May 4, 1943. S. BLOOMFIELD 2,318,191

RIVETING MECHANISM

Filed Feb. 2, 1942 3 Sheets-Sheet 1

FIG. 1

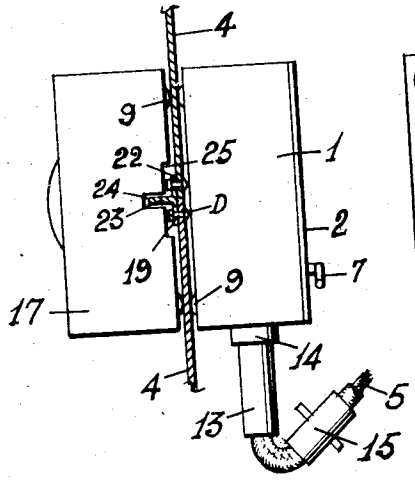


FIG. 2

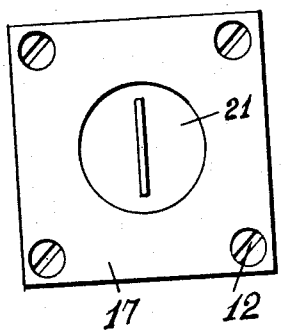


FIG. 3

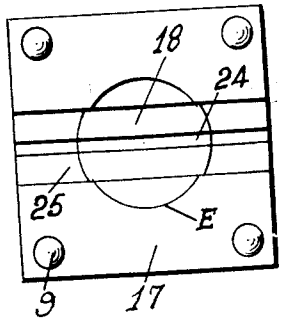


FIG. 4

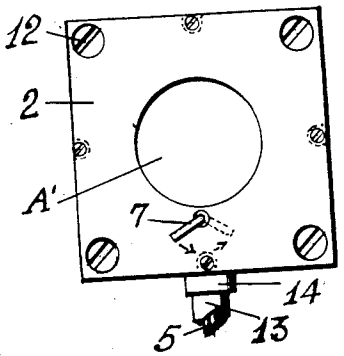


FIG. 6

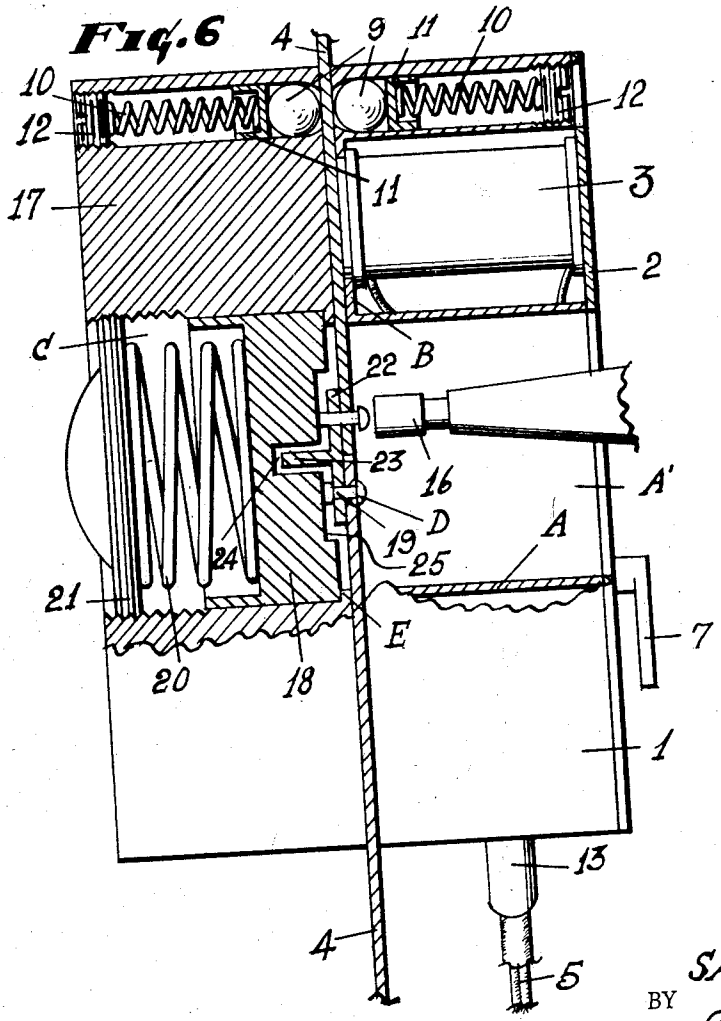
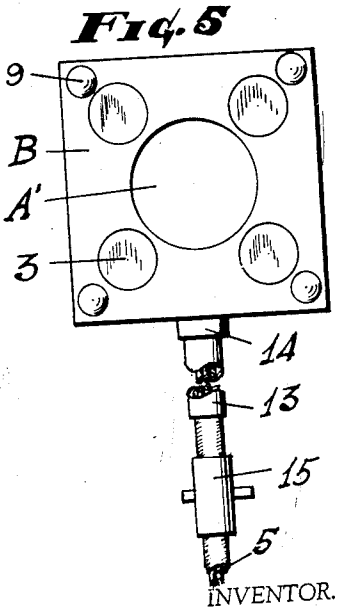


