

Nov. 14, 1944.

A. WEISS

2,362,736

ROTARY INTAGLIO PRINTING PRESS

Filed May 7, 1943

2 Sheets-Sheet 1

Fig. 1.

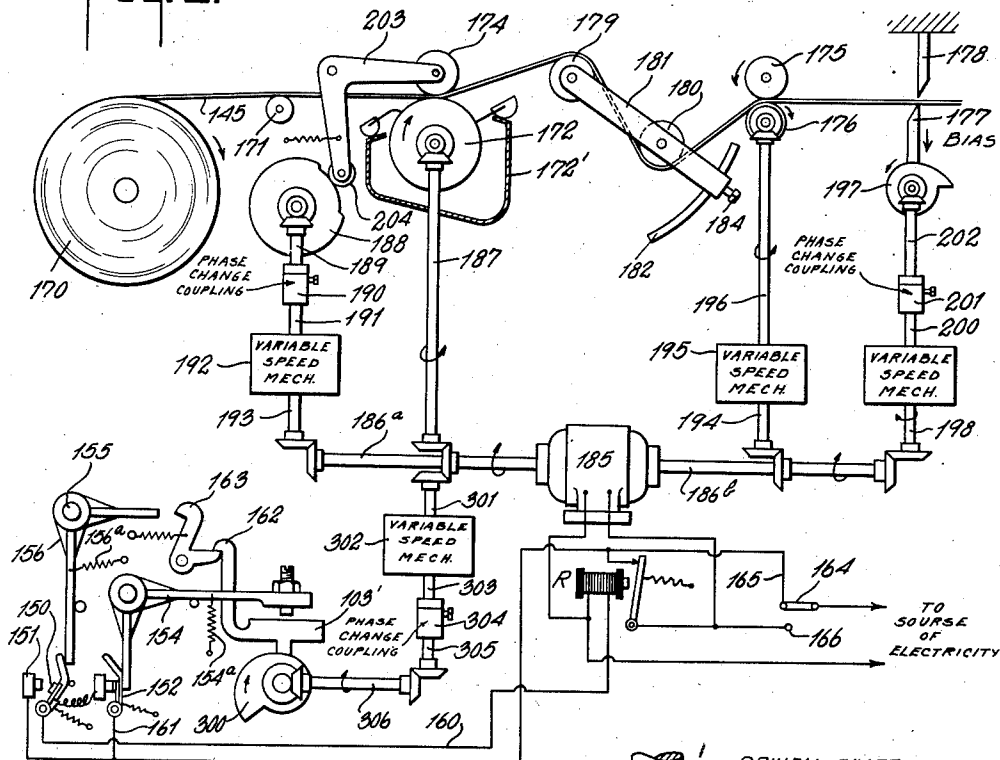
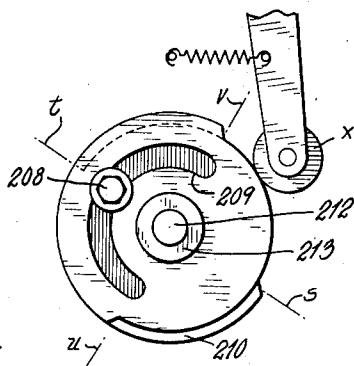
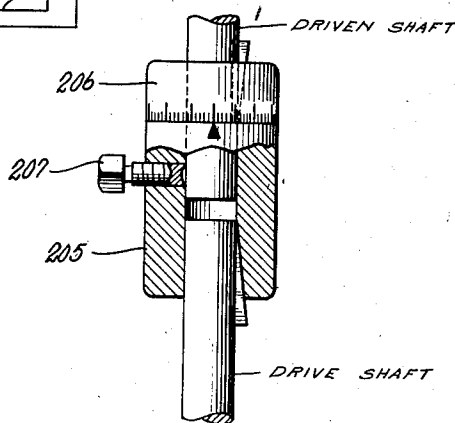


Fig. 3.



