Feb. 2, 1937. H. THOMASON 2,069,291

BRAKE LINING MACHINE

Filed Feb. 9, 1933 3 Sheets-Sheet 1

Fig. 1.

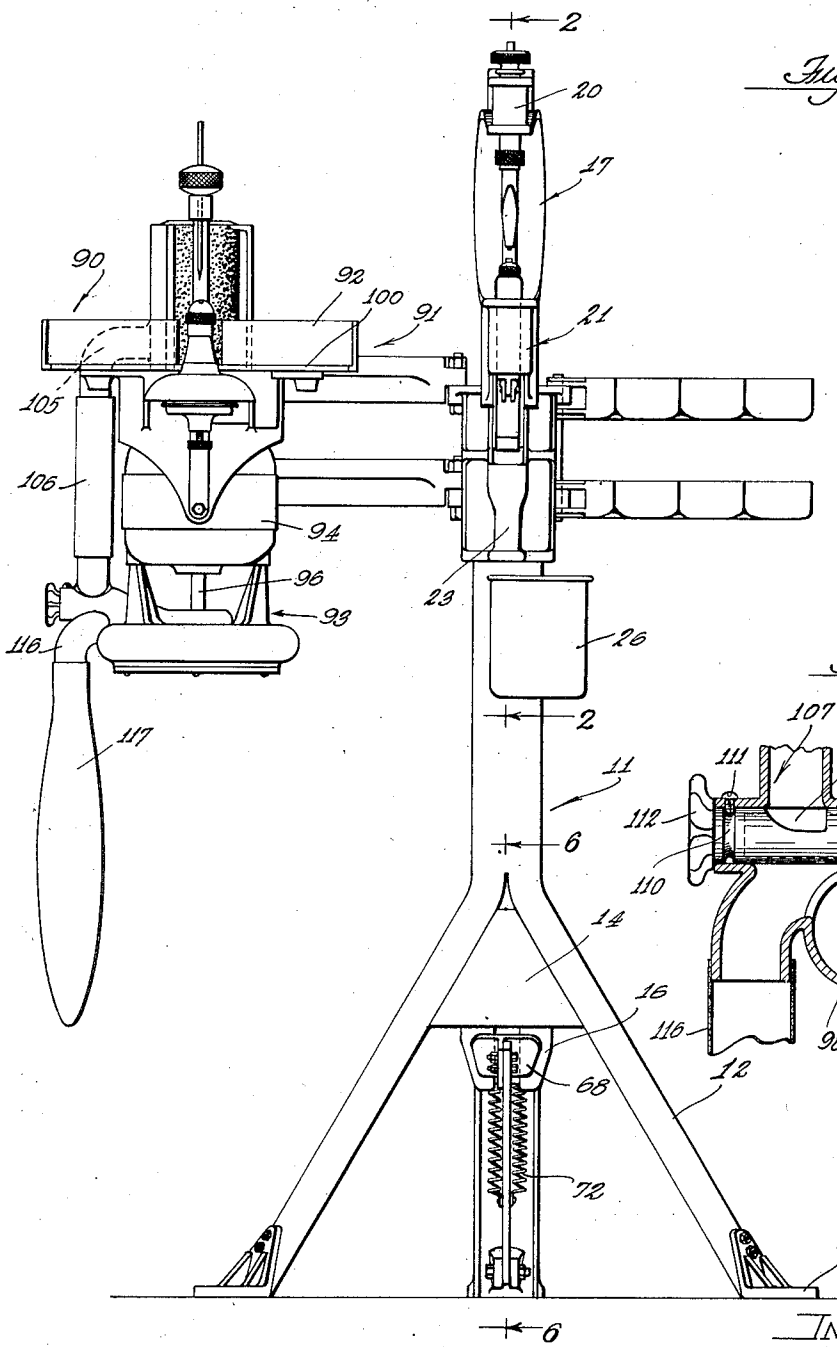


Fig. 8.

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Fig. 2.

