F. R. BELLUCHE.

TWO PATH SHEET TIMING AND TRANSFERRING MECHANISM.

APPLICATION FILED DEC. 29, 1920.

1,406,603.

Patented Feb. 14, 1922.

4 SHEETS—SHEET 1.

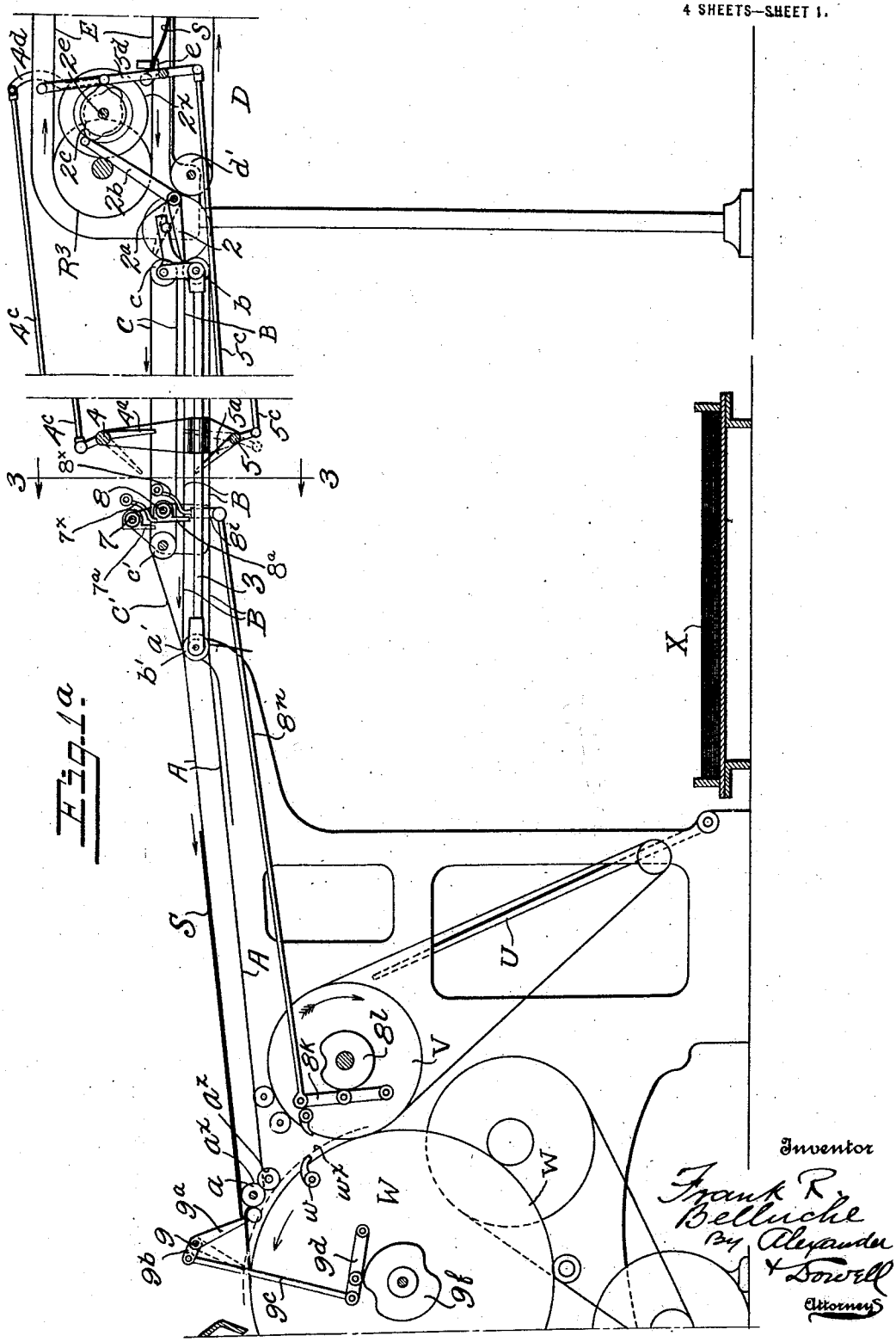


Fig. 1a.

