(No Model.) 4 Sheets—Sheet 1.

W. S. GRAFTON & R. R. SPEARS.

MACHINE FOR JOINING AND ROLLING SHEETS OF METAL.

No. 519,084. Patented May 1, 1894.

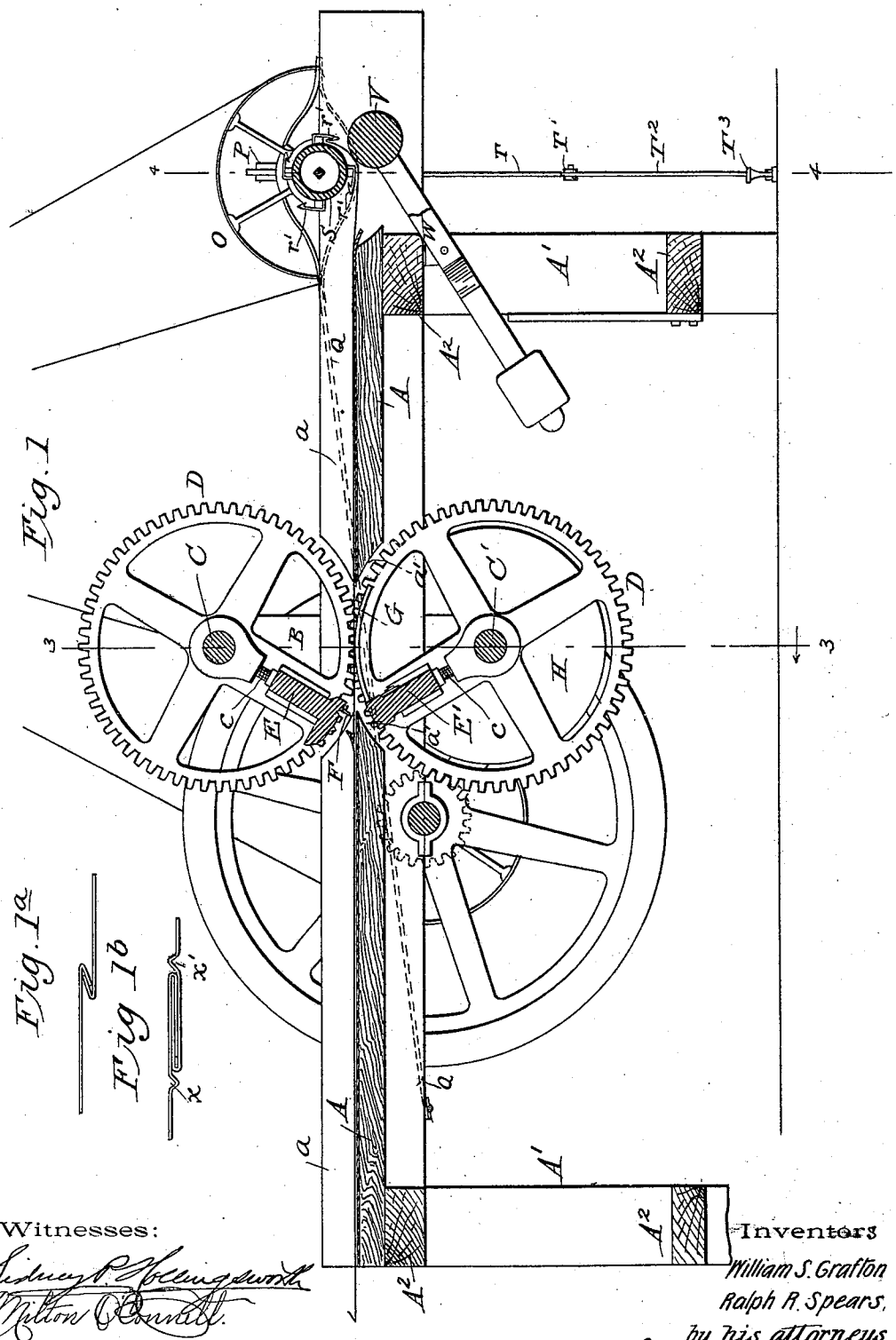

Fig. 1.

