June 14, 1932. C. H. CRABTREE 1,862,785

INKING MECHANISM FOR PRINTING MACHINES

Filed Aug. 7, 1930 6 Sheets-Sheet 1

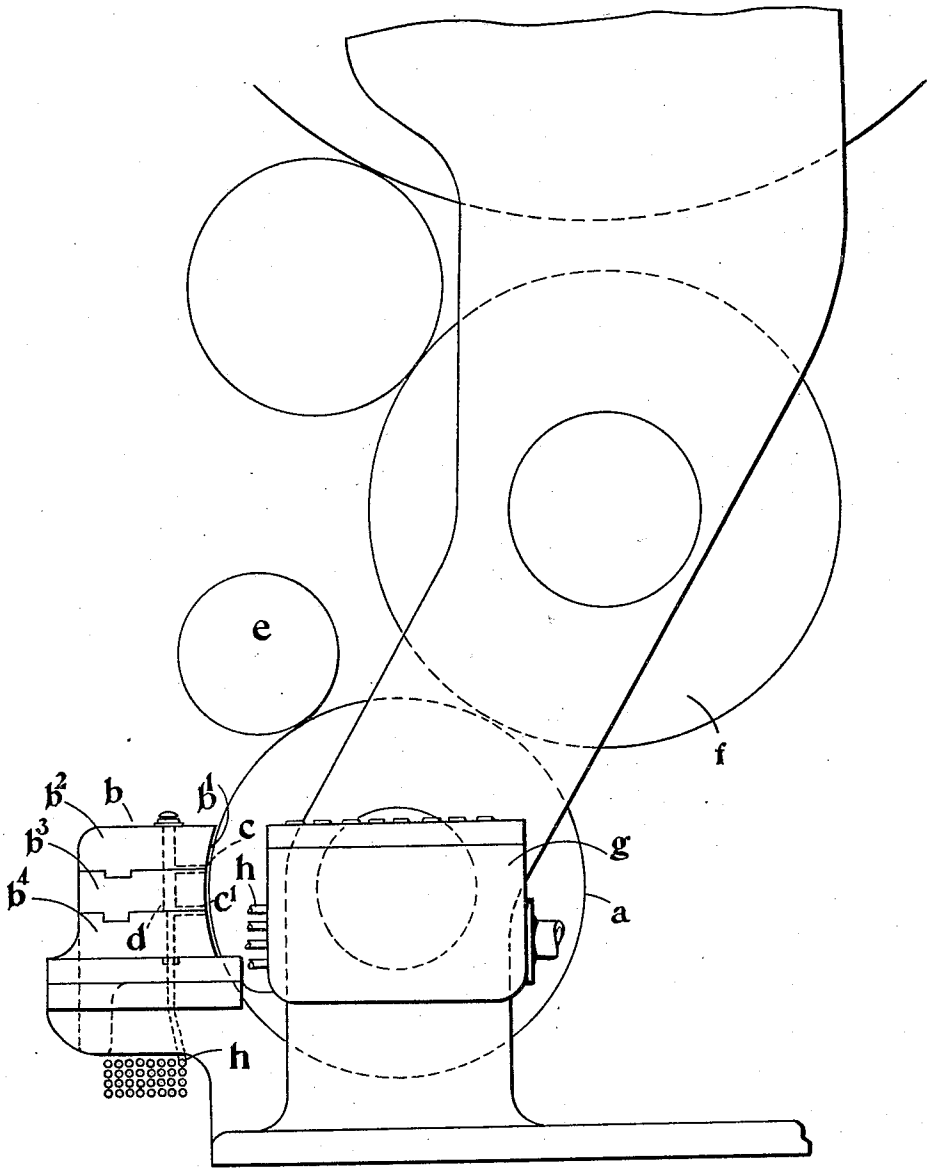


Fig. 1.

Inventor
C. H. Crabtree:
by
W. E. Evans:
Attorney.

June 14, 1932. C. H. CRABTREE 1,862,785

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Filed Aug. 7, 1930 6 Sheets-Sheet 2

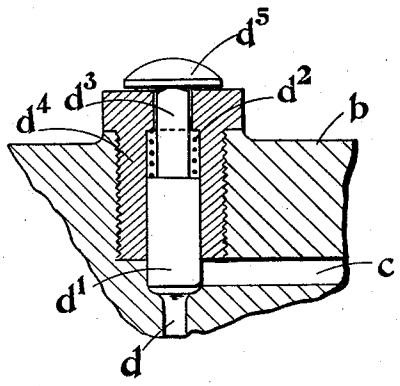


Fig. 3.