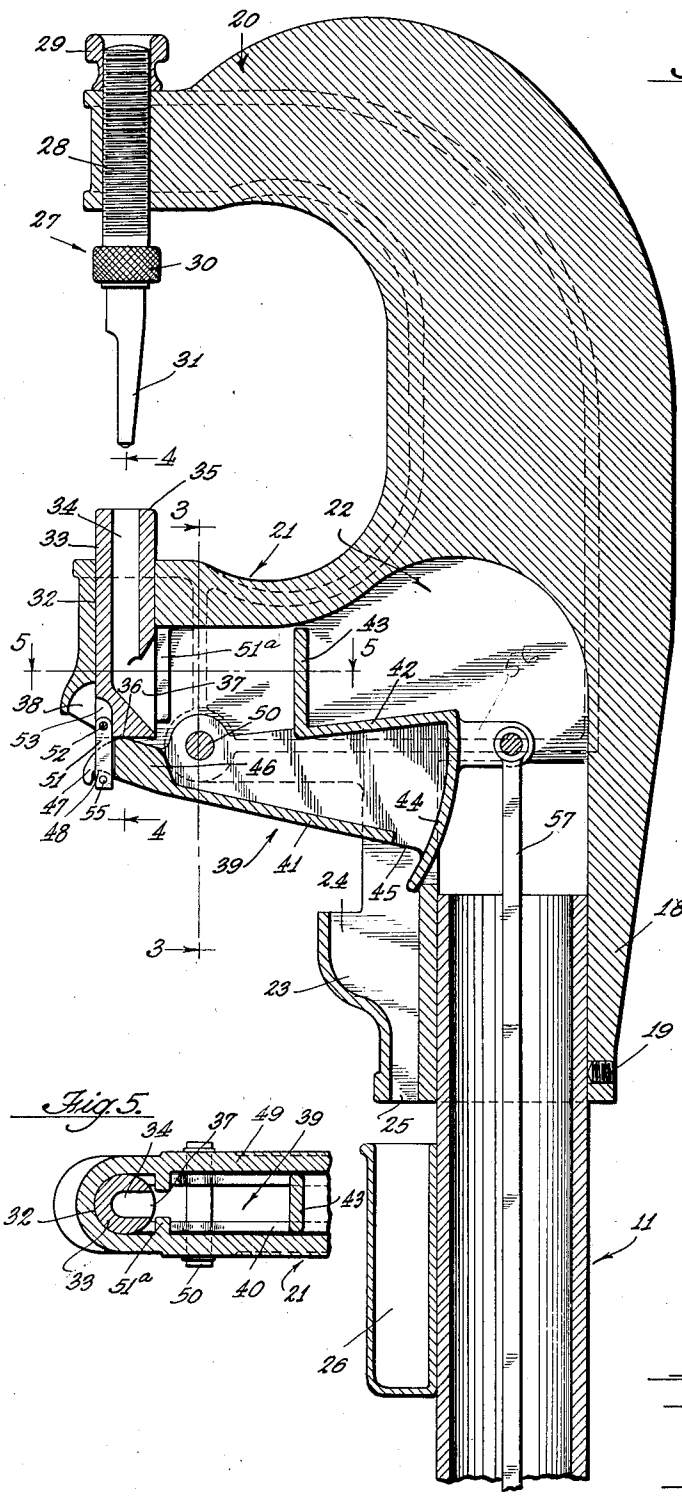


Fig. 4.

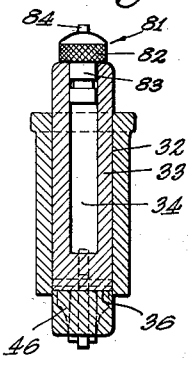


Fig. 5.

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Fig. 1.

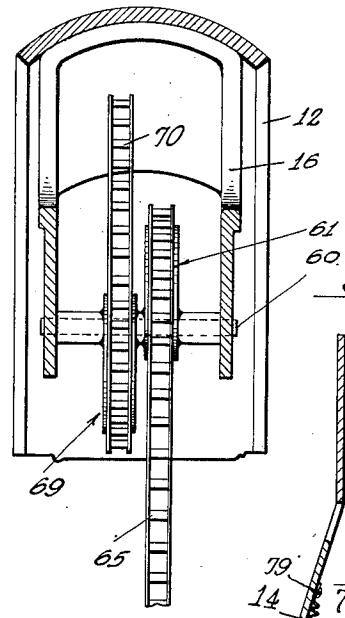


Fig. 3.

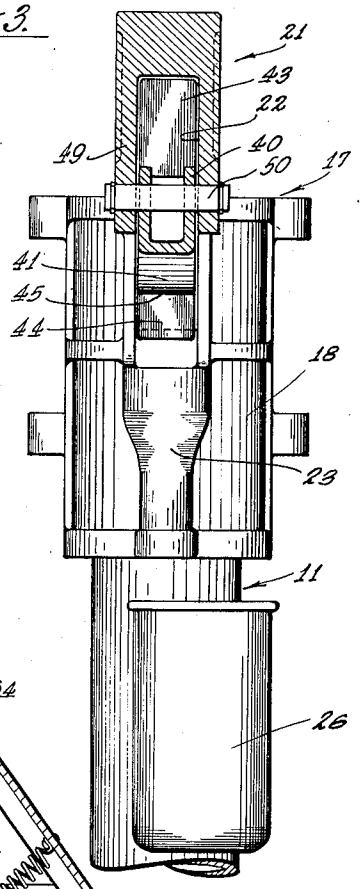


Fig. 6.