Fig. 1a

Fig. 1b

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(No Model.) 4 Sheets—Sheet 2.

W. S. GRAFTON & R. R. SPEARS.

MACHINE FOR JOINING AND ROLLING SHEETS OF METAL.

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Fig. 3.
ON LINE 3-3

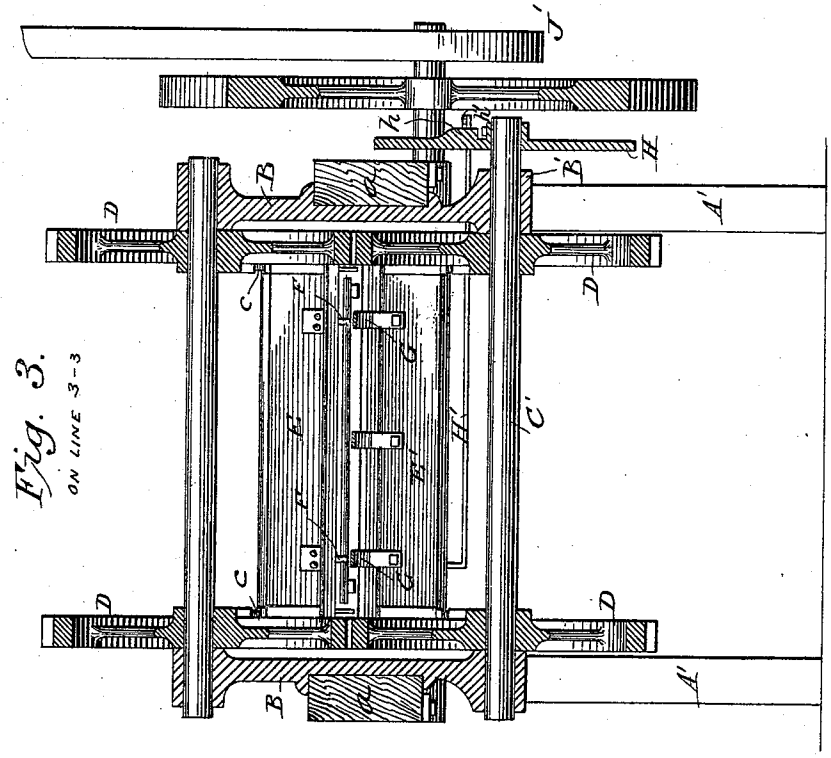
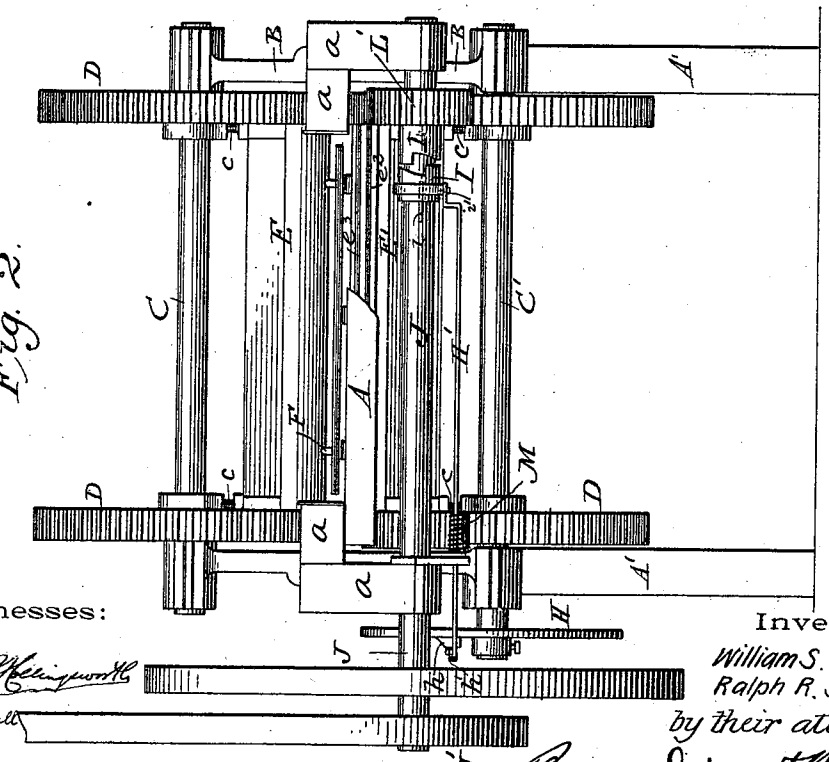


