(No Model.) 3 Sheets—Sheet 1.

F. A. WALSH.

MACHINE FOR WORKING SHEET METAL.

No. 511,567. Patented Dec. 26, 1893.

Fig. 1.

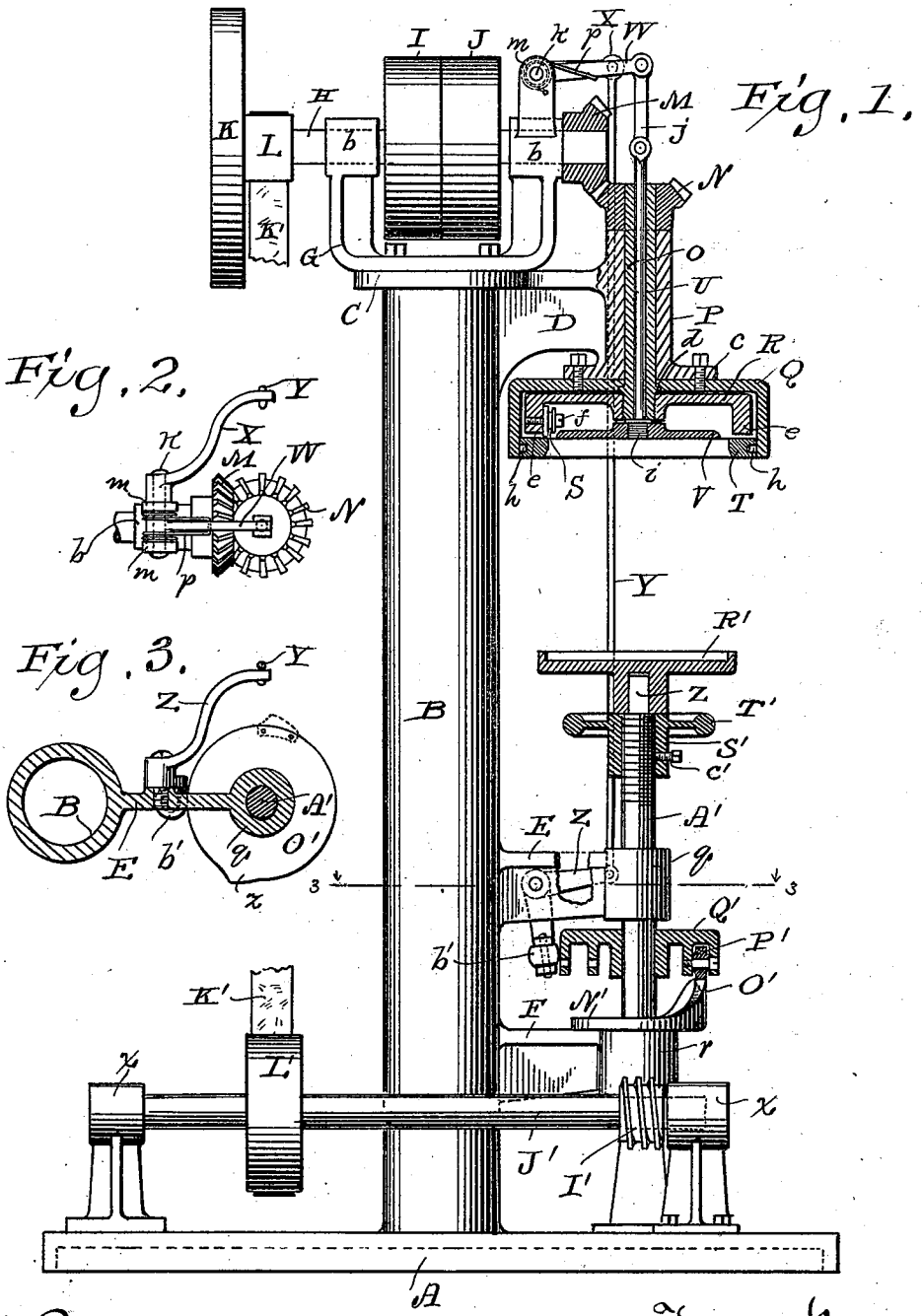

Fig. 2.