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Patented Feb. 2, 1937

2,069,291

UNITED STATES PATENT OFFICE

2,069,291

BRAKE LINING MACHINE

Hjalmar Thomason, Los Angeles, Calif.

Application February 9, 1933, Serial No. 655,965

16 Claims. (Cl. 164—97)

My invention relates to a brake lining machine, somewhat of the type of that disclosed in my patent application Serial No. 554,007, filed June 30, 1931.

The present invention has as one of its main features a punching and riveting machine having a combined action by which substantially the same mechanism may be used as a punch to punch the old rivets through the brake lining and brake band and also for riveting a new brake lining to the band.

In this connection an object and feature is the actuation of the punch or riveter from below upwardly. To effect this a foot pedal is operated and through a system of links and levers force a die or anvil upwardly against a punch or a riveting tool.

Another feature in regard to the operation of the die or anvil is an intermediary system of levers connected with flexible chains for giving a much increased pressure at the instant of punching or riveting so that the pressure exerted by the foot may be multiplied to the desired extent to effect the final punching or riveting operation. This feature is accomplished by using a rock shaft with cam shaped arcuate levers mounted thereon with a flexible chain from the foot pedal to one of the levers and another flexible chain from another lever to a link which actuates the die or anvil. These arcuate levers are proportioned to give an increased pressure during the instant of punching or riveting.

Another detailed feature of my invention relates to a construction for limiting or adjusting the stroke of the foot pedal in accordance with the work operated upon.

Another feature of the invention in connection with its use as a punch is discharging the punched elements, such as the old rivets or part of the brake lining punched to receive rivets, through a tubular die which forms a support for the punching and this die discharging into a hollow lever which is used to operate the die, the lever discharging into a chute and receptacle.

A further detailed feature of my invention relates to a releasable link for readily disconnecting the die or tubular anvil from its operating lever.

My invention is illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation.

Fig. 2 is a vertical section taken on the line 2—2 of Figure 1 in the direction of the arrows.

Fig. 3 is a vertical transverse section on the line 3—3 of Figure 2 in the direction of the arrows.

Fig. 4 is a vertical transverse section on the line 4—4 of Figure 2 in the direction of the arrows.

Fig. 5 is a horizontal section on the line 5—5 of Figure 2 in the direction of the arrows.

Fig. 6 is a vertical section of the base on the line 6—6 of Figure 1 in the direction of the arrows.

Fig. 7 is a vertical transverse section on the line 7—7 of Figure 6.

Fig. 8 is a vertical detail section through the air suction valve and adjacent parts.

Referring first to the body structure of the machine, this employs a tubular column 11 which has three legs 12 spaced apart at the bottom, these being formed by splitting a tube and spreading the legs laterally. Feet 13 are provided with means for attaching to a floor if desired. A plate 14 is connected between the two front legs and horizontal braces 15 connect between the two front and the rear leg. A bracket 16 is secured between the back leg and the plate 14.

The upper part of the machine has a head structure designated by the assembly numeral 17. This has a lower tubular end 18 attached to the upper end of the column 11 by set screw 19 or the like. The head has an upper arm 20 and a lower arm 21. The lower arm has a hollow space 22 for a purpose hereinunder detailed. On the front of the lower end 18 there is formed a chute 23, this having a wide mouth 24 at the top and a contracted discharge end 25. This discharges into a receptacle 26 which is hung on the column or post 11.

The punch assembly 27 employs a threaded bolt 28 which passes through an opening or vertical perforation in the horizontal upper arm 20. This is clamped by a nut 29 and at its lower end has a chuck 30 in which is mounted the punching or riveting tool 31. This tool may be readily changed for other tools. The lower arm 21 has a vertical guide passage 32 in which is mounted a tubular anvil 33. This anvil has a passage 34 therethrough and an upper end 35 forming a support for articles to be punched. The bottom of the anvil has a flat surface 36 and at the back there is a discharge opening 37 connecting to the passage 34. The lower part of the arm 21 has a recess 38.

To operate the anvil, which is designed to be lifted and lowered relative to the lower arm and to the punch or upper riveter 31 which is held stationary, a hollow rock arm or double lever 39 is utilized. This has side walls 40, a base 41, a top 42, an upwardly extending rear wall 43, and

a lower arcuate rear wall **44**, there being an opening **45** at the end of the bottom **41**. A cam **46** is formed at the outer end and has a pair of fingers **47** on the end, these fingers being formed with a notch or hook **48**.