Fig. 2.



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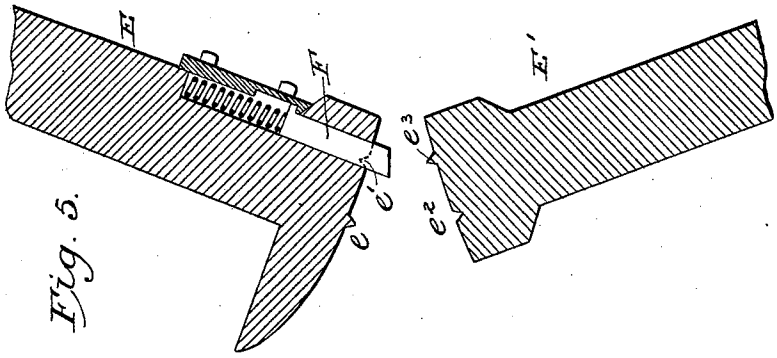

Fig. 5.

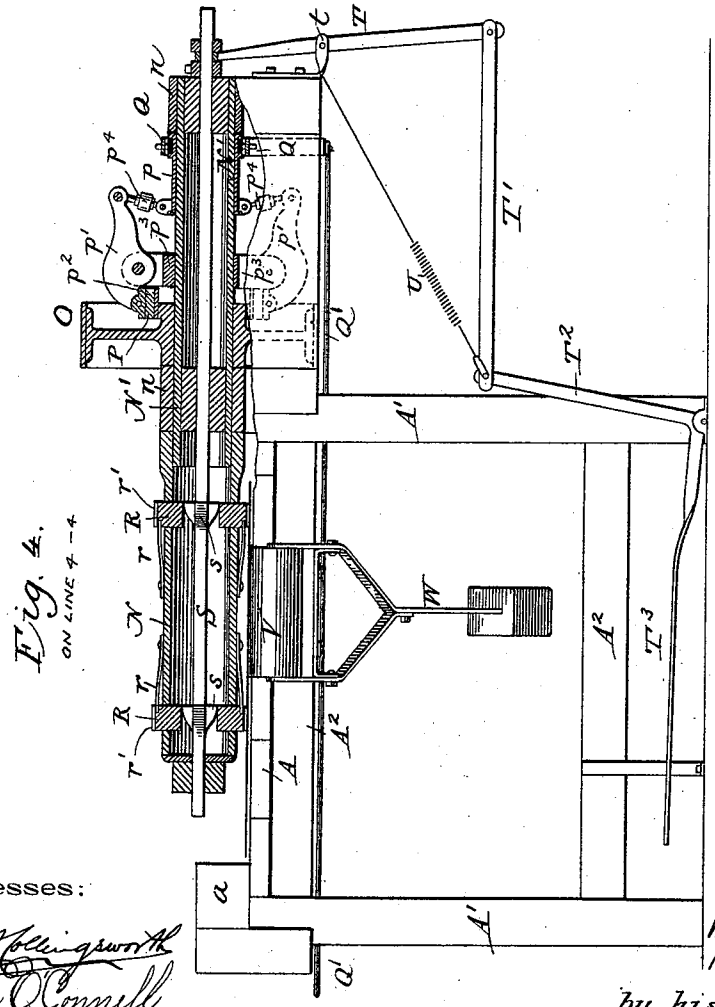

Fig. 4.
ON LINE 4-4

