Dec. 3, 1935. J. R. TOMLIN ET AL 2,022,696

PRINTING MACHINE

Filed June 17, 1932 2 Sheets-Sheet 1

FIG. 1.

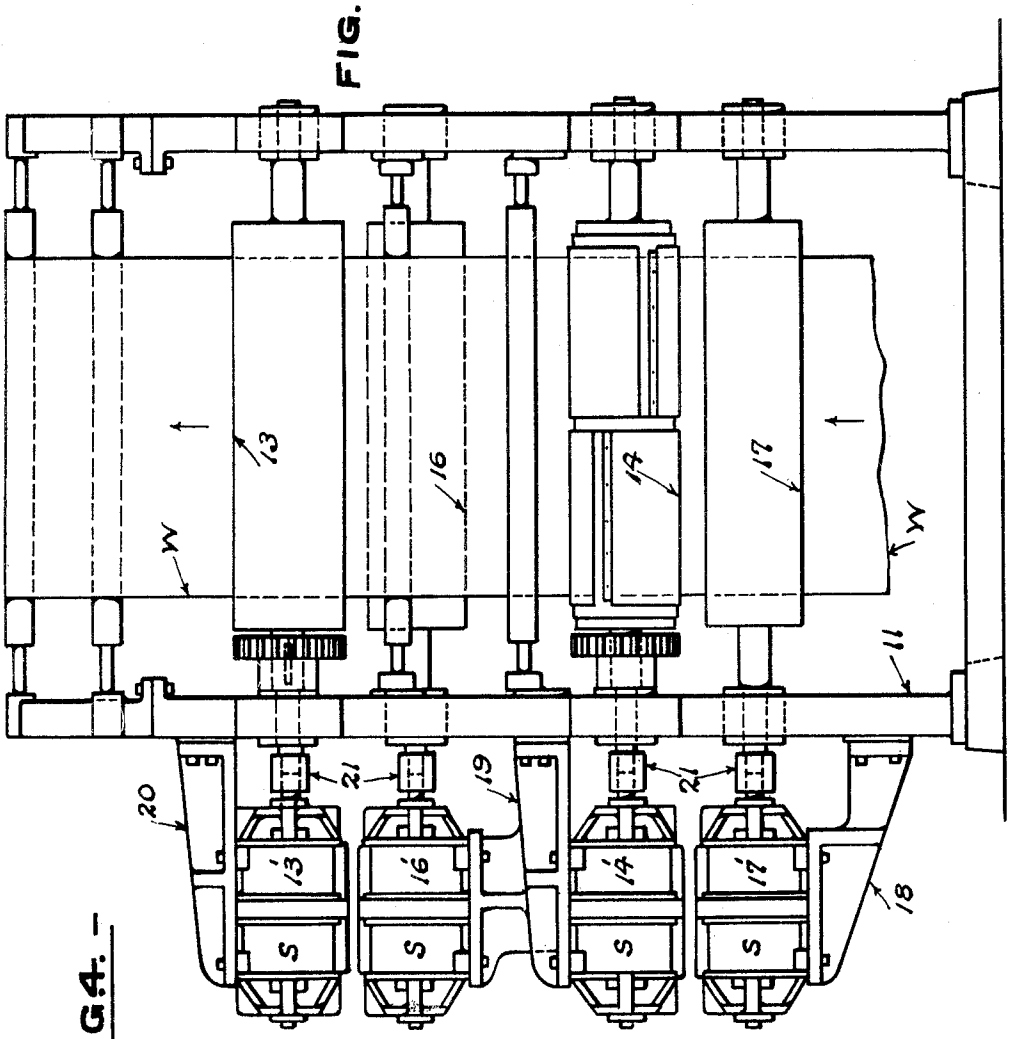
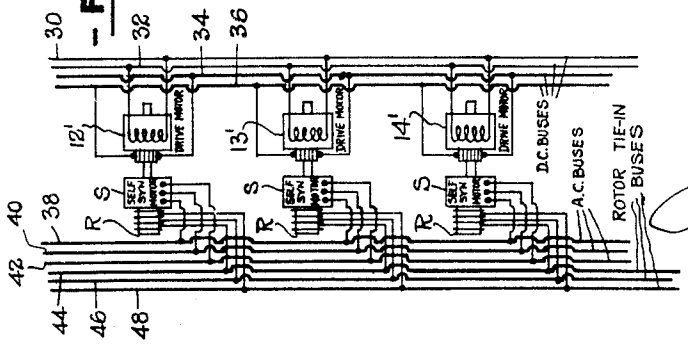