The lower arm **21** has opposite side walls **49** in which is mounted a stationary shaft **50**. A pair of inturned flanges **51a** are positioned adjacent the discharge opening **37** from the passage **34** and discharge the punchings into the hollow lever **39**. This lever rocks on the shaft **50**, the side walls **40** being journaled thereon.

A link **51** is pivoted at **52** to the lower end of the die or anvil **33**, there being a recess **53** for the pivot. The lower end of the link has a pin **55** which extends across the hooks or notches **48** in the fingers **47** at the outer end of the cam **46**. The upper surface of this cam is designed to engage the lower flat surface **36** of the die or anvil **33**. An arm **56** is formed on the back or lower rear wall **44** of the double hollow lever and has a link **57** connected thereto extending downwardly through the column or post **11**. A tension spring **5** is connected to this link and attached to an upper portion of the column **11** tending to retract this link upwardly and hence rock the lever **39** to lower the die or anvil **33**.

The compound leverage system for actuating the link **57** is designated by the assembly numeral **59**. This employs a rock shaft **60** which is mounted in journals in the brackets **16**. On this shaft there is a first cam lever **61** which has a section **62** of a relatively long radius and a section **63** of a shorter radius joined by the arcuate curve **64** of the cam. A chain **65** passes over the arcuate cam and is attached to the end **62** of the longer radius. The lower end of this chain is attached to a foot operated lever **66** pivoted at **67** to the rear leg and having a pedal **68** to be engaged by the foot. A downward motion of the pedal actuates the cammed lever **61** and this motion is communicated to a second cammed lever **69**, which is constructed the same as the lever **61** but reversed. This second cammed lever also has a chain **70** attached thereto, the chain being attached to the portion of greatest radius. The upper end of the chain is attached at **71** to the lower end of the link **57**. A retraction spring **72** connects between the lever **66** and the rear leg and tends to retract this lever.

A limit stop for the lever **66** and designated **73** has a pair of spaced bars **74** with a series of teeth **75** thereon. These teeth are designed to be engaged by rod **76**, which rod has a rubber covering **77** thereon between the bars. A spring **78** is attached to the rod **76** and at **79** to the plate **14** and exerts an upward pull on the rod, holding it in engagement with any one of the several teeth or with the upper notch **80** formed by a portion of the bracket **16**. This rod **76**, with its covering pad **77**, restricts the upward motion of the foot pedal and hence the degree of downward movement of the die or anvil **33**.

The manner and operation and functioning of my invention so far described is as follows. As above mentioned, when the foot pedal is in its uppermost position of Figure 6, the die or anvil **33** is in its lowermost position. Then pressing down on the foot pedal, the chain **65** is pulled downwardly causing a partial rotation of the rock shaft **60** and gives a downward pull on the link **57**. This rocks the hollow lever **39** causing the cam end **46** to lift on the flat bottom of the die or anvil **33**, bringing this up so that the punch **31** may punch rivets out of worn brake linings or holes in new linings, the punchings passing downwardly through the passage **34**, the opening **37**, the hollow space of the lever **39**, into the chute **23** and the receptacle **26**. The increased pressure due to differential leverage at the instant of punching is caused by the two cam levers **61** and **69** being of different radii at different ends of the arcs of the cams and the chains operating over these arcs.

When it is desired to use the machine as a riveting tool, an anvil insert **81** is used. This has a head **82** with a downwardly extending shank **83**, the shank being inserted in the passage **34** and the head resting on the top **35** of the anvil **33**. A rivet set **84** extends upwardly above the head and is used in conjunction with a riveting tool held in the chuck **30** for riveting the brake linings on the brake bands. The machine is used the same way for riveting as it is for punching.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a punching machine having a head with an upper and a lower arm, a punch in the upper arm, a reciprocating die mounted in the lower arm, said die having a pressure surface on its lower end, there being an axial passage with a lateral opening in the die, a hollow double lever having a cam to engage the pressure surface of the die, said lever having a discharge opening, and means to oscillate the said lever whereby the die is brought into punching relation with the punch; the punched material being adapted to discharge through the said passage, the opening in the die, the hollow lever and the opening in the lever.

2. In a punching machine as claimed in claim 1, the said lever having a hook adjacent the cam, a link connected between the hook and the die for retracting the die, the said link being disconnectable from the said hook.

3. In a punching machine as claimed in claim 1, the means to oscillate the said hollow lever comprising a foot operated lever, a flexible means connected thereto, a rock shaft having differential cam shaped levers, the flexible means being connected to one of said cam shaped levers, a second flexible means connected to another of said cam shaped levers, and a connection from the second flexible means to the hollow lever.