Inventor

Frank R. Belluche

By Alexander & Dowell

Attorneys

F. R. BELLUCHE.

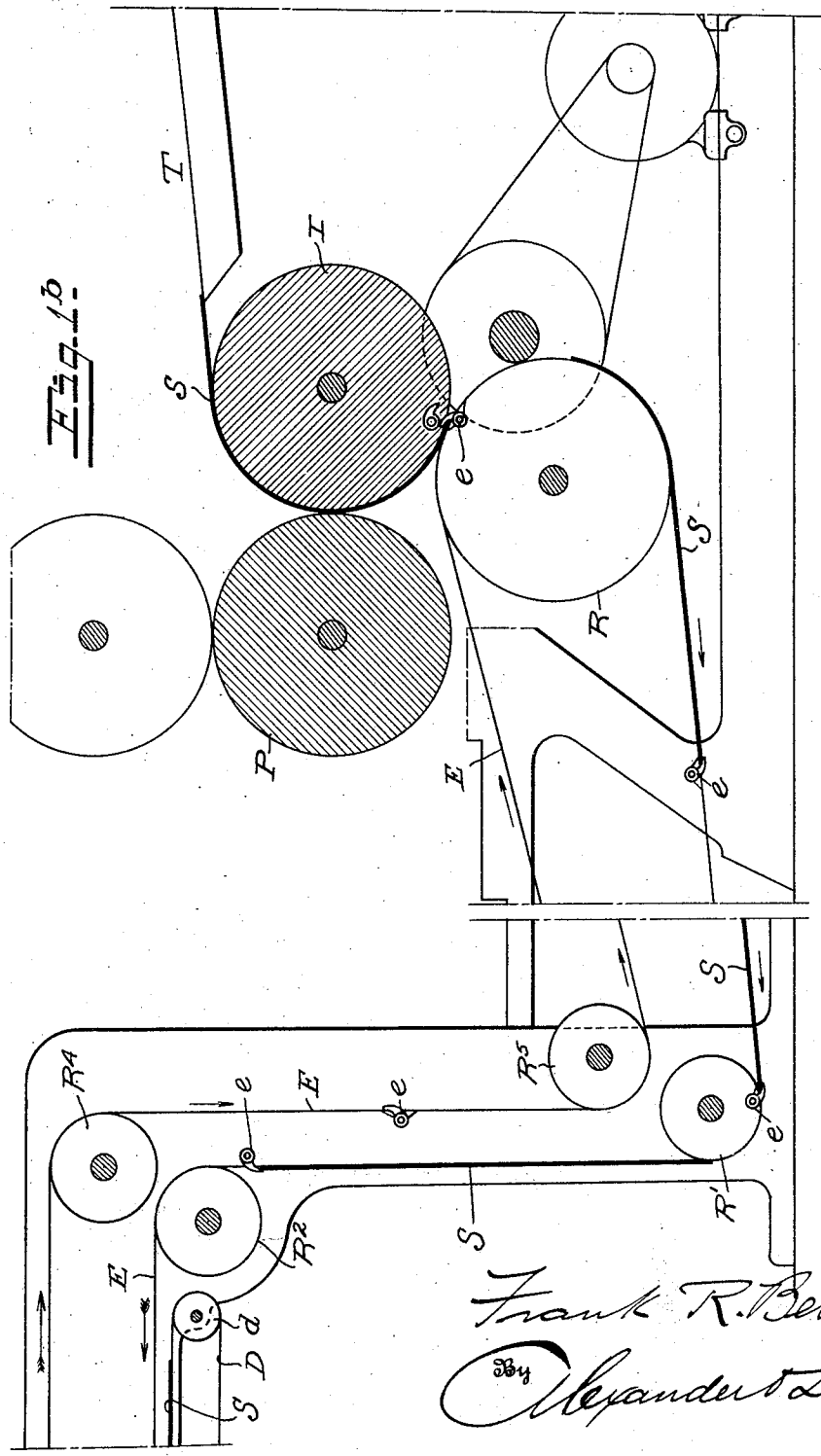
TWO PATH SHEET TIMING AND TRANSFERRING MECHANISM.

APPLICATION FILED DEC. 29, 1920.

1,406,603. Patented Feb. 14, 1922.

4 SHEETS—SHEET 2.

Fig. 1b.



Inventor

Frank R. Belluche

By Alexander & Dowell

Attorneys

F. R. BELLUCHE.

TWO PATH SHEET TIMING AND TRANSFERRING MECHANISM.