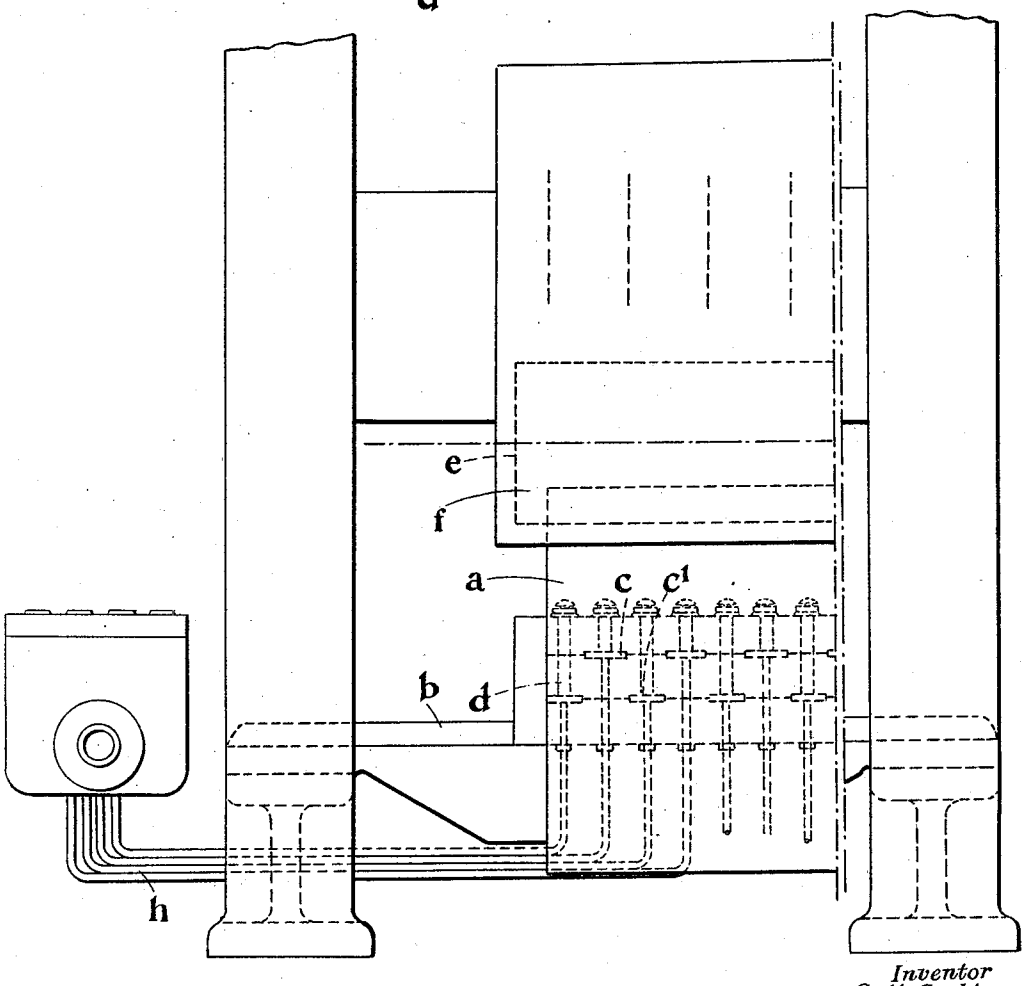


Fig. 2.

Inventor
C. H. Crabtree:
by
W. E. Evans
Attorney.