FIG. 5



INVENTOR.

SAM BLOOMFIELD

BY U. S. Charles Atty.

May 4, 1943. S. BLOOMFIELD 2,318,191

RIVETING MECHANISM

Filed Feb. 2, 1942 3 Sheets-Sheet 2

Fig. 7

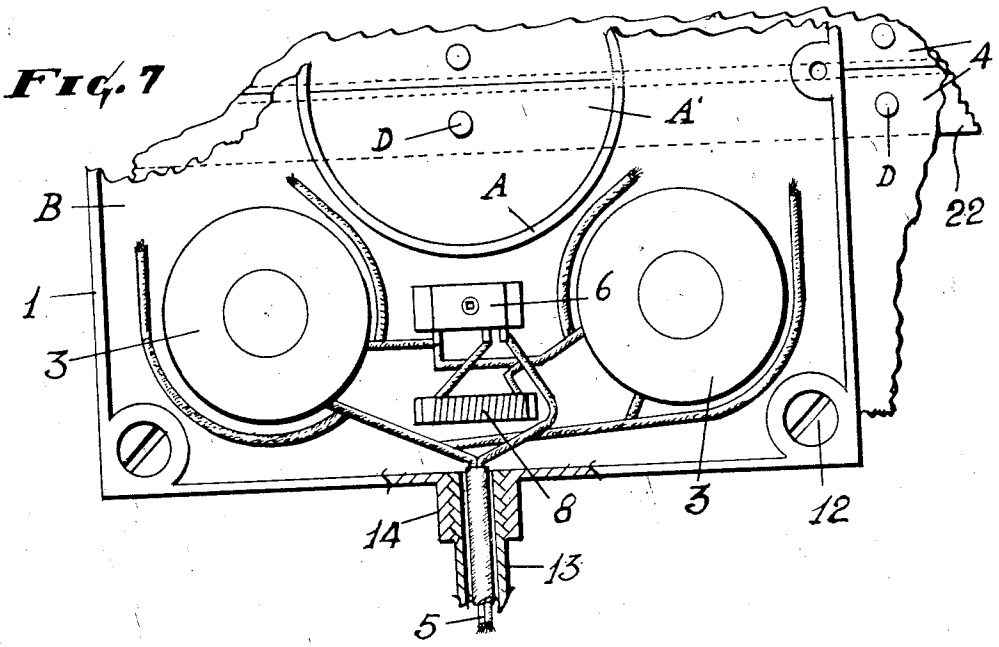


Fig. 8

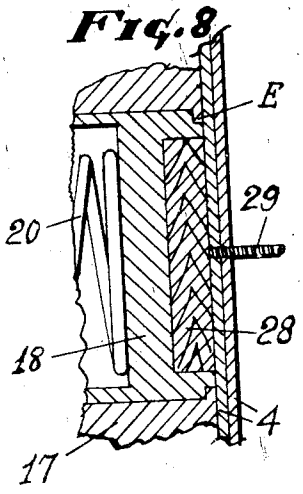


Fig. 9

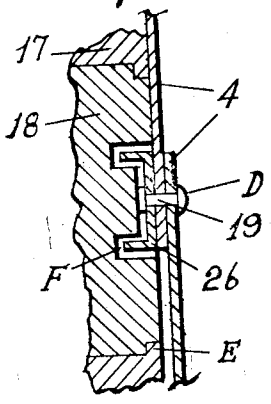


Fig. 10

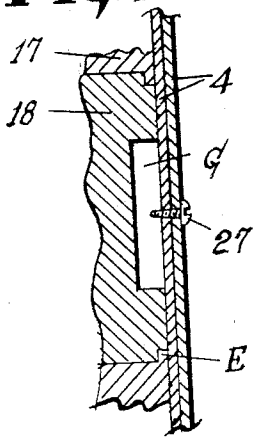
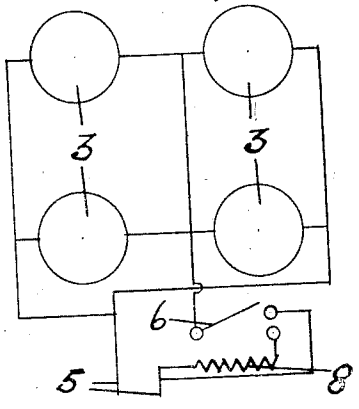


Fig. 11



INVENTOR.

SAM BLOOMFIELD

BY U. G. Charles atty.