Fig. 3.

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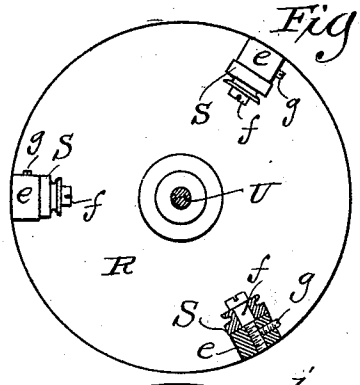
Fig. 9.



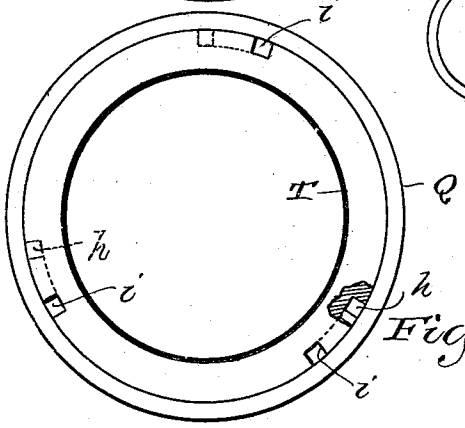


Fig. 10

Fig. 4.

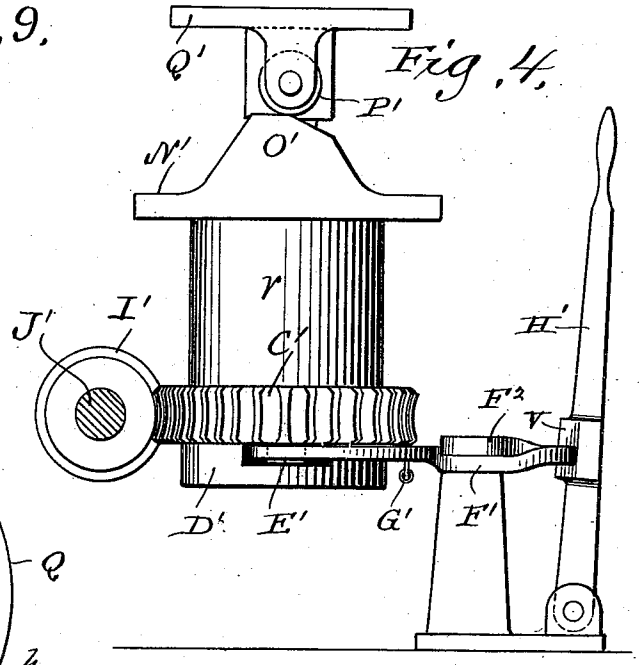


Fig. 5.

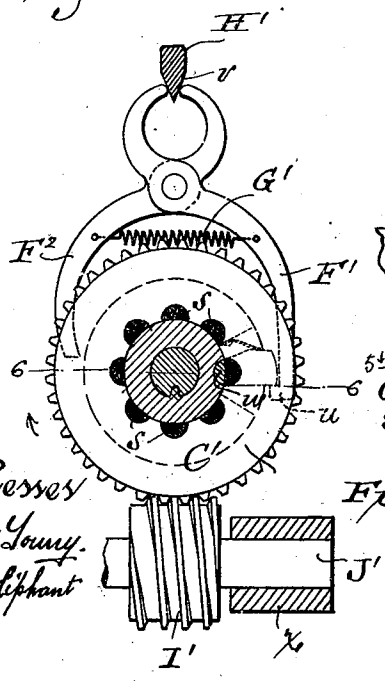


Fig. 6

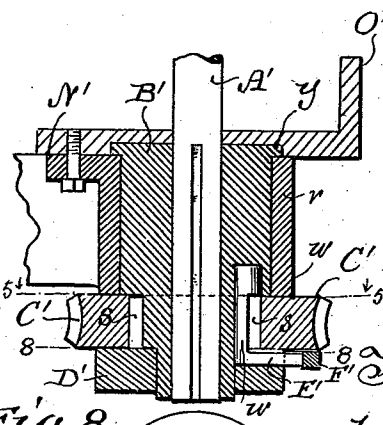


Fig. 7.