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2 Sheets-Sheet 2



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2,362,736

ROTARY INTAGLIO PRINTING PRESS

Adolph Weiss, Brooklyn, N. Y., assignor, by mesne assignments, to Champlain Company, Inc., New York, N. Y., a corporation of New York

Original application October 25, 1939, Serial No. 301,114. Divided and this application May 7, 1943, Serial No. 485,994

3 Claims. (Cl. 101—157)

This invention relates to rotary intaglio printing machines, and particularly to improvements in such machines of the character disclosed in my patents, Nos. Re. 18,856, 2,014,303 and 2,055,272, and in my applications Serial Nos. 81,409 and 130,672. The present application is a division of my application Serial No. 301,114 filed October 25, 1939 (Patent No. 2,321,342) which is a division of my application Serial No. 211,325, filed June 2, 1938 (Patent No. 2,217,191).

Among the general objects of this invention are to provide a simplified rotary intaglio printing machine structure and to provide improved co-ordination of the parts thereof.

Still further objects are to provide for automatic suspension of operation after a predetermined number of printing cycles, to provide for selective predetermination of such number of printing cycles, and to provide protection for the ink and inking roller during suspensions of operation to thereby maintain the press in operable condition.

Various additional objects will become evident from the following disclosure of illustrative embodiments of the invention.

Fig. 1 is a diagrammatic view illustrating the invention.

Fig. 2 is an enlarged scale elevation, partially in section, of a phase change coupling shown in Fig. 1. While this is a structural type of view, the figure is supplementary to diagrammatic Fig. 1. Accordingly the illustration of the coupling may be considered as diagrammatic in its relation to the invention as a whole.

Fig. 3 is a partially diagrammatic elevation of an adjustable cam that may be utilized in presses of the present invention.

Figs. 4 to 12, inclusive, are diagrammatic views illustrating some of the variations in printing results that can be achieved with presses embodying the present invention.

The invention, illustrated diagrammatically in Fig. 1, is applicable particularly to the specific press illustrated in my application Serial No. 301,114, filed October 25, 1939 (now Patent No. 2,321,342 patented June 8, 1943), of which this is a division. Referring to the drawings, and particularly to Fig. 1, the web 145 passes from supply roll 170 over guide roller 171 and between printing cylinder 172 and pressure roller 174. The printing cylinder is provided with a completely sealed inking system 172', of the type disclosed in my Patent No. 2,217,191. Subsequent to the printing, the web passes between

feed rollers 175 and 176, and is delivered between the blades 177 and 178 of cutting shears. Between the printing cylinder 172 and feed rollers 175, 176, the web may pass over two rollers 179 and 180, which are so arranged as to vary the distance which the web must travel in moving from the printing cylinder to the cutting shears. The axis of roller 179 is stationary, but roller 180 is rotatably mounted on a swinging frame 181 which is pivoted coaxially with roller 179. By swinging the frame 181 and locking it to a sector 182 by set screw 184, the adjustment is made to vary the length of the travel of the web between the printing cylinder 172 and the cutting shears. This adjustment permits severing of the web at any selected point in the printing cylinder impression.

The various driven elements of the press are mechanically connected together to be actuated from a single source of power indicated as an electric motor 185. To permit a clear and convenient diagrammatic showing of the operating relationships of the different parts, bevelled gears have been indicated in Fig. 1 of the drawings. However, in actual machine construction, it is preferable to so arrange the parts as to permit the use of spur gears or the like. As shown in the drawings, the motor drives shafts 186^a and 186^b, which are in effect a single shaft. By means of shaft 187, power is transmitted to the printing cylinder 172 to rotate it at predetermined speed, which may be the speed of the motor. A cam 188 (to be referred to later) is driven in coordination with the printing cylinder 172 by power transmitted to it through shaft 189, phase-change coupling 190, shaft 191, variable speed mechanism 192, and shaft 193, which is geared to the drive shaft. At least one of feed rollers 175 and 176 is driven in coordination with the printing cylinder 172, the driving power being transmitted from the drive shaft 186^b through shaft 194, variable speed mechanism 195, and shaft 196. The movable blade 177 of the web cutting shears is adapted to be actuated by cam 197, which is also driven in coordination with the printing cylinder 172. The power for driving the cam 197 is derived from the power shaft 186^b through shaft 198, variable speed mechanism 199, shaft 200, phase-changing coupling 201, and shaft 202.