June 14, 1932. C. H. CRABTREE 1,862,785

INKING MECHANISM FOR PRINTING MACHINES

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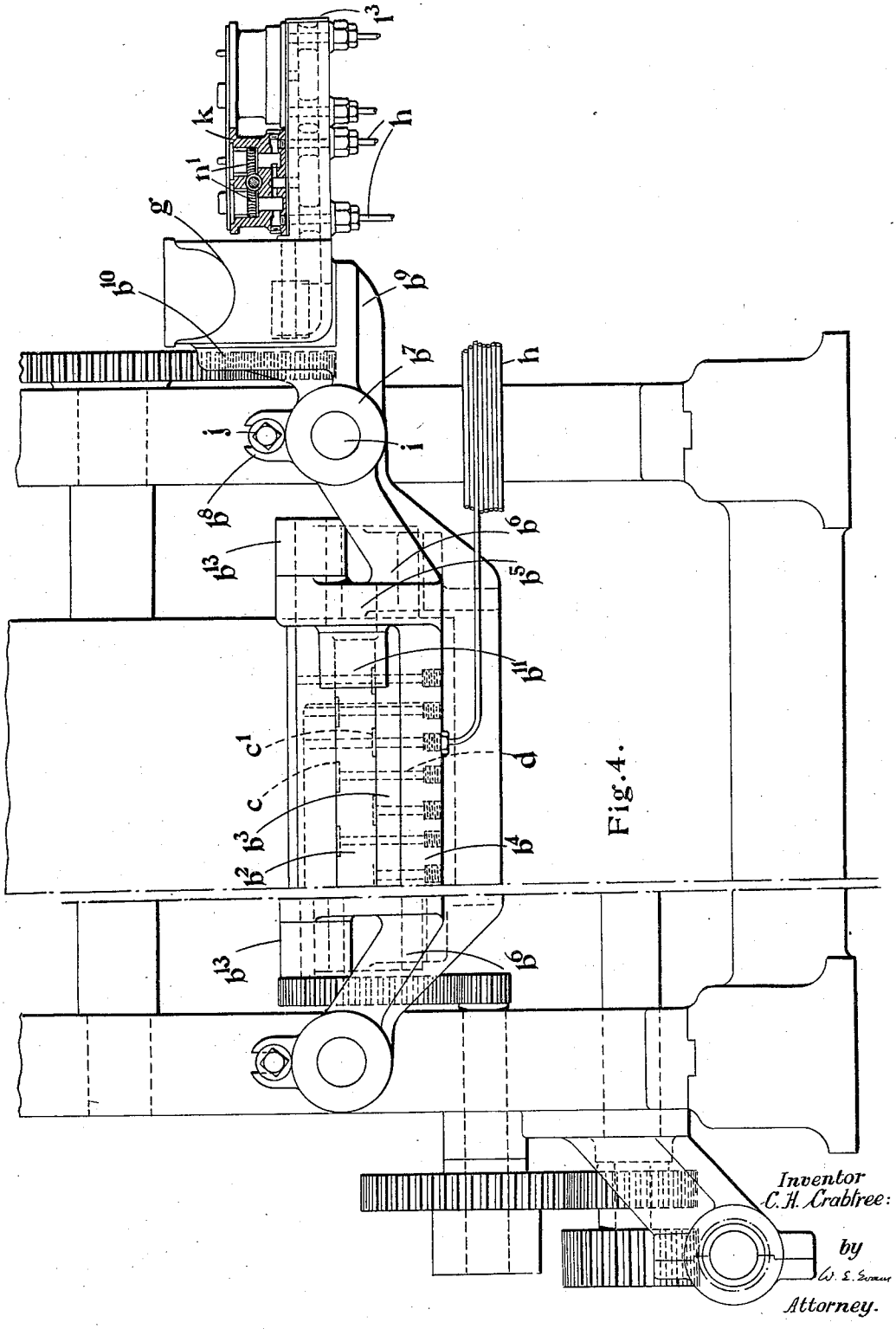


Fig. 4.

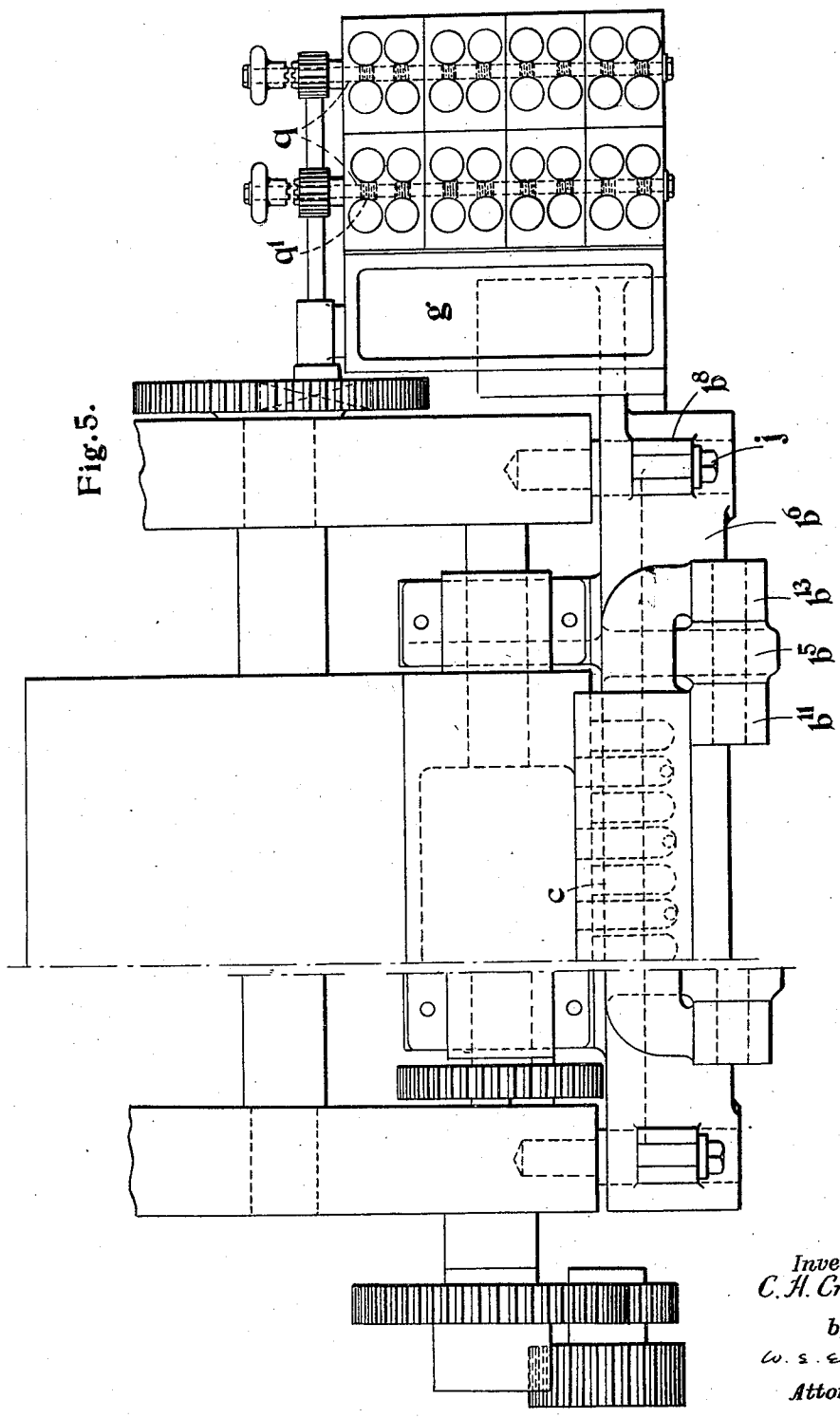
Inventor
C. H. Crabtree:
by
W. E. Simms
Attorney.