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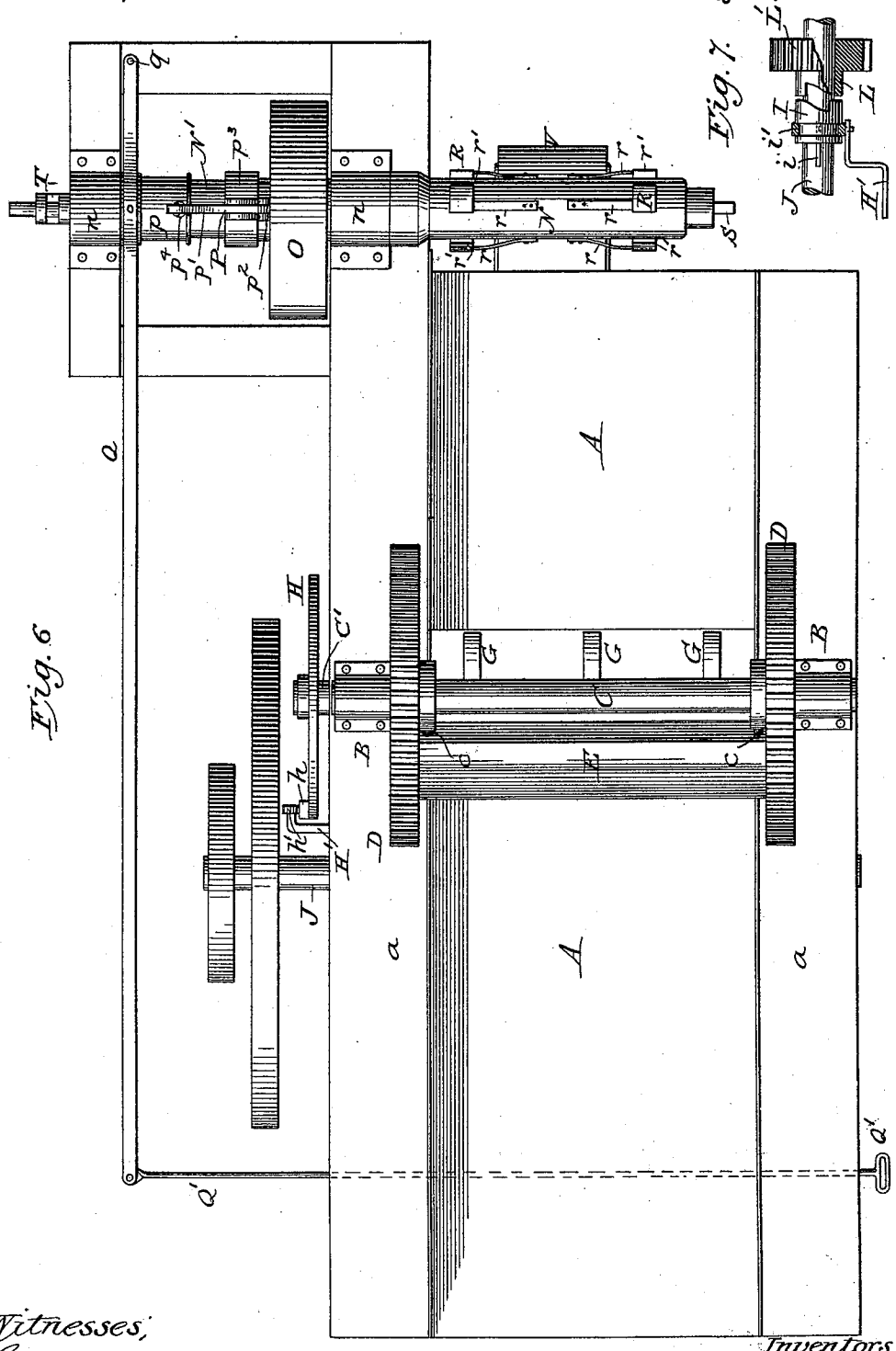

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UNITED STATES PATENT OFFICE.