May 4, 1943. S. BLOOMFIELD 2,318,191

RIVETING MECHANISM

Filed Feb. 2, 1942 3 Sheets-Sheet 3

Fig. 12

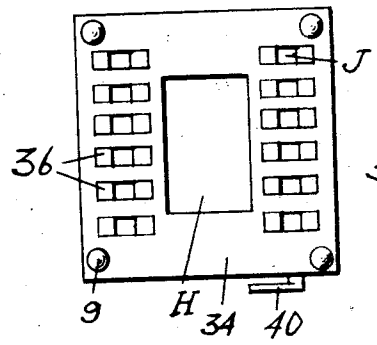


Fig. 13

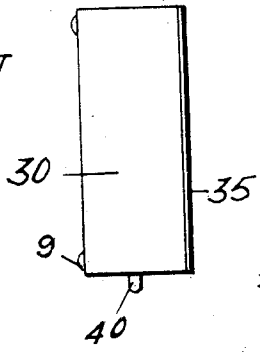


Fig. 14

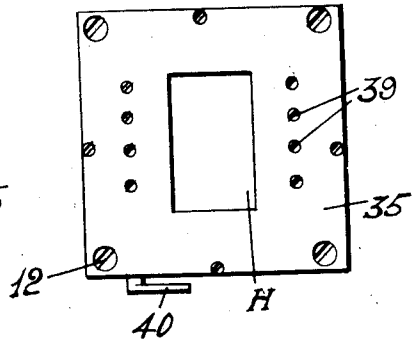


Fig. 15

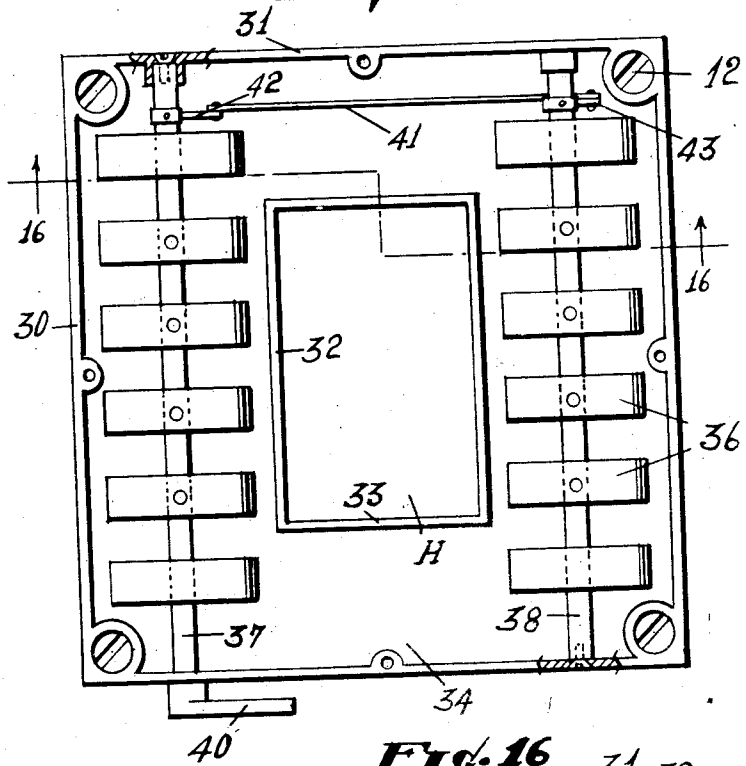
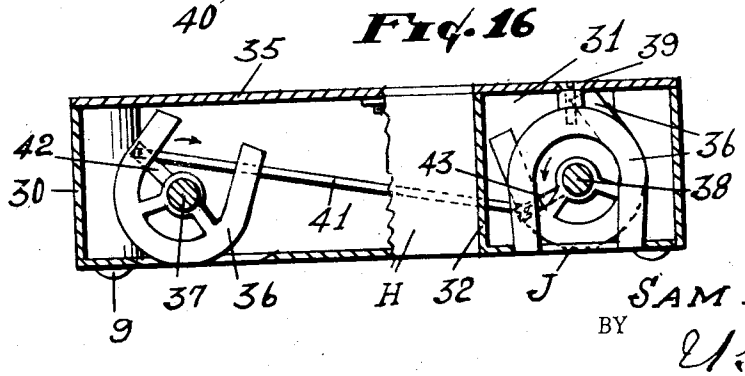


Fig. 16



INVENTOR.

SAM BLOOMFIELD

BY

U. S. Charles Atty.

Patented May 4, 1943

2,318,191

UNITED STATES PATENT OFFICE

2,318,191

RIVETING MECHANISM

Sam Bloomfield, Wichita, Kans.

Application February 2, 1942, Serial No. 429,253

4 Claims. (Cl. 78—46)

My invention relates to a riveting mechanism and has for its principal object a magnetically controlled dolly block, the movement of which responds to a magnet at the time of moving the same along aluminum sheets to drill apertures through the sheets or rivet the same together, the magnet being on one side, the dolly block on the other side of the aluminum sheets, it being understood that the dolly block and magnet are brought substantially in registry at the time the magnet is moved, the riveting being accomplished by a pneumatic tool of a conventional type, and furthermore the operation of riveting being performed by one mechanic to reduce the cost of operation.

A further object of my invention is to provide an electro-magnet that may be controlled by a switch and a resistance to reduce magnetic power to eliminate excess friction at the time of moving the mechanism, while in the event of employing permanent magnets, a means is provided to disengage a portion of the magnets from contact with the aluminum sheets, whereby magnetic attraction is reduced to avoid excess friction while moving the mechanism from one point of action to another along the aluminum sheets that are being riveted together, it being understood that aluminum is void of magnetic attraction while the magnetic power will attract the dolly block through the sheets to retain the same to snug engagement during the process of riveting.

A still further object of my invention is to provide a riveting mechanism that is comprised of two members, one of which is a magnet while the other member is a dolly block controlled by the magnet, whereby said dolly block may be moved when the structure of a fuselage, or the like, is congested with respect to space in which the dolly block must engage, and being moved therein by magnetic attraction as the magnet is moved along the exterior of the sheets that are being riveted together.

A still further object of my invention is to provide ball casters for the magnet and dolly block, the balls being socketed in the body of each thereof to engage with their respective sides of the aluminum sheets, the balls being spring tensioned to carry their respective members slightly spaced from the aluminum sheets when the magnetic power is reduced to avoid a drag of each member's surface at the time of moving the mechanism along the sheets.

A still further object of this invention is to simplify the construction of each member of the riveting mechanism to economize its production and to simplify the operation so that one mechanic as above stated may efficiently accomplish the riveting of the aluminum sheets together and the magnetic attraction to compress said sheets to snug engagement during the process of setting the rivets.

These and other objects will hereinafter be more fully explained, reference being had to the accompanying drawings forming a part of this specification, and in which like characters will apply to like parts in the different views.