Pressure roller 174 is rotatably mounted on a pivoted frame 203, which is adapted to be rocked by cam 188. When the inactive (or low) zone of cam 188 is in contact with roller 204, the pressure roller 174 holds the web 145 in contact

with the printing cylinder 172. Accordingly, throughout the inactive zone of cam 188 the web is printed with any design which passes the printing zone of the printing cylinder 172. However, during the active (or high) zone of cam 188, the pressure roller 174 is elevated, with the result that the web is out of contact with the printing cylinder and no printing play takes place.

While the web is out of contact with the printing cylinder, it is, nevertheless, advanced by feed rollers 175, 176, which may be driven at the same peripheral speed as the speed of the printing cylinder 172. By means of variable speed mechanism 195, the peripheral speed of feed rollers 175, 176 may be adjusted to conform with the peripheral speed of different sizes of printing cylinders 172 which may be inserted into the machine. Variable speed mechanism 199 provides an adjustment so that the cutting shears may be set to operate at any desired frequency in relation to the cyclic operation of the machine; for example, the web may be severed into lengths corresponding to one, less than one, or more than one revolution of printing cylinder 172. Phase-change coupling 201 provides a means whereby the point of severance may be located on the web, though a similar location may be effected by adjusting the position of roller 180. Variable speed mechanism 192 permits the control cam 188 to be rotated at various cyclic rates in relation to the rotation of the printing cylinder 172. Also phase-change coupling 190 permits any inactive sector of cam 188 to be located in coordination with any selected peripheral zone of the printing cylinder 172.

The press may be so controlled that upon being set in operation, it automatically stops after one or more printing cycles (e. g. after printing and cutting one or more slips). This control may be similar to that shown in Figs. 2 and 5 of my application Serial No. 301,114 (Patent No. 2,321,342, patented June 8, 1943), and is so illustrated in Fig. 1.

A cam 300 is shown as driven from drive shaft 186^a through shaft 301, variable speed mechanism 302, shaft 303, phase change coupling 304, shaft 305, and shaft 306. Thus cam 300 may be set at any phase with respect to the printing cylinder; and for each revolution of the printing cylinder, it may make one, more than one, or less than one revolution. Once each revolution, cam 300 elevates member 103' and stops the press. The starting and stopping of the press is effected by controlling motor 185 and a mechanical and electrical system associated with member 103'.

This mechanical and electrical system comprises movable contacts 150 and 152, which are spring biased away from the stationary contacts 151 and 153, respectively. Pivoted to the press casing (not shown) is a bell crank lever 154, having a vertical leg adapted to engage contact 152. A spring 154^a biases bell crank lever 154 with sufficient strength to overcome the bias of contact 152 and close the same when lever 154 is free to move. A shaft 155 extends across the press cover; and keyed or pinned to the end of the shaft is a bell crank lever 156. This lever is movable to close contact 150, but is biased in the opposite direction by spring 156^a.

Assume that the machine is in operation, with the printing cycle in progress. The electrical contacts are then in the positions shown in Fig. 1, the circuit to the motor 185 being maintained

by relay R. The holding circuit for relay R is through connection 160, contact 150, contacts 153 and 152, and connection 161 and switch 164 to the line. At the end of the printing cycle, cam 300 lifts member 103', which moves bell crank lever 154, and permits contacts 153, 152 to open. This breaks the holding circuit of relay R, allowing the relay to open and stop driving motor 185.