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MACHINE FOR JOINING AND ROLLING SHEETS OF METAL.

SPECIFICATION forming part of Letters Patent No. 519,084, dated May 1, 1894.

Application filed January 24, 1894. Serial No. 497,888. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. GRAFTON and RALPH R. SPEARS, citizens of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Machines for Joining and Rolling Sheets of Metal, of which the following is a specification.

The object of our invention is to unite sheets of metal and roll them up into a compact bundle ready for shipment.

Our invention is especially designed to seam and roll roofing sheets securely and expeditiously, and involves improved devices for securing together the hooked ends of a series of sheets, and novel mechanism for rolling the sheets thus secured into a compact bundle.

Our invention also involves improved mechanism for separating the rolling devices from the bundle, so that it may be discharged from the machine.

In the accompanying drawings,—Figure 1 is a longitudinal, central section through our improved machine. Fig. 1^a is a view illustrating the manner of connecting two sheets to form a seam. Fig. 1^b shows the plates joined and the seam formed. Fig. 2 is an end view of the machine. Fig. 3 is a transverse section on the line 3—3 of Fig. 1. Fig. 4 is a transverse section on the line 4—4 of Fig. 1. Fig. 5 is a view on an enlarged scale, of the compressing members of the joining mechanism. Fig. 6 is a plan view of the machine, and Fig. 7 is a detail view showing particularly the devices for clutching the driving shaft to the cross-head operating gearing.

A table or platform A, is provided at its longitudinal edges with upwardly projecting sides *a*, and has standards A′, which may be braced and strengthened by horizontal beams A^2. Uprights B, on opposite sides of the table support a shaft C, and hangers B′, which may be formed integrally with the uprights B, support a shaft C′. The shafts C and C′ carry cog wheels D, which are all of the same size, and which mesh with each other, as clearly shown, so that they all revolve in unison. To the upper shaft C, is connected a cross head E, and to the shaft C′ is connected a corresponding cross head E′. The manner of connecting the cross heads to the shafts is not important, but preferably, the connection is an adjustable one, by means of screws *c*, as shown in Fig. 1. The outer or working ends of the cross heads should, however, be formed as shown in Fig. 5. The upper cross head E, it will be observed, has a rounded working face, and it is provided with a projecting rib *e*, and a recess or groove *e′*. The opposite cross head E′, is provided with a corresponding longitudinal recess or groove e^2, and a rib e^3. When the cross heads E and E′ are brought together, the rib *e* matches with the recess e^2, while the rib e^3 matches with the recess *e′*, thus forming in the metallic sheets which are joined, ribs and recesses *x*, *x′*, as shown in Fig. 1^b, these ribs and recesses being located on opposite sides of the joint to prevent the unlocking thereof. The upper cross head E is provided with spring bolts F, which may be of any suitable construction, and which may be mounted in the cross head in any suitable way. The bolts F, normally project a short distance from the cross head, but when the cross heads E and E′ are brought into contact with each other, the bolts recede and permit the cross heads to pass. The lower cross head E′ carries a series of rearwardly projecting fingers G, which support the metal plates beneath the recess or opening *a′*, in the table, when the cross heads are in the position and at rest as shown in Fig. 1.

It is desirable that the cross heads should occupy the position shown in Fig. 1 to receive the locked ends of the sheets of metal, and that as soon as the locked ends of the metal sheets have reached the cross heads, the mechanism should be thrown into operation to cause the cross heads to compress the locked edges into a compact seam. In order to effect this operation automatically, we provide the following mechanism: On the shaft C′ is secured a disk H, provided with a projection, lug or cam *h*, on which at times bears a roller *h′*, on the end of a lever arm H′, which extends to a sleeve I, that slides on the shaft J, to which the main driving wheel J′ is secured.