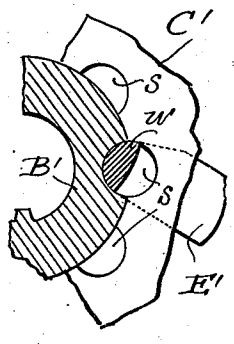


Fig. 8.

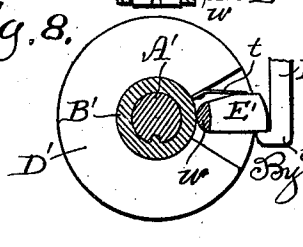


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Fig. 12.

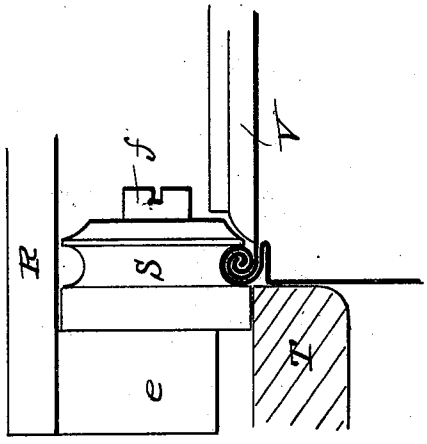
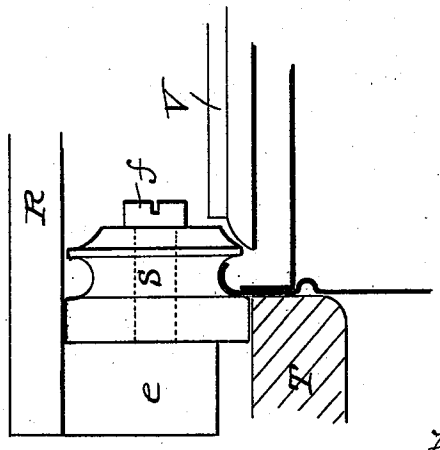


Fig. 11.



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UNITED STATES PATENT OFFICE.

FRANCIS A. WALSH, OF MILWAUKEE, WISCONSIN.

MACHINE FOR WORKING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 511,567, dated December 26, 1893.

Application filed April 27, 1892. Serial No. 430,892. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS A. WALSH, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Machines for Working Sheet Metal; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has for its principal object to provide a simple, durable machine for heading filled vessels of various sizes in such a manner as to receive slip-covers, but, owing to certain structural details, this machine may be utilized for other work in the art of working sheet-metal without departure from said invention, the latter consisting in certain peculiarities of construction and combination of parts to be hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings: Figure 1 represents an elevation of a machine constructed according to my invention, certain of the parts being illustrated in section; Fig. 2, a detail plan view of a portion of the machine; Fig. 3, a horizontal section taken on line 3—3 of Fig. 1; Fig. 4 a detail elevation partly in section illustrating a mechanism for imparting a rotary and vertically reciprocative motion to a vessel-support embodied in said machine; Fig. 5, a horizontal section taken on line 5—5 of the succeeding figure; Fig. 6, a vertical transverse section taken on line 6—6 of the preceding figure; Figs. 7 and 8 detail horizontal sections illustrating a clutch-mechanism that constitutes part of the aforesaid machine, the latter view being taken on line 8—8 of Fig. 6; Fig. 9 an inverted plan view of a roller-carrying device that is shown in Fig. 1 as detachably connected to a driving spindle, and Fig. 10, a similar view of a detachably connected housing and guide. Figs. 11 and 12 are diagrams representing an operation of my machine organized to head sheet-metal vessels.