Referring to the drawings:

Fig. 1 is a sectional edge view of aluminum sheets having the members of the mechanism oppositely positioned on the sides of the sheets.

Fig. 2 is an outer side view of the dolly block with respect to its position on the aluminum sheets, while Fig. 3 is an inner side view of said block.

Fig. 4 is an outer side view of the magnet while Fig. 5 is an inner side view of said magnet with respect to its position of engagement on the aluminum sheets.

Fig. 6 is an enlarged edge view of the magnet, and the dolly block, each of which is partly in section.

Fig. 7 is a plan view of the magnet fragmentarily, the head enclosure being removed.

Fig. 8 is a sectional view through the dolly block modified for drilling purposes.

Fig. 9 is a sectional view through the dolly block modified to secure a channel to a lapped portion of aluminum sheets.

Fig. 10 is a sectional view of the dolly block modified to accommodate for the length of screws when the screws are used to secure the aluminum sheets together.

Fig. 11 is a wiring diagram for the electro-magnets.

Fig. 12 is a plan view of one side of a permanent magnet arrangement.

Fig. 13 is a transverse view of Fig. 12, while Fig. 14 is the other side view of Fig. 12.

Fig. 15 is a plan view of the permanent magnet, having its head enclosure removed.

Fig. 16 is a sectional view taken on line 16—16 in Fig. 15.

The invention herein disclosed relates to a magnet and a dolly block coacting for riveting purpose.

The magnet consists of a casing comprised of side walls 1, said casing having a centrally disposed cylindrical wall A whereby an opening A' extends through the casing, the casing otherwise being hollow and having a bottom B and a removable head 2 as an enclosure for the casing, said casing being made of nonmagnetically controlled material.

Positioned in the hollow of the casing is a plurality of electro-magnets 3, each being of a conventional type and being equal in length to the depth of the casing between its head and bottom, said bottom being bored axial for each magnet and through which the core of the electro-magnet will extend and being flush with the outside of the bottom to engage with aluminum sheets 4, while the end of the electro-magnet body seats

on the bottom of the casing. The attraction of the electro-magnets passing through the sheets is controlling means for a dolly block later described, said electro-magnets each being connected to feed wires 5 that are supplied with a source of electric current to energize said electro-magnets simultaneously.

Positioned in the hollow of the casing in working relation to the electro-magnets is a switch 6 to vary the magnetic power of the electro-magnets, the switch having a rockable lever 7 to connect the current direct through the magnets and also to conduct the current through a resistance 8 to reduce the power of magnetism, eliminating excess friction when the casing is being moved along the aluminum sheets to a point of action, at which time the lever is rocked to increase the magnetism as securing means for a dolly block to the opposite side of the aluminum sheets, and place said sheets to snug engagement for riveting purposes later described.

Positioned near each corner of the magnet casing is a ball 9 functioning as a caster to carry the principal load of the casing when moved along the sheets, the balls each being tensioned by a spring 10, one end of which seats in a cavity of a piston-like element 11 that is forced to engagement with the ball to move the same outward in contact with the said aluminum sheets. The end of the bore adjacent the ball is contracted to retain the ball in the bore, the other end of said spring being in contact with a threaded stud 12 that threadedly engages in its respective end of the bore, by which means the spring is tensioned toward the ball, which in turn will resist the magnetic attraction proportionately when the resistance is employed to move the magnet along the aluminum sheets, while similar caster arrangement in a dolly block (later described) will cause the same to respond in like manner as described for the magnet.

A convenient means to manipulate the magnet structure is through the medium of a hollow handle 13 threadedly engaging in a nipple 14 integrally joined to one side wall of the casing substantially as shown in Fig. 7; the handle being hollow will also function as a conduit through which the electric feed wires will extend. There is also provided a main line control switch 15 positioned in the feed line to make and break the current for the said electro-magnets.

It will also be seen that the resistor switch is in close proximity to the handle to be actuated by the thumb of an operator, or otherwise at his option. The said cylindrical opening through the casing above referred to is for the convenience of entering rivets through the sheets of metal and to set the same with a conventional pneumatic riveting tool 16, the diameter of the opening being sufficient to encompass a plurality of rivets without moving the magnet block.