A feather i on the shaft J, engaging the sleeve I prevents the sleeve from turning on the shaft, but permits it to slide endwise. The sleeve I, is adapted to engage and interlock with a sleeve L, to which is secured a pinion L′, both of which are loose on the shaft J, but may be rigidly connected therewith when interlocked with the sleeve I. The lever H′ is secured to the sleeve I, by a ring i', which does not rotate with the sleeve, but slides therewith on the shaft J. The ring, as shown in Fig. 7, is arranged in an annular groove in the sleeve permitting it to operate as before described. The pinion L′ gears with one of the wheels D, on the shaft C′, and through this pinion, motion is communicated from the driving shaft to the cross heads. A spring M, tends to move the rod H′ to slide the clutch sleeve I into engagement with the sleeve L. The lug or cam h on the disk H so holds the rod H′ against the force of the spring M, as to disengage the clutch sleeve I from the sleeve L at the proper time to hold the cross head stationary in the position shown in Fig. 1. It will be understood that the sheets as they are joined are rolled up on suitable rolling mechanism, but before describing our improved rolling mechanism, we will describe the operation of the joining or seaming mechanism, the construction of which has just been explained. It will be understood that before the sheets of metal are brought to the machine, their ends are bent to the form shown in Fig. 1ª. One of these sheets is made to engage by its hooked end with the rolling mechanism, and another sheet with a hooked end is engaged with the rear end of the first-mentioned sheet. Power being applied to the rolling mechanism, the sheets are drawn forward, and the compressing cross heads occupy the position shown in Fig. 1, to receive them. When the interlocked ends of the sheets reach the cross heads, they are received by the spring bolts F, and the cross heads are moved a short distance inwardly and toward the rolling mechanism. This inward movement of the cross heads moves the shaft C′, to such an extent as to release the end of the operating rod H′ from the lug h on the disk H, and immediately the pinion L′ is coupled with the driving shaft, and a complete revolution is given to the cross heads, thereby applying great pressure to the joint, and forming a tight compact seam. When the cross heads have made a complete revolution, or nearly a complete revolution, and reached the position shown in Fig. 1, the end of the lever H′ will again be engaged by the cam or lug h, and the cross heads will remain stationary to receive another joint, and when it arrives, will move with it and then compress it in the manner before stated.

Our improved coiling and rolling mechanism is shown particularly in Figs. 1 and 4. As there shown, a hollow cylinder N, is secured to a tubular shaft N′, mounted in bearings n of the frame. A pulley O runs loosely on the shaft N′, but may be connected to revolve therewith by means of a clutch P, of ordinary construction, and which is operated by a sliding sleeve p, and a lever Q, which extends to the front end of the machine, as shown in Fig. 1. The lever Q extends longitudinally to the front end of the machine, as shown in Fig. 6, and is pivoted at one end at q, as there indicated. At its front end, the lever is provided with a handle Q′, which extends across the front end of the machine to the right-hand side thereof. By this means, the lever Q may be vibrated and the clutch properly operated. The sleeve p is connected by links p^4 with levers p', carrying shoes p^2, which bear on the hub of the pulley O. The lever Q may be operated to slide the sleeve p. When slid in one direction it will remove the shoes from the hub of the pulley; when slid in the opposite direction, it will cause the shoes to engage the hub of the pulley, and thus afford an operative connection between the pulley and shaft N′, as the levers p' are mounted in a frame p^3 which is rigidly secured to the hollow shaft.

The cylinder N, is provided with a series of radially movable blocks or holders R, each provided with a spring r, to hold it in its innermost position, or which tends to move it inwardly. These blocks are provided with hooks r', to receive the hooked ends of the plates to be rolled.