Referring by letter to the drawings, A represents a base, and B a standard on the same. The upper end of the standard is shown as provided with a flange C and bracket D, other brackets E, F, being extended from said standard at a certain distance from its lower end, as best illustrated in Fig. 1. Supported on the upper end of the standard is a yoke G provided with bearings *b* for a shaft H, that carries a loose pulley I and a tight pulley J for a driving belt. The shaft H also carries a fly-wheel K, pulley L and gear-wheel M, the latter being in mesh with a similar wheel N fast on a spindle O that has its bearing in a sleeve P that forms part of the bracket D, above described. A housing Q is shown as bolted to a flange *c* at the lower end of the sleeve P and this housing is recessed to engage a collar *d* on the spindle O as shown in Fig. 1. Screw-threaded or otherwise suitably connected to the lower end of the spindle O, within the hanger Q, is a head R provided at certain intervals with depending lugs *e* each of which has a tapped opening for engagement with the screw-threaded shank of a stud *f* on which a grooved roller S is arranged to have a free rotation, a set-screw *g* being employed to hold the stud in place, and it is obvious that any suitable formers may be substituted for the rollers.

While I have shown a series of rollers S, one may be found sufficient in practice for certain work, but if several be positioned at regular intervals apart the strain will be equally divided and better results obtained in connection with operations performed on sheet-metal of heavy grades. The housing Q is provided at intervals with lugs *h* for engagement with bayonet slots *i* in a guide T, it being intended that the machine shall be accompanied by a series of such guides having openings of diameters corresponding to vessels of different sizes.

The spindle O is provided with a longitudinal bore and thus constitutes a guide for a rod U having an enlarged and screw-threaded lower end *i* for engagement with a tapped opening in the center of a plate V, as shown in Fig. 1. The upper end of the rod U is connected, by a link *j*, with a lever-arm W fast on a stem *k* arranged to turn in bearings *m* on the yoke G, and said lever-arm is normally supported by the spring *p* shown in Figs. 1 and 2.

Fast on the stem *k* is another lever-arm X, and a rod Y connects this lever-arm with a bell-crank Z pivotally connected to the bracket E above described. The bracket E is provided with a guide *q* for a spindle A′ that is splined in a sleeve B′ the latter being free to turn in a bearing *r* that forms part of the

bracket F specified in the foregoing. Loose on the sleeve B′ below the bearing *r* is a worm-wheel C′ having a series of notches *s* radiating from its central opening, and a collar D′ fast on the lower end of said sleeve serves as a support for said worm-wheel. The sleeve B′ and collar D′ are recessed to receive a pivotal right angle dog E′, the horizontal arm of this dog being opposed by a spring *t* fast in the recessed portion of said collar, as best illustrated in Fig. 8, and, as also best shown in the same figure, one member F′ of a pair of jointed levers is provided with a hook end *u* normally opposed to said horizontal arm of the dog on that side farthest from said spring. A spiral spring G′ connects the levers F′ F² on that side of their pivot nearest the collar D′ and the contraction of this spring serves to bring said levers in opposition to the horizontal arm of the dog E′ above described. Interposed between the outer ends of the jointed levers is a wedge-lug *v* on a hand-lever H′ that is fulcrumed to the base of the machine, and by actuating this lever, in the proper direction, said levers are spread apart to overcome the spring G′ and at the same time come out of the path of the dog E′, thereby permitting the spring *t* to act and partially rotate said dog. This partial rotation of the dog brings the semi-circular portion *w* thereof far enough out of the corresponding recess or seat in the sleeve B′ to engage with one of the radial notches *s* in the worm-wheel C′, as best illustrated in Fig. 7, whereby this worm-wheel is clutched with said sleeve to impart rotary motion to the latter and spindle A′ splined therein, said worm-wheel being driven by a worm I′ on a shaft J′ that has its bearings *x* on the base of the machine and is connected by a belt K′ and pulleys L L′ with the shaft H above described. The spindle A′ is preferably run in a direction reverse to the head R and thus any tendency of the supporting chuck R′ to rotate is overcome.