Attached to extension 193' is a latch-engaging hook 162 which moves upwardly with extension 103', allowing latch 163 to advance so that its upper portion engages the end of the horizontal arm of bell crank lever 156.

The press is started by rotating shaft 155, thereby moving bell crank lever 156 clockwise to close contacts 150, 151 which complete the circuit to relay R, so that the relay operates and starts the driving motor 185. Latch 163 is arranged to hold bell crank lever 156 in its operated position, thereby maintaining contacts 150, 151 closed as the press starts to operate. The initial movement of the press causes extension 103' to descend, which allows bell crank lever 154 to rotate and close contacts 152, 153. This restores the original holding circuit for relay R, through connection 160, contact 150, contacts 153 and 152, and connection 161. After contacts 152, 153 are closed, hook 162 retracts latch 163 and permits bell crank lever 156 to return to its initial position and contacts 150, 151 to open.

When the machine cycle is completed, contacts 152, 153 are again opened and the machine stopped. If it is desired to operate the press continuously, switch 164 is shifted from contact 165 to contact 166, thus connecting the motor 185 for continuous operation.

Fig. 2 shows more clearly the diagrammatic phase-change couplings 190, 201 and 304. The driving shaft of the coupling is keyed to a collar 205 and the driven shaft is keyed to an abutting collar 206. Set screw 207 secures collar 205 to the driven shaft for the transmission of power. By loosening the set screw, the driven shaft can be rotated with respect to the driving shaft to change the operating phase of the part actuated from the driven shaft. To aid in making the adjustment, the contiguous ends of collars 205 and 206 may be provided with a scale and cooperating index as shown in the drawings.

The control cam for elevating and depressing the pressure roller may be of a suitable adjustable type. One of such type of adjustable cam is shown in Fig. 3. Affixed to the cam shaft is a cam element 210 having an active (or high) zone which extends clockwise from the line *s* to the line *t*. Rotatably mounted on the cam shaft is a replaceable and adjustable cam element 211 having an active zone extending clockwise from the line *u* to the line *v*. Attached to cam shaft 212 is a collar 213 which holds the adjustable cam element 211 against the main cam element 210. A bolt 208 passes through an arcuate slot 209 in the adjustable cam element and is threaded into the main cam element. The cam roller *x* has a face wide enough to engage both the edge of the main cam element 210 and the adjustable cam element 211. By setting the adjustable cam element to effect various degrees of overlap of the active zones of elements 210 and 211, the effective active and inactive zones of the cam are varied.

Figs. 4 to 12

These figures show a few of the many printing effects that may be produced by a press such

as illustrated in Fig. 1 of the drawings. The web shown in the figures represents the web after it has been acted upon by the printing cylinder. For the sake of illustration, the printing cylinder is assumed to be engraved with either a square design, or a circular design, or both. Each design printed on the web is illustrated in full lines. Where a design on the printing cylinder passes the printing zone without being printed (due to pressure roller 174, Fig. 1 being elevated), the location of such design with respect to the web is indicated in dot-dash lines in Figs. 4 to 12.

For each of Figs. 4 to 12, the printing cylinder is the same size, and cam 188 is the same though rotated at various speeds relative to the printing cylinder. In each of these figures, one printing cylinder revolution corresponds to the web length between consecutive of the vertical dot-dash lines. However, the location of these lines has nothing to do with the beginning and end of the printed slips (if such are being made) as the web may be so severed as to place the design on any selected part of the slip.

For Fig. 4, the control cam (188 in Fig. 1) rotates synchronously with the printing cylinder which has one square engraving. The cam action graph 188^a indicates that the web is in contact with the printing cylinder during intervals *i* (five shown) and out of contact during intervening intervals *h*. Accordingly, web 145^a is printed as shown, with one rectangle per printing cylinder revolution; and the length of the printing cylinder impression is equal to arrow 400^a, which is the peripheral length of the printing cylinder.