June 14, 1932. C. H. CRABTREE 1,862,785

INKING MECHANISM FOR PRINTING MACHINES

Filed Aug. 7, 1930 6 Sheets-Sheet 4

Fig.5.



Inventor
C. H. Crabtree:
by
W. S. Evans:
Attorney.

June 14, 1932. C. H. CRABTREE 1,862,785

INKING MECHANISM FOR PRINTING MACHINES

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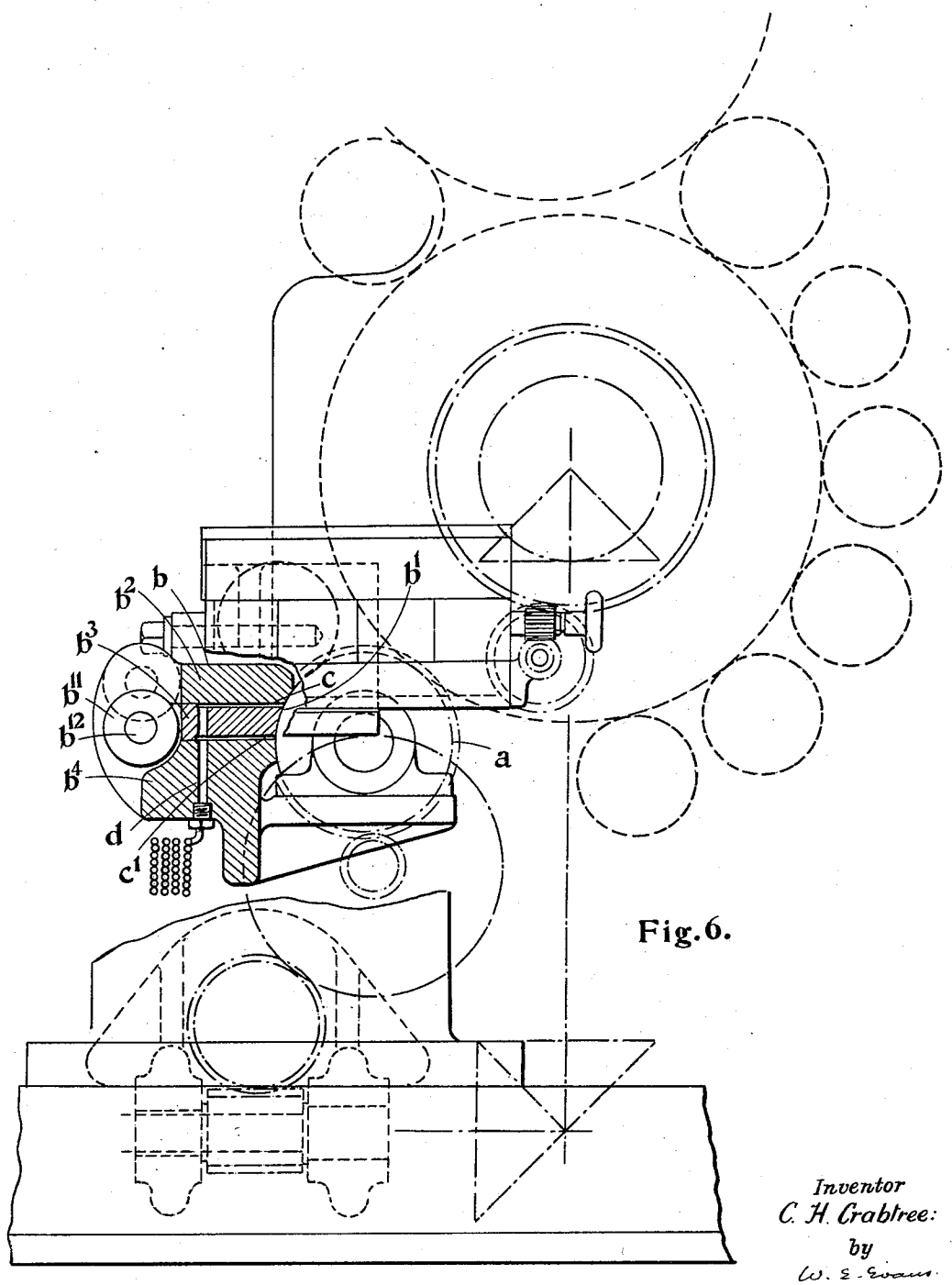