Bolted or otherwise rigidly secured to the bearing *r* is a horizontal plate N′ preferably recessed to fit a flange *y* on the spindle-sleeve B′, and this plate is provided with a vertically disposed cam O′ of suitable contour, in the path of an anti-friction roller P′, or other projection, depending from a flanged disk Q′ that is fast to the spindle A′, above described. By means of the cam O′ and the relative projection on the disk Q′, the spindle A′ is caused to rise and fall at each revolution thereof, and in case it is desirable to multiply this reciprocation of said spindle, two or more suitable devices may be arranged on said disk to travel on said cam. In Fig. 1, I have shown the disk Q′ as provided with bearings for an additional anti-friction roller that is placed in position when the spindle A′ is to reciprocate twice, while making one revolution. The flange of the disk Q′ is provided with a lateral cam projection corresponding to each of the cam opposing devices carried by said disk and, as the latter is rotated, the cam projection comes into contact with an arm of the bell-brank Z to thereby impart motion to the same, thus causing said bell-crank to tilt on its pivot. The tilt of the bell-crank actuates the rod Y and lever-arms W, X, against the power of the spring *p* and thus the rod U, linked to the former lever-arm, is forced down in its guide to cause the plate V to eject the completed work from the guide T that is supported in the hanger Q above described. As shown in Fig. 1, I prefer to arrange an anti-friction roller *b′* on that arm of the bell-crank Z that is opposed to the lateral cam projection *z* on the flange of the disk Q′ above described. The spindle A′ has its upper end reduced to form a stud for loose engagement with the hub of a supporting chuck R′, and said spindle is screw-threaded adjacent to the stud to engage a correspondingly threaded sleeve S′ that impinges against said chuck-hub. As shown the sleeve S′ is provided with a hand-wheel T′ and by adjusting said sleeve on the adjacent spindle the chuck R′ may be raised or lowered to compensate for wear, or variations in the length of vessels worked upon by the machine. As shown in Fig. 1 a set-screw is employed to hold the sleeve S′ in the position to which it may be adjusted. A vessel to be worked upon by the machine is placed on the supporting chuck R′ and the lever H′ actuated to permit the clutch-dog E′ to engage with the continuously traveling worm-wheel C′, as above described, whereby rotary motion is imparted to the spindle A′, the latter being moved upward during a portion of its revolution, by the cam-mechanism hereinbefore set forth, to bring the upper portion of said vessel within the guide T that is detachably connected to the stationary hanger Q depending from the bracket D of the machine-standard, while at the same time the aforesaid vessel is engaged with the working device or devices S carried by the head R that is connected to the spindle O, in gear with the main shaft H of said machine.

The cam-mechanism is so timed that on the completion of the work on the vessel, the spindle A′ is permitted to automatically descend while in rotation, and at the same time the bell-crank Z is tilted on its pivot to actuate the mechanism controlling the plate V whereby the latter is moved down against the vessel to force the latter out of the guide T and free of the machine, although for some work it may be found more desirable to do away with the ejector-plate and make said guide in parting sections for the purpose of releasing the completed work at a predetermined time. If the lever H′ be set in such position as to have the wedge-lug *v* thereon hold the jointed levers F′ F² apart, the rotation of the spindle A′ will be continued indefinitely and the reciprocation of said spindle will depend upon the construction of the cam-mechanism. That is to say, if there be two or more pro-

jections or rollers P′ depending from the disk Q′ and a single cam O′ in their path, there will be a reciprocation of the spindle each time one of said projections travels on said cam, or the same action may be had by a multiplication of cams in the path of a single projection on said disk. If the machine be organized, as shown in Fig. 1 and the lever H merely employed to start the spindle A′, the latter will be stopped at each half revolution by the clutch-dog E′ coming into contact with one or the other of the trip-levers F′ F^2, the continuous or intermittent rotation of said spindle being a matter of choice dependent on the character of the vessels or other sheet-metal devices to be worked upon by the machine.