To print the web 145^b shown in Fig. 5, it is only necessary to so adjust the speed of cam 188 that it makes one revolution for each two revolutions of the printing cylinder. In other words, the cam runs at half the angular speed of the printing cylinder. As indicated by cam graph 188^b, the design is printed only every second revolution of the printing cylinder, so that the printing cylinder impression is twice the peripheral length of the printing cylinder, as indicated by the length of arrow 400^b.

Fig. 6 shows the effect of reducing the angular speed of the cam 188 to one third that of the printing cylinder as indicated by graph 188^c. The design is printed on web 145^c only once every third revolution of the printing cylinder; and the printing cylinder impression has a length equal to arrow 400^c.

In Fig. 7 the web 145^d is printed the same as the web in Fig. 6. The printing cylinder impression has the same length as indicated by arrow 400^d. However, the result is obtained by rotating the control cam at two-thirds the angular speed of the printing cylinder, the cam action being indicated by graph 188^d.

For Figures 8 to 12, the printing cylinder has both square and circular engravings. Operated in continuous contact with the web, it would print the web 145^e shown in Fig. 19, the length of the printing cylinder impression being indicated by arrow 400^e.

If this two design cylinder is used with the cam 188 operating as for Fig. 4, it prints a web 145^f as shown in Fig. 9. This is the same as web 145^e, the circular design being blanked out by the cam

action indicated by graph 188^f. The length of the impression is that of arrow 400^f.

By cutting the cam speed in half as indicated by graph 188^g, Fig. 10, the web 145^g is printed. This is the same as web 145^b, Fig. 5, the length of the printing cylinder impression being that of arrow 400^g.

For Fig. 11, the cam is operated synchronously with the printing cylinder as indicated by graph 188^h. However, the phase of the cam is shifted 180 degrees from the condition indicated in Fig. 9. Thus, the web 145^h is printed with the circular design instead of the square design. Arrow 400^h indicates the length of the impression, which is equal to the peripheral length of the printing cylinder.

For Fig. 12, the cam 188 is slowed to half speed as indicated by graph 188ⁱ. The result is that the length of the impression is doubled as indicated by the length of arrow 400ⁱ; and web 145ⁱ is printed with the circular design every second revolution of the printing cylinder.

For these examples, it will be apparent that a variety of effects may be produced by suitably correlating the angular speeds of the control cam and printing cylinders. These may be related after the manner of ratios used in hunting tooth gear sets. Thus, even with a cam speed near to the cylinder speed, the length of the impression may be made several (or even many) times the peripheral length of the printing cylinder. Also, the same cylinder may have various designs which may be printed selectively or in various chosen combinations.

In compliance with the patent statutes, I have disclosed the best forms in which I have contemplated applying my invention. However, it will be understood that the disclosures are illustrative and not limiting.

This application is a division of my application Serial No. 301,114, filed October 25, 1939.

I claim:

1. A rotary printing press comprising: a printing cylinder having a peripheral zone free of engravings, a sealed fountain housing sealed to said cylinder, means to start the press, and means to stop the press with said zone of the cylinder in a position outside of said fountain housing whereby the remaining zones of the cylinder are within the sealed fountain housing.

2. A rotary printing press comprising: a printing cylinder having a peripheral zone free of engravings, a sealed fountain housing sealed to said cylinder, means to start the press, means to stop the press after a predetermined number of printing cycles with said zone of the cylinder in a position outside of said fountain housing whereby the remaining zones of the cylinder are within the sealed fountain housing, and means to vary said predetermination to a different number of printing cycles.

3. A rotary printing press comprising: a printing cylinder, means to set the cylinder in operation, means automatically operative to suspend operation of the cylinder after a predetermined number of printing cycles, and mechanism to vary the relative speeds of operation of said means and said cylinder to vary said predetermination to a different number of printing cycles.

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