FIG. 4.



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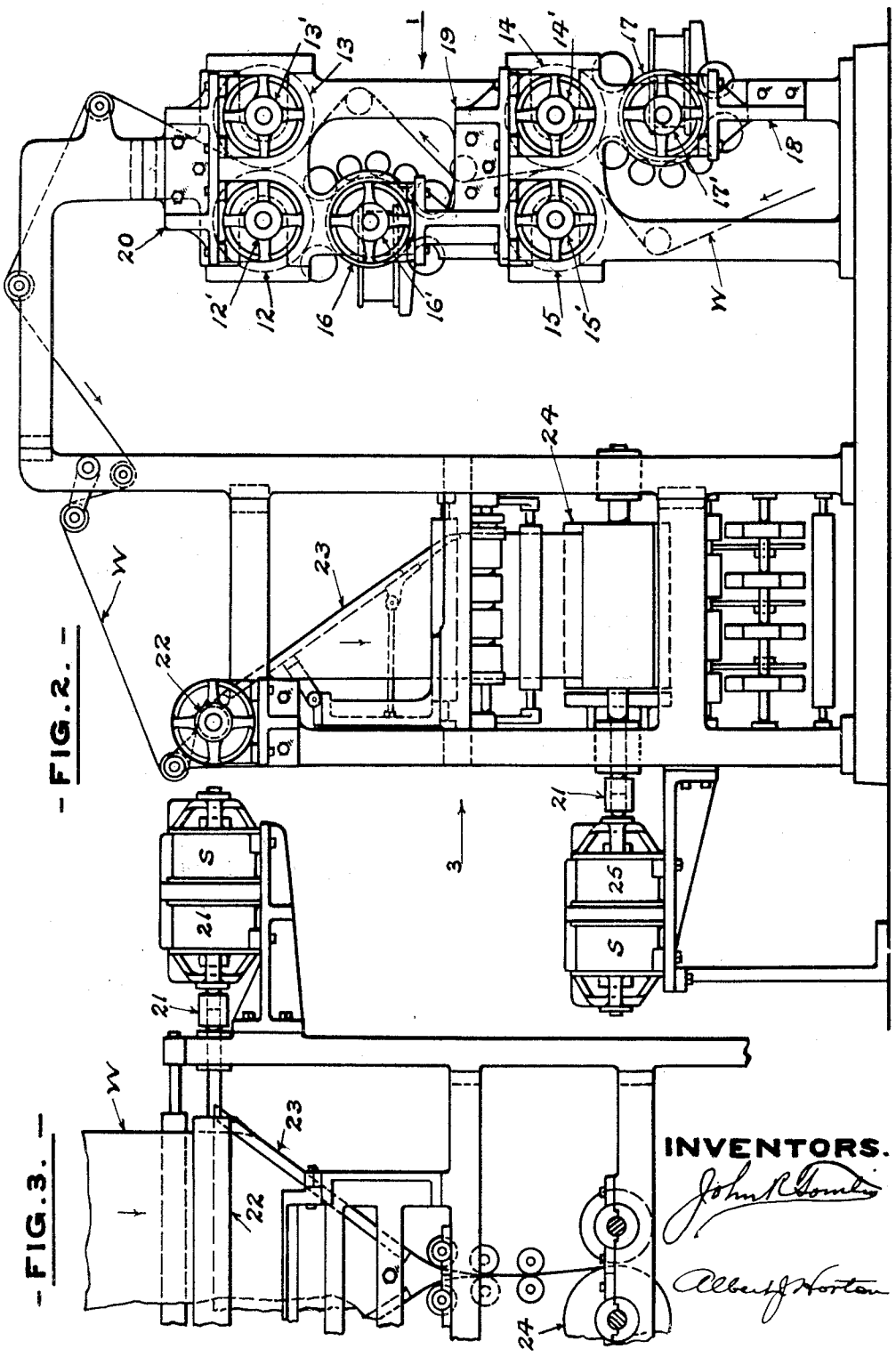