In Figs. 11 and 12, I show the operation of my machine, as organized to head vessels designed to receive slip-covers, the walls of such vessels being primarily provided with an inwardly extended bead or seat that serves as a support for the head, the walls of said vessels being generally straight and extended a certain distance above the flange on the head-blank. The opening in the guide T being of the same diameter as the vessel, that portion of the latter within said guide is supported during the operation of the tool, or tools S, and the tendency of the bead or seat, for the head of said vessel, is to extend inward, as shown in Fig. 12, to thereby form a greater bearing surface for said head. The pressure of the grooved roller or rollers S turns the upper edge of the vessel over as shown in Fig. 11, and continued pressure causes the upper portion of the vessel wall and head flange to be rolled together in the form of an inturned seam, simultaneous with a compression of the head-seat, as shown in Fig. 12, at which time the work is completed and said vessel discharged from the guide.

While I have shown the spindle A′ as being capable of rotation, it is obvious that the cam plate N′ may be the rotary part in order that a reciprocation may be imparted to said spindle, or the supporting chuck R may be reciprocated independent of the spindle, this being a matter of mechanical expediency that in no way involves a departure from the spirit of my invention, in its broadest sense.

I claim—

1. The combination of a vessel-support, a vessel-guide in opposition thereto, suitable means for reducing the normal distance between said parts to bring about an engagement of a supported vessel with the guide, and a tool independent of the guide but arranged to operate longitudinally of the vessel against that edge of the same adjacent to said guide, substantially as set forth.

2. The combination of a vessel-support, a vessel-guide in opposition thereto, suitable means for reducing the normal distance between said parts to bring about an engagement of a supported vessel with the guide, a tool independent of the guide but arranged to operate longitudinally of the vessel against that edge of the same adjacent to said guide, and other suitable means for ejecting said vessel from the aforesaid guide subsequent to the operation of the tool, substantially as set forth.

3. The combination of a vessel-support, a housing in opposition to the same, a vessel engaging guide detachably arranged within the housing, suitable means for reducing the normal distance between the support and housing to bring about an engagement of a supported vessel with the guide, and a tool arranged within said housing to operate upon that edge of the vessel brought within the same, substantially as set forth.

4. The combination of a vessel-support, a housing in opposition thereto, a guide in the housing, suitable means for reducing the normal distance between the support and housing to bring about an engagement of a supported vessel with the guide, a head having a rotation within the housing, and a tool carried by the head in opposition to the guide-engaged vessel, substantially as set forth.

5. The combination of a vessel-support, a vessel-guide in opposition to the support, suitable means for reducing the normal distance between said parts to bring about an engagement of a supported vessel with the guide, a tool arranged to perform an operation longitudinally of the vessel on that edge of the same adjacent to the guide, and an ejector for the completed work, substantially as set forth.

6. The combination of a reciprocative vessel-support, a stationary vessel-guide in opposition to the support, and a tool arranged to exert pressure longitudinally against that edge of the vessel adjacent to the guide while the two latter are in engagement incidental to a movement of said support, substantially as set forth.

7. The combination of a reciprocative vessel-support, a stationary vessel-guide in opposition to the support, a tool arranged to exert pressure against that edge of the vessel adjacent to the guide while the two latter are in engagement incidental to a movement of said support, and suitable means for releasing said vessel from the guide, substantially as set forth.

8. The combination of a reciprocative chuck, a guide in line with the chuck and correspondent to a sheet-metal vessel supported on said chuck, a suitable tool for exerting pressure against that edge of the vessel adjacent to the guide an ejector adjacent to the tool, a lever-mechanism connected to the ejector, and suitable means for actuating the lever-mechanism at a predetermined time, substantially as set forth.

9. The combination of a chuck-carrying spindle, suitable means for rotating the same, and other suitable means for reciprocating said spindle during its rotation, a guide in line with the chuck and correspondent to a

sheet-metal vessel supported on the chuck, and a suitable tool arranged to exert pressure on an edge of said vessel when the latter and said guide are engaged, substantially as set forth.

10. The combination of a chuck-carrying spindle, suitable means for rotating the same, and other suitable means for reciprocating said spindle during its rotation, a guide in line with the chuck and correspondent to a sheet-metal vessel, supported on the chuck, a suitable tool arranged to exert pressure on an edge of the vessel when the latter and the guide are engaged, and suitable means for releasing the completed work from said guide, substantially as set forth.