Fig. 6.

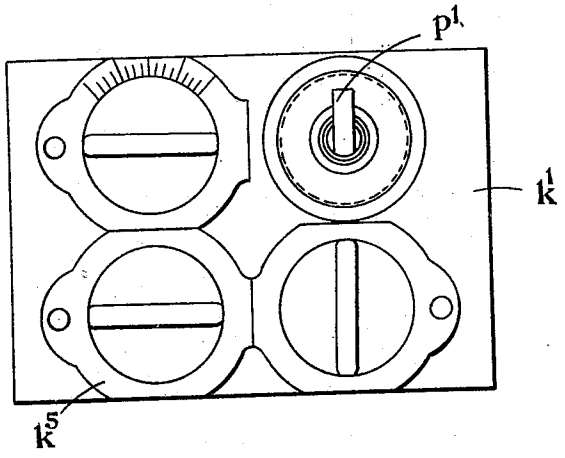
Inventor
C. H. Crabtree:
by
W. E. Evans
Attorney.

June 14, 1932. C. H. CRABTREE 1,862,785

INKING MECHANISM FOR PRINTING MACHINES

Filed Aug. 7, 1930 6 Sheets-Sheet 6

Fig. 8.



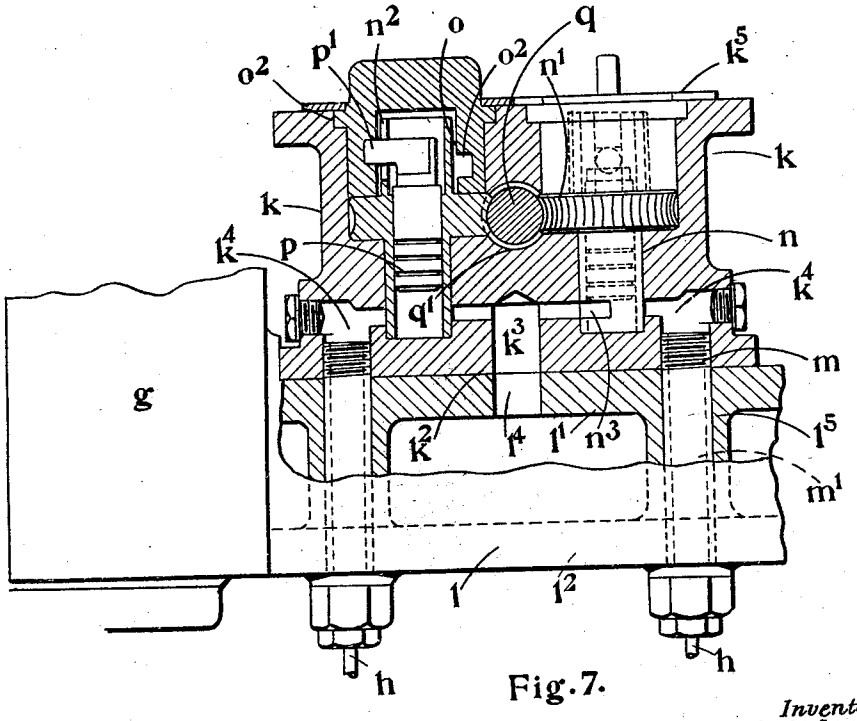


Fig. 7.

Inventor
C. H. Crabtree.
by
W. E. Evans
Attorney.

Patented June 14, 1932 1,862,785

UNITED STATES PATENT OFFICE

CHARLES HENRY CRABTREE, OF LEEDS, ENGLAND

INKING MECHANISM FOR PRINTING MACHINES

Application filed August 7, 1930, Serial No. 473,591, and in Great Britain August 20, 1929.

This invention relates to the inking mechanism of printing machines and has among its objects to improve and simplify the distribution of ink and to avoid certain practical disadvantages experienced in known inking mechanism. Thus, it has been proposed to apply ink upon an inking cylinder running at a speed equal to the peripheral speed of the impression cylinder and printing surface by using a plurality of pumps, such as one pump to a column of printed matter, the printing cylinder rotating a number of times for each impulse of the pumps, whereby the quantity of ink applied to the printing cylinder varies; while, moreover, the use of one pump for each column does not yield even distribution without recourse to a number of distributing rollers.