FIG. 2.

FIG. 3.

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2,022,696

PRINTING MACHINE

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Application June 17, 1932, Serial No. 617,754

7 Claims. (Cl. 270—5)

This invention relates to printing machinery and more particularly to driving mechanism for printing machines.

The general object of the invention is to provide a more convenient and more efficient method and means for driving printing machines.

A more particular object of the invention is to provide an improved method and combination of means for driving the various major operating units or components of printing machines.

A further object is to provide a driving system for a printing machine which embodies individual driving motors for certain elements of a printing machine, the driving motors being electrically interconnected by synchronizing means for maintaining a corresponding synchronization of the printing cylinders or rollers.

Another object is to provide an independent motor drive for each printing cylinder and for each folding cylinder of a printing machine, with a view to eliminating interconnecting drive shafts, gear trains and mechanism generally associated with conventional drive systems for printing machines.

It is also an object of the invention to provide driving mechanism for printing machines of generally improved construction, whereby the device will be simple in construction, and durable as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

The system herein contemplated eliminates practically all interconnecting drive shafts and coacting elements, such as gears, heretofore used, with a consequent general simplification of the whole driving system and a saving in labor and maintenance. In addition, the present system is far more flexible and convenient for the exacting requirement of modern newspaper and printing plants, it being observed the breakdown or disabling of a single unit will not affect the other power driven units, whereas, by the conventional system employing one main drive, should the latter fail, the entire system is rendered inoperative.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a fragmentary elevational view of a printing machine embodying the invention; as seen in the direction of the arrow 1 of Figure 2;

Figure 2 is a fragmentary elevational view of the invention; and

Figure 3 is a fragmentary elevational view of the machine as seen in the direction of the arrow 3 of Figure 2.

Figure 4 is a diagrammatic view of the electric circuit to the driving and self synchronizing motors.

While the preferred form of the invention is illustrated in the accompanying drawings, it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and that the invention is not limited to the precise arrangement and organization of the instrumentalities as herein shown and described.

In the drawings, wherein similar characters of reference indicate corresponding parts in the several views of the preferred form of the invention, and referring to Figure 1, 11 designates a supporting frame on which a plurality of printing units are secured. Each of the said printing units comprises a printing couple consisting of two major operating members, a plate cylinder and an impression cylinder, the respective plate and impression cylinders in the upper and lower pairs being numbered 12, 13, 14 and 15 which are the upper and lower printing couples respectively, generally referred to in the aggregate as a "perfecting" unit. Each of the printing couples has connected thereto an inking mechanism which includes as a major member, an inking cylinder 16, 17 for each of the said printing couples 12, 13, 14 and 15 respectively.

As an important feature of the present invention, an individual motor is coupled to the shaft of each of the major rotating members of the printing machine, i. e., the plate impression and inking cylinders, these motors being numbered 12', 13', 14', 15', 16' and 17' respectively, the primed members indicating the motors of the adjacent members. The motors are conveniently supported on brackets or platforms which are bolted, or otherwise suitably secured to the frame 11, the arrangements shown being found satisfactory, although any other suitable method or means may be employed.

In the present instance, by way of example, a bracket 18 secured to the frame 11, supports the motor 17', while another bracket 19 fastened to

the frame is adapted to support the three motors, two of which 14', 15' depend from the underneath side of the bracket 19 while the third 16' is seated on the top of the same bracket.