The dolly block consists of a rectangular body portion 17 that is centrally bored as at C, in which is positioned a bucking head 18 against which the insertible end of the rivet pin 19 will engage and being set thereby when driven by the said pneumatic tool that impounds its force on the head D of the rivet, whereby said aluminum sheets are secured together. Said bucking head is cylindrical to conform to the bore through the block and adapted to slide therein with a smooth running fit, and being retained therein by a pair of segmental flanges E extending inward of the bore and oppositely disposed therein, one end of the head being bored to form a seat for one end of a coil spring 20, the other end of the spring engaging with the inner side of a disc 21 that threadedly engages in the outer end of the bore by which means the spring is tensioned toward the bucking head to function as a cushion for the jar of the pneumatic tool, the cushion being means to avoid displacement of the dolly block body from its respective side of the aluminum sheets when the tool is in operation, it being understood that the magnetic attraction of the magnet block is means to retain the body of the dolly block to close engagement with the sheets and substantially in registry with the magnet structure as the said dolly block structure is of metal subject to magnetic attraction; furthermore, being so retained is means that when the magnet structure is moved along the aluminum sheets the dolly block by magnetic attraction will follow closely therewith.

It will also be seen that adjacent each corner of the dolly block body is positioned a similar ball caster and tensioning means therefor as heretofore described for the magnet structure, and the excess friction of the dolly block will likewise be overcome by suitable tensioning of the springs against the balls similar to that provided for the casters of the magnet. When the current is reduced, the body of the dolly block and the magnet structure will automatically space each thereof slightly from the said sheets and when the said electromagnets are charged by the electric current to their maximum capacity the body of the magnet and dolly block will be attracted toward each other and to snug engagement with the their respective sides of the aluminum sheets to resist the pulsative movement of the pneumatic tool.

When the edges of the aluminum sheets are to abut each other the same may be connected by a cleat, T-shaped in cross section, the legs 22 being centrally positioned to straddle the joint, while the shaft 23 transversely extending will function as a flange to stiffen the cleat longitudinally. In this mode of assembly there is provided on the face of the dolly block a channel 24 diametrically crossing the body and bucking head in which the flange will engage; furthermore, along each side of the channel a depression 25 is formed in which the legs of the cleat will seat but being spaced from the bottom of the depression to provide room for a head of a rivet that is formed by setting the same, it being understood that the dolly block is free to move longitudinally on the cleat as attracted by the magnet that likewise moves in the same direction.

It will also be seen that when the sheets of aluminum overlap at their marginal edges as shown in Fig. 9, a channel 26 is placed thereon, while the legs of the channel extend outward. In this arrangement, a pair of grooves F will cross the dolly block to receive the legs slidable therein, and the depressions above referred to will be omitted; being so assembled, the rivets will be aligned along the center of the channel as shown in said Fig. 9.

In Fig. 10 is illustrated a pair of aluminum sheets connected by screws 27. In this instance, the dolly body and bucking head will be channeled as at G diametrically of the head and of sufficient depth to receive the point of the screws propecting therein, the screws binding the sides of the aluminum sheets together without interfering with the dolly block.

To drill apertures through lapped sheets of aluminum, there is provided a wood block 28 fitting snugly in the face of the bucking head coinciding

therewith peripherally, and being in the center of the head and adapted to receive the point of a drill bit **29** as well as preventing said sheets from bending inward toward the head as the drill bit enters the sheets, said block being replaceable when multilated by repeated drilling. It will also be understood that the magnet will be employed in each performance illustrated in Figs. 8, 9, and 10, the magnet being omitted from said views, but essential to support the dolly block for each performance set up in said views.