According to the invention the ink is applied to a slowly rotating inking cylinder by means of pumps which discharge ink through a number of sets of orifices, such as two, in which sets the orifices alternate in a staggered relation, whereby the orifices in one set are spaced apart in a position and to an extent corresponding to the width and position of the orifices in the adjacent set, so that thus in the slow rotation of the inking cylinder separate bands of ink or colour are applied on the inking cylinder which by reason of the staggered relation and positions of the respective sets of orifices form a continuous film on the inking cylinder. By such means equality of feed and uniformity of distribution is ensured where, for example, two separate orifices are provided for each column and a separate pump with respect to each orifice, there being thus two pumps for each column.

According to the invention, moreover, telltale devices are provided by which the impulses of the pumps are indicated, each telltale device comprising a plunger closing communication within a passage through which the ink passes to the orifice, the plunger, for example, being provided with an integral pin, the end of which extends outwardly and is provided with a head, a helical spring being mounted upon the inwardly extending part of the pin as a means of maintaining the plunger in its normal closed position. By such means at each impulse the plunger is lifted to permit of ink passing through the orifice from which the ink is discharged on to the inking cylinder, the impulse being indicated by the movement of the external head referred to.

The invention comprises the features hereinafter described.

The invention is illustrated in the accompanying diagrammatic drawings, by way of example.

Figure 1 is an end elevation of a part of a printing machine showing the inking mechanism according to the invention.

Figure 2 is a front elevation corresponding to Figure 1.

Figure 3 is a detail sectional view, to an enlarged scale, of one of the indicating devices.

Figure 4 is a front elevation of a modified construction of the inking mechanism according to the invention.

Figure 5 is a plan view corresponding to Figure 4.

Figure 6 is a sectional end elevation corresponding to Figures 4 and 5.

Figure 7 is a detail sectional view of the pump mechanism.

Figure 8 is a plan view corresponding to Figure 7.

In carrying the invention into effect according to the construction represented in Figures 1 to 3 of the accompanying drawings a slowly rotating inking cylinder a is provided to extend the width of the machine or press, and at the rear of the cylinder a I mount a bridge b extending the width of the machine or press. This bridge b is advantageously provided with a front face b^1 having a curvature corresponding with that of the inking cylinder a and with means for bringing the bridge into such proximity to the inking cylinder that the ink may be applied upon the cylinder as the cylinder slowly rotates, for example, in an upward direction past the bridge.

Two sets of orifices c, c^1 may be provided in the manner hereinbefore described in lines

parallel with the axis of the inking cylinder, the orifices being of an elongated form and of a width corresponding, for example, to one-half the width of a column. The respective sets of orifices c, c^1 are disposed in position one set immediately above the other, and the orifices in each set spaced apart to an extent corresponding to the width of the respective orifices of the other set, so that thus the film bands of ink or colour that are applied upon the inking cylinder a form substantially a continuous film from one end or section of the inking cylinder a to the other.

The bridge is advantageously formed in three parts b^2, b^3, b^4 divided in substantially horizontal planes passing through the respective sets of orifices c, c^1 by which facility is afforded for the separation of the parts for cleaning or repair. Ink is supplied to each orifice through a vertically disposed passage d extending through the bridge b. The respective orifices are substantially horizontally disposed and communicate with the corresponding vertical passages d, which at their upper ends are adapted each for the reception of a plunger d^1 whose lower end is pressed downwardly, under the action of a helical spring d^2 provided as hereinbefore described, whereby the plunger d^1 rests upon a seat in the vertical passage d so as to close communication with the corresponding orifice, so that thus in the operation of the pump the ink or colour forces the plunger d^1 upwardly whereby it rises from the seat and the ink or colour thence passes transversely to the orifice. Each of the sliding plungers provided as hereinbefore described is formed or fitted with an upwardly extending rod or pin d^3, or separate piston and rod, which projects through a closure plug or bush d^4 fitted in the bridge b and is provided with a head d^5 which, by its movement under the action of the plunger thus serves to give visible indication of the operation of the corresponding pump.

The bridge b is conveniently supported on brackets provided on the machine frame at each side, and suitable means, such as screwed adjusting spindles, are provided for adjusting the position of the bridge upon the brackets to control the clearance between the front face b^1 and the inking cylinder a.

In position above and in contact with the inking cylinder a a smoothing roller e is advantageously provided to which is imparted an axial movement. An inking roller f is set above the inking cylinder a referred to, and the roller f has imparted to it a peripheral speed corresponding to that of the printing cylinder and web, and the roller f is so set as not to contact with the inking cylinder a, but to be maintained in such close relation that on the rotation of the inking roller referred to a continuous film of ink passes from the inking cylinder by capillary attraction on to the inking roller f after which it is transferred to the printing cylinder in the usual manner, whereby a smaller number of distributing rollers than that commonly employed may be used. The roller f is conveniently mounted in bearings that will permit of the roller being moved towards and away from the inking cylinder a for control of the clearance between them.