4. In a punching machine, a punch, a slidable die, a lever to actuate said die, an oscillating foot operated lever, a rock shaft having a pair of cam shaped levers, a first flexible means between the foot operated lever and one of the cam shaped levers, a second flexible means connected to a second cam shaped lever, and a connection from the second flexible means to the lever for actuating the die.

5. In a punching machine, a reciprocating die, a foot operated lever, a rock shaft having a first and a second cam shaped lever, each lever having a relatively long and a relatively short radius with an arcuate curve connecting the ends of said radii, a first flexible means connected to a first cam shaped lever, a second flexible means connected to the second cam shaped lever, and an operating connection from the second flexible means to the said die to reciprocate said die.

6. In a punching machine as claimed in claim 5, the connection between the second flexible means and the die including a lever with a fulcrum between the ends, one end having a con-

nection to the flexible means, the opposite end having a cam to engage the die to exert a pressure on the die in a punching or riveting operation, and a link connected to the said latter lever and connected to the said die.

7. In a punching machine, a hollow vertical post or column having a head at the top with an upper and a lower arm, a fixed punch secured to the upper arm, the lower arm having a vertical opening with a die mounted therein for vertical reciprocation, said die having a vertical passage with a lateral opening, a hollow lever pivoted in the lower arm between its ends, said hollow lever having a discharge opening at one end and a cam on the opposite end to engage the lower end of the die, the column having a chute positioned below the open end of the hollow lever, a receptacle below the chute, a retracting connection between the hollow lever and the die, and means operative through the post or column to oscillate said hollow lever.

8. In a punching machine as claimed in claim 7, the means to oscillate the hollow lever including a rock shaft having a first and a second cam shaped lever, each having a long and a relatively short radius with a cam shaped curve connecting said radii, flexible means passing over said curves, one flexible means extending upwardly into the post or column and having a connection to the hollow lever and the other flexible means being connected to a means to exert a pull on the said second flexible means.

9. In a punching machine, a reciprocating die, a foot operated lever, a connection between the lever and the die to actuate the die, a limit stop for the lever having a series of teeth with notches, a rod adapted to engage in the said notches and held in position by the said teeth, the said rod having means to engage the said lever, and a retracting means connected to the rod to retain the said rod in the said notches and engaging the said teeth.

10. In a machine, a rock shaft having a pair of cam levers, each lever having a portion with a short and a long radius and a cam connecting the parts of the two radii, and a flexible tension element passing over each cam surface and secured to the portion of each cam lever having the longer radius, the said cam levers being placed in the reverse direction whereby the flexible pulling elements extend in opposite directions one from the other.

11. In a punching machine, a structure having a punch and a guide passage, a slidable die operating in said passage and having a passage therethrough and through the said guide passage with an outlet, a hollow lever below the outlet, means to move the die through the medium of the lever for punching, the punchings being adapted to drop through the passage and through the hollow lever and directed away from the front of the machine.

12. A punching machine having a fixed head with an upper and a lower arm with a guide passage, a punch located in the upper arm, a die slidably mounted in the guide passage said die having an axial passage therethrough with a lateral opening below said guide passage, the punchings being discharged through the said axial passage and opening, a hollow lever mounted in the lower arm, means to oscillate said lever, and a connecting means between the lever and the die to move the die into punching position and to retract said die, the hollow lever being positioned below said opening to receive the punchings.

13. In a punching machine having a fixed head structure with an upper and a lower arm with a guide passage, a fixed punch in the upper arm, a reciprocating die in the guide passage, said die having a passage therethrough with an opening below the guide passage, a hollow lever below said opening having a discharge opening, said lever having a cam surface to engage the die and move the die into punching relation with the punch, the said passage, the hollow lever and the discharge opening for the lever being adapted for conveyance of the punchings.

14. In a punching machine as claimed in claim 13, a link pivotally connected to the lever and the die for retracting the die.

15. In a punching machine, a column having a head structure with an upper and a lower arm extending laterally from said structure, a punch mounted in the upper arm, an anvil mounted in the lower arm having a die at its upper end to cooperate with the punch, means to develop relative reciprocation between the punch and the anvil and die, the anvil being tubular and thus providing a passage through the lower arm and having a discharge opening below the lower arm directed towards the said column.

16. In a punching machine as claimed in claim 15, the means for developing the reciprocating motion comprising a hollow lever pivoted to the lower arm positioned to receive punchings discharged through the tubular anvil, the said lever having a discharge opening adjacent the column.

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