and operation of my invention are as follows: The operator when about to start the machine first closes the two point switch through which the motor circuit passes. He then operates the starting box to start the motor. When the motor is at speed the operator throws the two point switch controlling the clutch circuit into the closed position. With the parts in the position shown he then pulls down the hand lever until the large switch carried thereby is closed. Nothing happens however, because the circuit is broken by the button on the crank disk. The operator then in the usual manner brings the work into position with the rivet between the jaws of the riveter. He will then press the button on the lever handle and close the circuit from the source of supply through the clutch. The closure of this circuit causes the clutch to operate and drive the worm, the controlling spring-held brake being released by the energizing of the solenoid at the same time as the clutch goes into action. The instant that the crank disk has rotated, the switch will be closed at that point and the operator may then release the button and the process will go on.

The rotation of the crank disk will cause the knuckle pin to rotate about the pivotal point of the two tension links on the jaw. These links will thus approach parallelism with the driving plunger, and this plunger will be forced downwardly by the compression member to drive the rivet. As soon as the disk has made a half revolution, and the driving plunger is at the end of its stroke, the other circuit breaking pin will come into operation to break the circuit, disconnecting the clutch and permit the spring actuated brake to stop the rotation of the worm. To release the rivet the operator again presses the button and the same thing happens exactly on the return stroke. This process can be continued indefinitely.

If it should happen that too great a resistance were encountered by the driving plunger on its downward movement, the increase in current at the motor would operate the circuit breaking solenoid, and that instead of breaking the motor circuit, would

break the clutch circuit and thus stop the movement of the driving mechanism without affecting in any way the motor. Under such circumstances as these, it would become necessary to reverse the mechanism, and this the operator would do by pushing up on the lever breaking the circuit and manually tightening the brake on the planetary transmission. This would cause the outer gear to rotate in a direction opposite to the rotation of the inner gear and thus would rotate the sleeve in a reverse direction to withdraw the rivet driving plunger. With the plunger withdrawn the operator would close the circuit where it had been broken by the circuit breaker and then close the circuit by manipulation of the lever. In all probability the second blow of the rivet driving member would overcome the increased resistance and drive the rivet.

It will be noted that a fly-wheel is provided. The purpose of the fly-wheel is to store energy to overcome the initial resistance of the rivet. It will be noted that the mechanical advancement of the rivet driving mechanism increases toward the end of the stroke, and the energy stored in the fly-wheel assists in overcoming the resistance of the rivet at the beginning of the stroke when the advancement is comparatively speaking, slow.

I claim:

1. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel, means for operating it to move the plunger, and means carried by the wheel for automatically causing the disengagement of the clutch at the end of the plunger excursion toward and from the work.

2. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel, means for operating it to move the plunger, means carried by the wheel for automatically causing the disengagement of the clutch at the end of the plunger excursion toward and from the work, and means controlled by the operator for operating the clutch when it has been disengaged by such automatic means.

3. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, an electromagnetic clutch interposed between the drive wheel and the motor, means carried by the wheel for breaking the clutch controlling circuit when the plunger is at either end of its excursion.

4. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, an electromagnetic clutch interposed between the drive wheel and the motor, means carried by the wheel for breaking the clutch controlling circuit when the plunger is at either end of its excursion, and means controlled by the operator for short circuiting the break caused by the wheel control means.

5. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, an electromagnetic clutch interposed between the motor and wheel, a yieldingly held brake adapted normally to stop the movement of the wheel, and electrically controlled means operative only when the clutch is in operation for releasing such brake.

6. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, an electromagnetic clutch interposed between the motor and wheel, and a manually controlled reversing mechanism interposed between the motor and wheel.

7. An electric riveting machine having a motor adapted for constant operation, a rivet driving plunger and a drive wheel permanently connected thereto, an electromagnetic clutch interposed between the motor and wheel, and a manually controlled reversing mechanism interposed between the motor and wheel, the clutch and reversing mechanism and control being coördinated to prevent simultaneous operation.

8. An electric riveting machine having a motor, a rivet driving plunger, and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel and means for operating it to move the plunger, and means automatically operative for disengaging the clutch before the end of the excursion of the plunger, when the load carried by the motor exceeds a predetermined figure.

9. An electric riveting machine having a motor, a rivet driving plunger, and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel and means for operating it to move the plunger, and means automatically operative for disengaging the clutch before the end of the excursion of the plunger, when the load carried by the motor exceeds a predetermined figure, and manually operated means for simultaneously closing the clutch circuit and reversing the direction of drive transmitted therethrough.

10. An electric riveting machine having a motor, a rivet driving plunger, and a drive wheel permanently connected thereto, a clutch interposed between the motor and the

drive wheel, means for operating it to move the plunger, and automatic means responsive to an overload on the motor for disengaging the clutch, and manually operated means for reversing the movement of the drive wheel in response to the driving power of the motor.

11. An electric riveting machine having a motor, a rivet driving plunger, and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel, means for operating it to move the plunger, and automatic means responsive to an overload on the motor for disengaging the clutch, and manually operated means for reversing the movement of the drive wheel in response to the driving power of the motor, said means comprising a planetary transmission and clutch.

12. An electric riveting machine having a motor, a rivet driving plunger, and a drive wheel permanently connected thereto, a clutch interposed between the motor and the drive wheel, means for operating it to move the plunger, and means responsive to an overload on the motor for automatically disengaging the clutch, a planetary transmission, interposed between the motor and the driving wheel, adapted normally to be inoperative, and manually operated means controlled by the operator for throwing said planetary transmission into operation to reverse the movement of the wheel.

In testimony whereof I affix my signature in the presence of two witnesses this 20th day of January, 1916.

WENSEL MORAVA.

Witnesses:
ESTHER VAN FRANK,
GENEVA HIRTH.