Each pump is fed from and conveniently provided within a storage tank or container g placed in a convenient position at the side of the printing couple where the adjustment or control of adjustment of the pump on the tank or container is easily effected, and the respective pumps are set together so as to be conveniently operable for supplying ink to the respective orifices in the bridge by way of delivery tubes h which extend under the bridge to the respectively vertically disposed passages in the bridge.

It is preferred to provide two pumps and two orifices for each column, but no limitation is involved to this number. Moreover, the invention may be carried out in the use of a less number of pumps or even in the use of merely one for a whole section or length of the inking cylinder, and in providing the orifices in any number of sets in which the respective orifices are set in staggered relation for the purpose described.

The construction of the several parts of the mechanism may clearly be modified without departing from the invention. Thus, in carrying the invention into effect according to the modified construction of the several parts, as illustrated in Figures 4 to 8, the bridge b is divided into three horizontal sections b^2, b^3, b^4, the lower of which, b^4, is formed with the vertically disposed passages d and the upper surface of which defines the lower edge or surface of the lower set of ink orifices c^1, while the forward edge forms part of the curved front b^1. At the two ends the said section is provided with upstanding lugs b^5 to which the middle and upper sections b^3, b^2 of the bridge may be secured and also with extensions b^6 provided with bored bosses b^7 by which the bridge as a whole may be slidably supported upon horizontally disposed bearing pins or shafts i mounted in the machine frame. The said bosses are also provided with forked lugs b^8 for engagement with horizontally disposed adjusting screws j by which the position of the bridge relatively to the inking cylinder a may be determined. The said lower section b^4 of the bridge may also be fitted with outstanding lugs or platforms by which, for example, an ink tray disposed below the inking cylinder may be supported and at the one end and beyond the boss b^7 at that end it may be formed or fitted with a horizontal platform b^9 and vertically disposed plate b^{10} upon which may be received the storage tank or container g and the pumps k.

The second or intermediate section b^3 of the bridge is provided as a flat fitting, having in its upper and lower surfaces the respective series of ink orifices or passages c, c^1 leading to the curved front b^1, the upper series c communicating with vertically disposed extensions of the passages d of the lower section b^4. At the two ends the said section is formed with bosses b^{11} extending forwardly, which are adapted, when the section is positioned upon the lower section, to lie on the inner sides of the upstanding lugs b^5 of the lower section, to permit the intermediate section to be secured in position upon the lower section by such means as bolts, pins or the like b^{12}, passing through the said bosses and engaging the said lugs. The uppermost section b^2 of the bridge is provided as a flat fitting having the lower surface machined and adapted to close the upper series of orifices c in the intermediate section b^3. Such section may be provided with the indicating or tell-tale devices as hereinbefore described, but if desired these devices may be omitted and the said section may merely form the closure plate for the upper series of orifices. The said section is secured in position upon the intermediate section by means of bored bosses b^{13} carried upon extensions at the ends of the section, which bosses are adapted to lie on the outer sides of the lugs b^5 of the lower section b^4 and to be secured thereto in the same manner as the bosses of the intermediate section.