11. The combination of a chuck-carrying spindle, suitable means for rotating the same, and other suitable means for reciprocating said spindle during its rotation a guide in line with the chuck and correspondent to a sheet-metal vessel supported on the chuck, a suitable tool arranged to exert pressure on an edge of the vessel when the latter and the guide are engaged, an ejector adjacent to said guide a lever-mechanism connected to the ejector, and a suitable means for actuating said lever-mechanism at a predetermined time, substantially as set forth.

12. The combination of a rotative spindle, suitable means for reciprocating the spindle during its rotation and a vessel supporting chuck loose on said spindle but reciprocative therewith, substantially as set forth.

13. The combination of a rotative spindle, suitable means for reciprocating the spindle during its rotation, a vessel supporting chuck loose on the spindle, and a sleeve screw-threaded to said spindle in opposition to the chuck, whereby the latter may be positively adjusted, substantially as set forth.

14. The combination of a spindle, a disk fast on the spindle and having one side thereof provided with a projection, a stationary cam in the path of the projection on the disk, a revoluble sleeve having a spline-connection with said spindle, a driving gear, and a clutch-connection between the sleeve and driving-gear, substantially as set forth.

15. The combination of a spindle, a disk fast on the same and having one side provided with a projection, a stationary cam in the path of the disk-projection, a revoluble sleeve having a spline-connection with said spindle, a clutch-dog pivotally connected to the sleeve, a gear-wheel normally loose on said sleeve and provided at intervals with notches for engagement with the clutch-dog, suitable means for actuating this clutch-dog, and a driving-pinion in mesh with the gear-wheel, substantially as set forth.

16. The combination of a spindle, a disk fast on the same and having one side thereof provided with a projection, a stationary cam in the path of the disk-projection, a revoluble sleeve having a spline-connection with said spindle, a spring-controlled clutch-dog pivotally connected to the sleeve, a gear-wheel notched at intervals to engage the clutch-dog, a pair of spring-controlled trip-levers in opposition to an extension of said clutch-dog, a lever arranged to actuate the trip levers, and a driving pinion in mesh with the gear-wheel, substantially as set forth.

17. The combination of a vessel-support, a vessel-guide in opposition to the same, suitable means for reducing the normal distance between said parts to bring about an engagement of a supported vessel, and a seaming-tool arranged to operate longitudinally of the vessel against that edge of the latter adjacent to the guide, whereby this end of said vessel and a cover arranged with relation thereto are rigidly joined incidental to said engagement of the aforesaid vessel and guide, substantially as set forth.

18. The combination of a vessel-support, a vessel-guide, in opposition to the same, suitable means for reducing the normal distance between said parts to bring about an engagement of a supported vessel, a seaming-tool arranged to operate longitudinally of the vessel against that edge of the latter adjacent to the guide, whereby a permanent union is established between this end of said vessel and a cover arranged with relation thereto when said engagement takes place, and other suitable means for releasing the aforesaid vessel on the completion of the seaming operation, substantially as set forth.

19. The combination of a reciprocative vessel-support, a stationary vessel-guide in opposition to the same, a rotary device carrying a seaming tool and arranged beyond the guide in longitudinal opposition to the vessel, whereby a permanent union of said vessel and a cover arranged with relation thereto takes place incidental to engagement of this vessel with said guide, and other suitable means for releasing the aforesaid vessel from the guide on the completion of the seaming operation, substantially as set forth.

20. The herein described method of heading sheet-metal vessels by a single operation without the employment of an inner mandrel or die, said method consisting in supporting a head for each vessel on a previously formed interior bead-like seat constituting part of the vessel wall a certain distance longitudinally from the edge of the same, surrounding this portion of the vessel with a resistance to outward expansion extended below said seat and then rigidly uniting the vessel head and wall by a seaming operation simultaneous with a compression of said seat, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

FRANCIS A. WALSH.

Witnesses:
N. E. OLIPHANT,
JOHN E. WILES.