APPLICATION FILED DEC. 29, 1920.

1,406,603.

Patented Feb. 14, 1922.

4 SHEETS—SHEET 3.

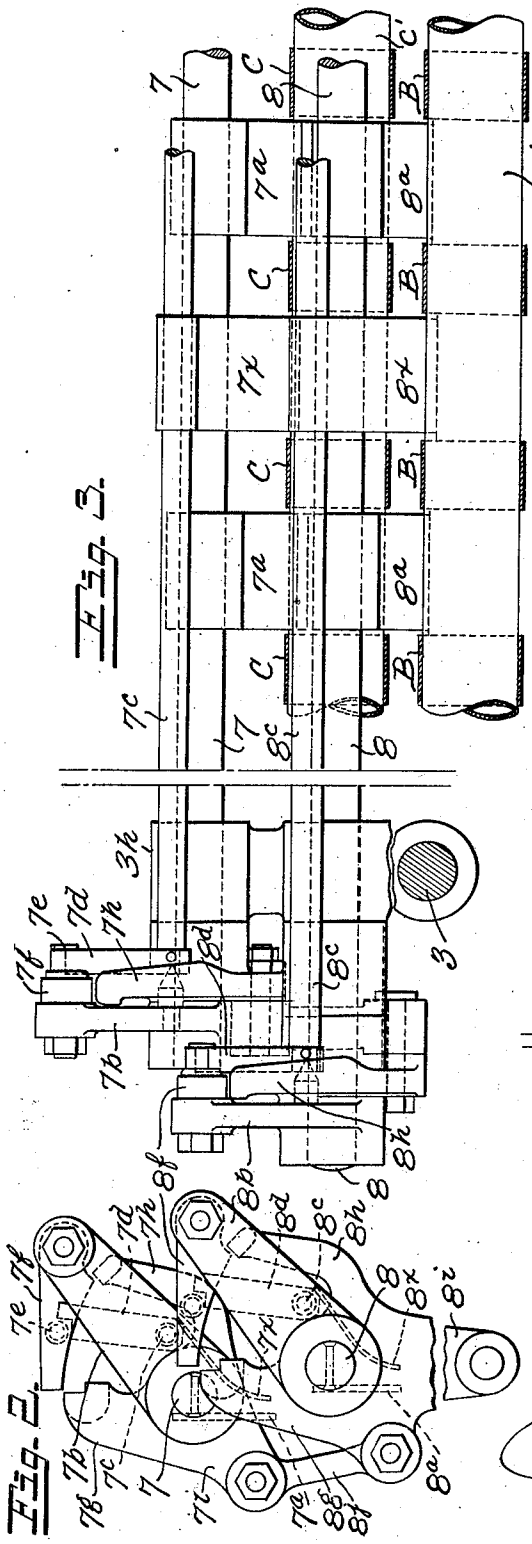


Fig. 3.