The storage tank or container g for the ink conveniently comprises a rectangular boxlike fitting prepared for reception upon the platform b^9 and against the vertical plate b^{10} of the bridge member b^4 as hereinbefore described and to be secured thereto in any suitable manner. At the lower end and on the outer side the interior of the storage tank opens into a feed chamber l of rectangular form and relatively thin cross-section bounded by upper and lower plates l^1, l^2 and closed at the outer end remote from the storage tank by a closure plate l^3 or in any suitable manner. The upper plate is bored or formed with a number of feed orifices l^4, each of which serves to supply ink to two or more pumps k, while extending completely through the upper and lower plates and separated from the chamber between the said plates by means of bored connecting pieces or tubes l^5 are passages extending from the upper surface of the upper plate to the lower surface of the lower plate, and representing respectively the delivery passage for a single pump. The bodies of the pumps k, of which there may be, for example, sixteen, are conveniently provided in multiple units, that is to say, for example, a group of four pump bodies may be formed as a single rectangular casting k^1 adapted to be seated upon the upper plate l^1 of the feed chamber. Each unit may thus comprise four pump cylinders connected in pairs at k^2 to feed passages k^3 adapted to register with the feed orifices l^4 of the upper plate of the feed chamber and with separate delivery passages k^4 adapted to register with the delivery passages l^5 of the upper plate of the feed chamber. The units are secured in position by means of bolts m which pass through the upper and lower plates of the feed chamber from the lower side and are screwthreaded into the delivery orifices k^4 of the pump units, the said bolts being bored to form the actual delivery passages m^1 from the respective pumps and to serve at the lower end as unions by which the conduits or tubes h leading to the bridge b may be connected. Each pump conveniently comprises a rotatable valve sleeve n surrounded by a worm wheel n^1, which may be integrally formed therewith, and adapted to rotate within an adjustable sleeve o introduced in the upper part of the pump cylinder. The pump plunger p which is disposed within the valve sleeve n is provided with a transversely disposed pin or the like p^1 which extends through a longitudinal slot n^2 in the wall of the valve sleeve n and engages a cam or like groove o^1 in the wall of the adjustable sleeve o. The valve sleeve n is provided with a slot n^3 which in the rotation of the sleeve is adapted alternately to register with the supply and delivery ports of the pump cylinder. Each pump unit is bored transversely between the pairs of pump cylinders for the reception of a driving spindle q carrying worms q^1, which are adapted to engage respectively with the worm wheels n^1 of the pumps lying on either side of the said spindle. In an installation of thirty-two pumps, therefore, two driving spindles may serve each to operate sixteen pumps which comprise four pump units. Any suitable means for effecting the rotation of the driving spindles may be employed. Thus, they may be driven by suitable pinions from a worm spindle rotated through gearing from the machine driving mechanism, the pinions being loose upon the spindles and engaged therewith at will by hand-operated clutches. The adjustable sleeves are conveniently provided with flanges o^2 adapted to fit in shouldered recesses in the upper surface of the pump units and to be retained in position therein by means of a cover plate or plates k^5, which may be graduated to permit the angular position of the adjustable sleeves to be determined, and thus the output of the pump, by reason of the relative disposition of the cam groove of the adjustable sleeve and the port of the valve sleeve.

I claim:

1. Inking mechanism for printing machines, comprising an inking cylinder, means for rotating said inking cylinder, and means to deliver ink to said inking cylinder consisting of a plurality of delivery orifices disposed in sets distributed around the periph-

ery of the inking cylinder, the orifices in which sets alternate in staggered relation, an ink reservoir and pumps for supplying ink to said delivery orifices, the inking cylinder being rotated slowly so that the separate bands of ink applied thereto from the respective delivery orifices form a continuous film of ink on the surface of the cylinder.

2. Inking mechanism for printing machines as set forth in claim 1, comprising an axially movable smoothing roller in contact with the inking cylinder, and means for effecting axial movement of the said roller for the purpose of securing uniformity of distribution of the ink on the inking cylinder.

3. Inking mechanism for printing machines, comprising an inking cylinder, means for rotating said inking cylinder, means to deliver ink to said inking cylinder consisting of a plurality of delivery orifices disposed in sets distributed around the periphery of the inking cylinder, the orifices in which sets alternate in staggered relation, an ink reservoir and pumps for supplying ink to said delivery orifices, the inking cylinder being rotated slowly so that the separate bands of ink applied thereto from the respective delivery orifices form a continuous film of ink on the surface of the cylinder, an inking roller, and means for rotating said inking roller at a peripheral speed corresponding to that of the printing cylinder of the printing machine, the said inking roller being set in such close proximity to the slowly rotating inking cylinder that a continuous film of ink passes by capillary attraction from the inking cylinder to the inking roller.

4. Inking mechanism for printing machines, comprising an inking cylinder, means for rotating said inking cylinder, an inking bridge having a curved face set in close proximity to the surface of the inking cylinder and formed with a curvature struck from the axis of the said cylinder, a plurality of delivery orifices formed in the curved face of the said inking bridge and disposed in sets extending along the said curved face in spaced relation, the orifices in which sets alternate in staggered relation, an ink reservoir and pumps for supplying ink from said reservoir to said delivery orifices, the inking cylinder being rotated slowly so that the separate bands of ink supplied thereto from the respective delivery orifices form a continuous film of ink on the surface of the cylinder.

5. Inking mechanism for printing machines as set forth in claim 4, comprising an inking bridge constructed in a number of superposed sections, the sets of delivery orifices being respectively arranged in the curved face of the bridge along the lines of junction of the superposed sections.

6. Inking mechanism for printing machines as set forth in claim 4, comprising a closed ink reservoir, pumps mounted upon said reservoir and drawing ink therefrom, and conduits leading from said pumps to the respective orifices in said inking bridge.

7. Inking mechanism for printing machines as set forth in claim 4, comprising a closed ink reservoir, pumps mounted upon the said reservoir and drawing ink therefrom, said pumps being provided with rotatable sleeve valves, adjustable cams, pistons within said sleeve valves operated by said adjustable cams, and a common driving element for rotating said sleeve valve, and conduits leading from said pumps to the respective orifices in said inking bridge, and indicator plungers and cylinders in which said plungers are disposed, said cylinders being in communication with said respective conduits.

CHARLES HENRY CRABTREE.