In order to hold the blocks in position to receive a roll of plates, we provide a sliding bar S, provided with inclined blocks s, engaging the inner ends of the radially moving blocks R. This rod S, is operated by a lever T, pivoted at t, to the main frame, and connected by a link T′ with a lever T^2 operated by a treadle T^3. A spring U, holds the mechanism in position to cause the engagement of the inclined blocks s, with the blocks R, but when the treadle T^3 is depressed, the rod S, is shifted, and the blocks R, are moved inwardly by their springs. The bundle of plates carried by the rolling cylinder may then be removed endwise from it. In order to prevent the sheets from unwinding, we provide a tension roller V, on a weighted lever W.

The operation of this part of the mechanism has been indicated above, but, briefly stated, it is as follows: When the several parts of the mechanism are in the position shown in Fig. 4, and power is applied to the driving pulley O, the sheets of metal attached to the hooks r' will be wound about the cylinder N. When the roll has attained a sufficient size, the revolution of the cylinder N, is stopped by the operation of the lever Q, which shifts the clutch mechanism P, and the roll is wired in the usual way. By then depressing the treadle T^3, the blocks s are withdrawn from the radial blocks R, which are moved inwardly by their springs r, and the bundle may be removed laterally from the cylinder.

It will be observed that in our machine, both the seaming and joining mechanism and the rolling mechanism are power-driven. They operate simultaneously and without interference with each other, and only one operator is required to do the work.

We claim as our invention—

1. The combination, substantially as hereinbefore set forth, with rolling devices to which the sheets to be rolled are connected, of compressing mechanism comprising cross heads mounted on shafts geared together to move simultaneously and provided with mechanism for stopping their movement temporarily at the end of each revolution.

2. The combination, substantially as hereinbefore set forth, with rolling devices to which the sheets to be rolled are connected, of a compressing member provided with means for revolving it, and with devices for checking or suspending its movement temporarily at the end of each revolution, and another compressing member with which said first mentioned compressing member co-operates.

3. The combination, substantially as hereinbefore set forth, with the rolling mechanism of the seaming mechanism having compressing members provided with spring bolts and means for revolving the compressing members, and for checking or temporarily suspending the movement of the members at the end of each revolution.

4. The combination, substantially as hereinbefore set forth, of the driving shaft, the cross heads, the shafts to which they are connected, gearing connecting the two shafts, a pinion interposed between said gearing and the driving shaft, a clutch for connecting the pinion with the driving shaft, an operating lever, and lever operating devices connected with the shaft of one of the cross heads and adapted to operate the clutch once in each revolution of the cross heads.

5. In a machine for seaming sheets of metal, the combination of a pair of cross heads movable toward and from each other, and each provided with a rib and a groove, both of which are transverse to the line of movement of the cross head and which are arranged to form matching ribs and grooves on opposite sides of the joint or seam of the metal sheets, outside the folds thereof, and parallel with their edges.

6. The combination, substantially as hereinbefore set forth, with mechanism for joining sheets of metal, of rolling mechanism, comprising a cylinder N, blocks or holders movable radially in straight lines through openings in the cylinder, and provided on their outer ends with hooks, means for moving the blocks inward toward the axis of the cylinder, and mechanism for forcing the blocks outwardly.

7. The combination in a metal rolling machine, of the radially moving holders, springs for moving the holders inwardly, devices operating upon the inner ends of the holders to move them outwardly and mechanism for operating said devices.

8. The combination of the hollow cylinder, the radially moving blocks carried thereby, an endwise moving rod carrying devices engaging the blocks to move them outwardly, mechanism for operating the rod, and a tension roll adapted to act upon the outside of the roll of plates to keep them from unwinding.

9. The combination with mechanism for joining sheets of metal, of the rolling mechanism comprising the hollow cylinder, the radially moving spring-actuated blocks, an endwise moving rod for moving the blocks outwardly, a tubular shaft to which the cylinder is secured, a driving pulley loose on said shaft, a clutch secured to the tubular shaft and engaging with the pulley, and a lever extending to the front end of the machine for operating the clutch.

In testimony whereof we have hereunto subscribed our names.

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RALPH R. SPEARS.

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ALEX. GLASS.