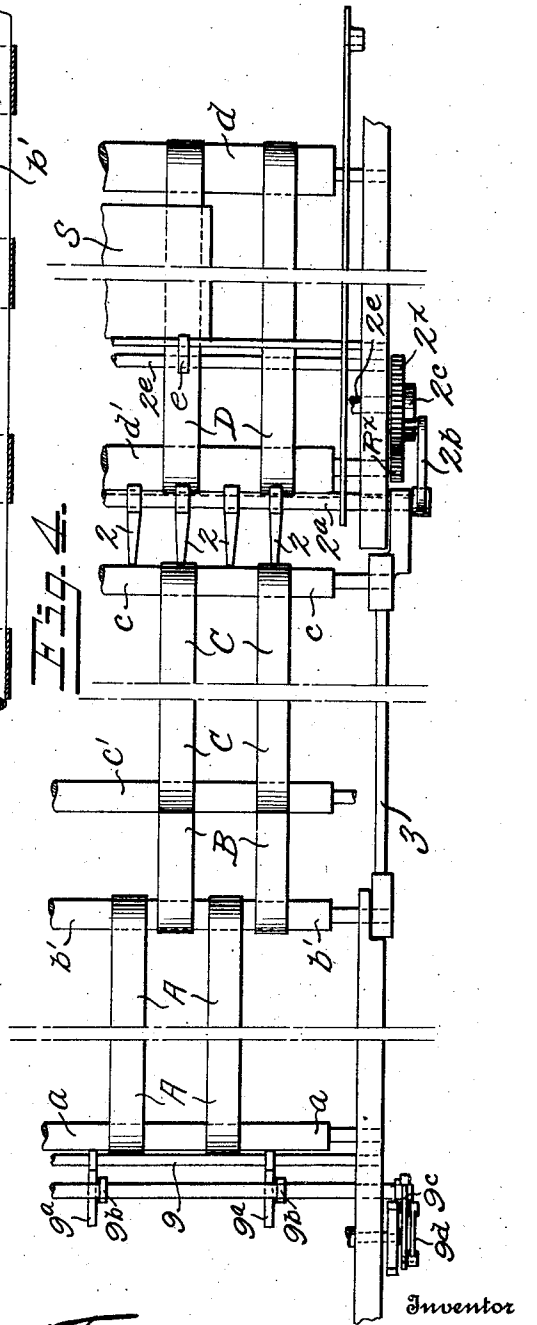


Fig. 4.

Fig. 2.

Inventor

Frank R. Belluche

By Alexander Powell

Attorneys

F. R. BELLUCHE.

TWO PATH SHEET TIMING AND TRANSFERRING MECHANISM.

APPLICATION FILED DEC. 29, 1920.

1,406,603.

Patented Feb. 14, 1922.

4 SHEETS—SHEET 4.

Fig. 4.

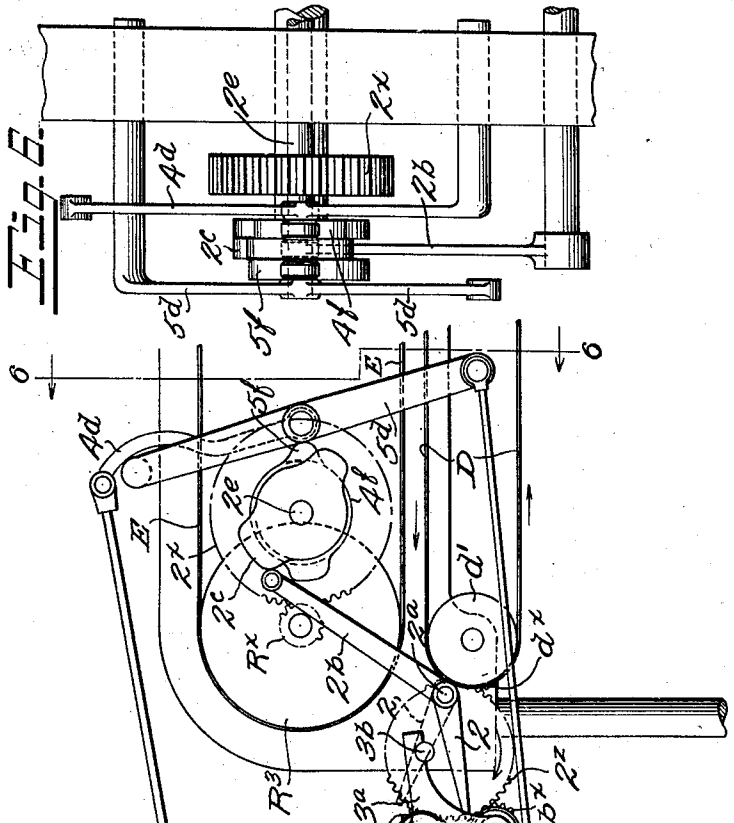
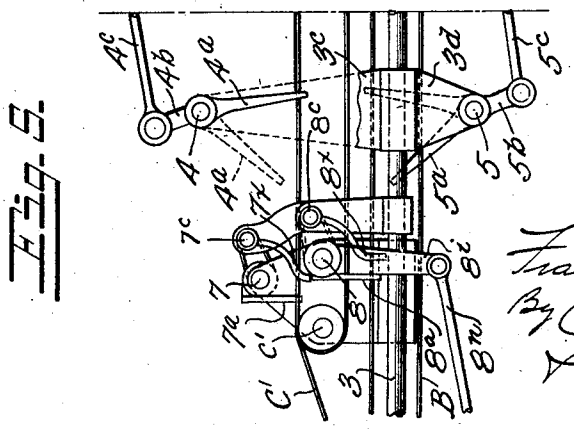


Fig. 5.