In a similar manner, a pair of motors 12' and 13' are secured in depending relation to a bracket 20 bolted or otherwise suitably fixed to the frame 11.

The respective shafts of the motors may be joined to the adjacent shafts of the plate, impression, inking and folding cylinders, and also the drag roller, by couplings 21, or in any other suitable manner, the shafts of the said cylinders being rotatably mounted in means secured to the frame 11. Each of the motors, above mentioned, may be of a direct current type or alternating current type, and each equipped with a synchronizing device S coupled immediately thereto or to the shaft of the said motor.

The synchronizing devices which are preferably actuated by polyphase alternating current, may be of well-known construction, having wound rotors, the function of the synchronizing devices being to maintain the speed of each motor absolutely synchronous with all the others. Those versed in the art will understand that this is accomplished by connecting the stators of the several synchronizing devices in parallel and to a polyphase alternating current line, and connecting all their rotors in parallel in a separate circuit, as shown in Figure 4.

The major folding members of the printing machine are likewise operated by synchronized motors which are maintained in absolute step with the units shown in Figures 1 and 2 by synchronizing units S attached thereto. The portion of the folding mechanism actually shown, includes the forwarding or drag roller 22 from which the web W passes to a V-shaped former 23 and thence to a folding cylinder 24. The forwarding roller 22 is operated by a motor 21 having attached thereto a synchronizer S, while the folding cylinder 24 is actuated by a motor 25 also provided with a synchronizer S. In certain types of printing machines it may be desirable to drive other rotary operating members of the machines by separate or individual motors. In such cases, the folder fans, nipping rollers, web guide rollers, and the like may, each be driven by separate motors in the manner hereinbefore disclosed, and inasmuch as the same principle and structure are employed in each instance these additional motors are not here illustrated.

All of the motors, it will now be understood, are operated in parallel and are electrically coupled so that all operate in synchronism. The synchronizing devices are preferably energized before power is applied to the said motors, and remain energized until the machine stops. Three of the direct current drive motors 12', 13' and 14' are diagrammatically illustrated in Figure 4, and their field coils are excited by direct current supplied through feed wires or buses 30 and 32, from any suitable generating source, not shown. Direct current is supplied to the armature or rotor windings of the drive motors from a suitable source, not shown, through feed wires or buses 34 and 36. When electric current is supplied to the drive motors through the usual control mechanism, not shown, all of these motors will operate at approximately the same speed, but in order to insure that they will operate or rotate in absolute synchronism, self synchronizing motors are provided, and the rotor of each self synchronizing motor is mechanically connected to a drive motor by securing the rotor of the self synchronizing motor directly to the rotatable armature shaft of the drive motor. The stators of the self synchronizing motors S are connected in parallel, as illustrated in Figure 4, in a three wire, three phase alternating current line, the wires or buses being indicated at 38, 40 and 42. Any suitable control mechanism, not shown, may be employed for controlling the alternating current supplied through the wires or buses 38, 40 and 42 to the stators of the self synchronizing motors S. The rotors R of the self synchronizing motors are tied together in parallel through three wires 44, 46 and 48, but no external potential is supplied to these wires.

By this arrangement the self synchronizing motors S operate in accurate synchronism, and, inasmuch as the rotors of these motors are mechanically connected directly to the rotor or armature shafts of the drive motors, all of the drive motors are consequently driven in absolute synchronism, thus insuring that all of the major operating components of the printing machine are driven in exact synchronism.

The particular arrangement shown is illustrative of printing machines in general and it is of course to be understood that the method may be advantageously adapted with printing machines of diverse description, which have heretofore customarily employed a single motor or a main power distributing shaft.