In Figs. 12 to 16, inclusive, is illustrated an arrangement wherein permanent magnets are employed, the structure consisting of a casing rectangular in form, and having a rectangular opening H centrally passing therethrough, the body having side and end walls **30** and **31**, respectively, externally, and side and end walls **32** and **33**, respectively, internally, said walls having a bottom **34** integrally joined thereto, whereby the structure is channel like in cross section, and having a removable head **35** to close the channel. A plurality of permanent magnets **36** are positioned in spaced relation in the oppositely disposed side channels, said magnets being assembled on their respective shafts **37** and **38** in such a way that the legs of the magnets will extend through opening J in the bottom of the channel. The shafts are journalled in the outer end walls **31** and adapted to turn in all of the magnets except the magnet at each outer end of each assembly, the latter named magnets being secured to the shafts and rockable therewith, the other magnets being permanently carried by screws **39** passing through the head and into the magnets at their upper extremity. It will be seen that shaft **37** outwardly extends through one end wall and has a crank **40** secured thereto as rocking means for the shaft and magnets carried thereby, the other shaft **38** being rocked through the medium of a connecting arm **41** that has ends hingedly connected to cranks **42** and **43** respectively that are mounted rigidly on shafts **37** and **38**, respectively, as shown in Figs. 15 and 17, whereby the said outer positioned magnets at the ends of their respective shafts are rocked from engagement with their respective leg openings to reduce magnetic power of the magnet assembly for the purpose of reducing friction when the magnet is moved, the function being the same as described for the electromagnets, it being understood that the casing of the permanent magnet arrangement has similar casters positioned in each corner thereof.

And other modifications may be employed as lie within the scope of the appended claims.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a riveting mechanism, a dolly block and an electric magnetized structure to coact as means to secure interlapping aluminum sheets to snug engagement, said dolly block comprising a bucking head and means to cushion the same in the body of the dolly block, the magnetized structure being hollow and having a bottom and head oppositely disposed to enclose the hollow, said bottom and head having an opening centrally passing therethrough to register with the cushioned bucking head whereby rivets may be inserted through the said interlapping portions of the sheets and set by a pneumatic riveting tool operating through said opening, and means for the electric magnetized structure to vary the power of magnetic attraction for the purpose specified.

2. In a riveting mechanism comprising a dolly block and an electric magnetized structure to coact as means to secure interlapping aluminum sheets to snug engagement, a bucking head and means to cushion the same in the body of the dolly block, the electric magnetized structure being hollow and having a bottom and head oppositely disposed to enclose the hollow, said bottom and head having an opening centrally passing therethrough to register with the cushioned bucking head whereby rivets are insertible through the said interlapping portion of the sheets and being set by a pneumatic riveting tool operating through said opening, means to vary the power of electro-magnetic attraction, spring tensioned balls to function as casters for the electric magnetized structure, and similar casters for the dolly block so that when the magnetism is reduced the casters will carry their respective magnetized structure and dolly block bodies from engagement with the aluminum sheets, in which instance, the dolly block will respond to movement of the electric magnetized structure along said aluminum sheets to a point for riveting engagement, at which time, the said body portions are brought to snug engagement with said aluminum sheets when the magnetism is energized to its maximum strength.

3. In a riveting mechanism, a dolly block having a bucking head and means to cushion the same carried by the block, an electro-magnet structure to coact with the dolly block, electric current regulating means for the current of the electro-magnet structure and electric power means to energize the electro-magnet structure, the dolly block to engage on one side of aluminum sheets and the electro-magnet structure to engage on the other side as moving and retaining means for the dolly block to snug engagement with the aluminum sheets, the electro-magnet structure having an opening passing therethrough and ranging toward the dolly block, said opening being an accessible means through which to insert rivets in aluminum sheets and set the same by a pneumatic riveting tool.

4. In a riveting mechanism, a dolly block having a bucking head and means to cushion the same carried by the block, an electro-magnet structure to coact with the dolly block, electric current regulating means for the electro-magnet structure and electric power means to energize the electro-magnet structure, the dolly block to engage on one side of the aluminum sheets and the electro-magnet structure to engage on the other side as moving and retaining means for the dolly block to snug engagement with the aluminum sheets, the electro-magnet structure having an opening passing therethrough and ranging toward the dolly block, said opening being an accessible means through which to insert rivets in said aluminum sheets and set the same by a pneumatic tool, a plurality of casters positioned in the dolly block and in the magnet structure to reduce frictional engagement when the magnet structure is moved and the dolly block responding to the movement for registry with each other.

SAM BLOOMFIELD.