What we claim is:

1. In a web printing machine, the combination of a frame, perfecting printing couples operably supported by the frame, inking mechanisms for the printing couples, each printing couple including a rotary impression cylinder and a rotary plate cylinder, a separate synchronized motor unit for each cylinder, each motor unit positioned in axial alignment with each cylinder and coupled directly with the cylinder and including a driving motor and a synchronizing device coupled directly to the driving motor, each synchronizing device including a stator and a rotor, the stators being connected in parallel to a polyphase alternating current source, and the rotors connected in parallel in a separate circuit.

2. In a web printing machine, the combination of a frame, perfecting printing couples operably supported by the frame, inking mechanisms for the printing couples, each printing couple including a rotary impression cylinder and a rotary plate cylinder, a separate synchronized motor unit for each cylinder, each motor unit positioned in axial alignment with each cylinder and coupled directly with the cylinder and including a driving motor and a synchronizing device coupled directly to the driving motor, each synchronizing device including a stator and a rotor, the stators being connected in parallel to a polyphase alternating current source, the rotors connected in parallel in a separate circuit, and means for energizing the synchronizing devices before energizing the driving motors.

3. In a web printing machine, the combination of a frame, perfecting printing couples, inking mechanisms for the printing couples, each printing couple including an impression cylinder and a plate cylinder, the said cylinders being rotatably mounted on and positioned within the frame, brackets carried by the frame and positioned outside thereof, a synchronizing motor unit positioned in axial alignment with and immediately connected to each cylinder, the motor units be-

ing positioned outside the frame and supported by the said brackets.

4. In a web printing machine, the combination of a frame, perfecting printing couples, each printing couple including an impression printing cylinder and a plate printing cylinder, the said cylinders being rotatably mounted on and positioned within the frame, an inking mechanism for each plate cylinder, each inking mechanism including a source of ink supply, an inking cylinder, and cooperating ink distributing rollers, the ink cylinders being rotatably mounted on and positioned within the frame, brackets carried by and positioned outside the frame, a synchronized motor unit positioned in axial alignment with and immediately connected to each printing and inking cylinder, the motor unit being positioned outside the frame and supported by the brackets.

5. In a web printing machine, the combination of a frame, perfecting printing couples, each printing couple including an impression printing cylinder and a plate printing cylinder, the said cylinders being rotatably mounted on and positioned within the frame, an inking mechanism for each plate cylinder, each inking mechanism including a source of ink supply, an inking cylinder, and cooperating distributing rollers, the inking cylinders being rotatably mounted on and positioned within the frame, a folding mechanism supported by the frame, the folding mechanism including a folding cylinder and cooperating components, said folding cylinder being rotatably mounted on and positioned within the frame, brackets carried by and positioned outside the frame, a synchronized motor unit positioned in axial alignment with and immediately connected to each printing cylinder, inking cylinder and folding cylinder, the motor units being positioned outside the frame and supported by the said brackets.

6. In a web printing machine, the combination of a frame, perfecting printing couples, each printing couple including an impression printing cylinder and a plate printing cylinder, the said cylinders being rotatably mounted on and positioned within the frame, an inking mechanism for each plate cylinder, each inking mechanism including a source of ink supply, an inking cylinder, and cooperating ink distributing rollers, the inking cylinders being rotatably mounted on and positioned within the frame, a folding mechanism supported by the frame, the folding mechanism including a drag roller, former, folding cylinder, and cooperating components, the drag roller and folding cylinder being rotatably mounted on and positioned within the frame, brackets carried by and positioned outside the frame, a synchronized motor unit positioned in axial alignment with and immediately connected to each printing cylinder, inking cylinder, folding cylinder and the drag roller, the motor units being positioned outside the frame and supported by the said brackets.

7. In a web printing machine having major operating rotary members, a separate synchronized motor unit positioned coaxially with and coupled directly to each major operating rotary member, each synchronized motor unit including a driving motor and a synchronizing device coupled directly to the driving motor, each synchronizing device including a stator and a rotor, the stators being connected in parallel to a polyphase alternating current source, and the rotors connected in parallel in a separate circuit.

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