Inventor

Frank R. Belluche

By Alexander & Dowell Attorneys

UNITED STATES PATENT OFFICE.

FRANK R. BELLUCHE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED PRINTING MACHINERY COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

TWO-PATH SHEET TIMING AND TRANSFERRING MECHANISM.

1,406,603. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed December 29, 1920. Serial No. 433,812.

To all whom it may concern:

Be it known that I, FRANK R. BELLUCHE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Two-Path Sheet Timing and Transferring Mechanism; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel mechanism for transferring sheets of paper from a machine, such as a printing press, operating thereon to another machine, such as a bronzer, for further operations; and for so timing or controlling the passage of the sheets between the two machines that the sheets will be properly presented to the second machine regardless of small variations, or lack of exact synchronism, in the time required for a complete cycle of operations by the respective machines.

The invention is an improvement upon the mechanism shown in the application of Upham, Belluche and Hornig, filed June 21, 1920, Sr. #390,500, which shows and broadly covers sheet transferring and timing means whereby such difficulties as have been heretofore caused by slight variations in time of operation of the two machines will not prevent the proper transfer of the sheets from the press to the bronzing machine, nor the proper presentation of such sheets to the bronzing machine after they are transferred from the printing press.

I will explain one practical embodiment and application of the present invention (as adapted to transfer sheets from a printing press to a bronzing machine) with reference to the accompanying drawings, to enable others familiar with the art to readily adapt and use the same; but I do not consider the invention restricted to the specific mechanisms shown; and therefore refer to the claims for summaries of the essentials of the invention, and of the novel features of construction, and the novel combinations of parts, for all of which I desire protection.

In said drawings Figs. 1^a and 1^b together illustrate a digrammatical longitudinal partly sectional elevation of a printing press, of a bronzing machine, and of my novel mechanism for transferring sheets from the press to the bronzer and compensating for lack of synchronism in the operations of the two machines.

Fig. 2 is an end elevation of the sheet stopping and detecting device.

Fig. 3 is a detail side elevation of Fig. 2 and enlarged section on line 3—3 of Fig. 1.

Fig. 4 is a detail diagrammatical view showing the general relative arrangement of the several sets of transferring tapes.

Fig. 5 is an enlarged side elevation partly in section of the sets of sheet transferring devices B, C and D and coacting devices.

Fig. 6 is a detail section on the line 6—6 Fig. 5.

In the particular apparatus shown the sheets are received from a table T and after being printed are taken from the impression cylinder I by grippers *e* on endless carriers E, which carriers are shown in Fig. 1 as running horizontally from a reel R beside the impression cylinder to and under rotary guides R′; then up over rotary guides R^2, then preferably in a horizontal direction to and over guides R^3; then back to and over guides R^4; then down under guides R^5; and thence back to the reel R; thus the grippers *e* travel in an endless circuit.

The grippers *e* ordinarily transfer the printed sheets from the impression cylinder I to and over a sheet delivery table; but in the present case instead of the sheets being dropped onto a delivery table, the sheets S are delivered from the carriers E onto the upper run of a set of horizontally disposed endless tapes D; which tapes run over rotary guides *d*, *d′* which are journaled in suitable bearings on the press frame, or other convenient support, in a plane below and parallel with the run of the carrier E between the guides R^2 and R^3.

From the tapes D the successive sheets are alternately delivered to sets of carrier tapes B and C; by which they are in turn delivered to a set of carrier tapes A by which the sheets are conveyed to the receiving end of the machine that next operates on the sheets, which machine is indicated in Fig. 1^a as a bronzing machine and may be of any suitable construction.

As shown the bronzing machine has a cylinder W, provided with grippers *w*, adapted to take sheets at the proper point from the tapes A and carrying them past the usual

bronzing devices, and then surrender them to a delivery reel V, by which they are transferred into position to be discharged by a fly U onto a receiving table X as indicated in the drawing. The particular makes or mechanisms of the printing press and bronzing machine form no part of this invention. The types indicated are well known; and it should be understood that any other suitable printing and bronzing machines, or other machines operating on sheets may be used.

The sheets brought forward on the tapes D are directed alternately onto the endless tapes B and C by any suitable means operated in the proper manner and time. In the example shown a switch 2 is mounted on a shaft 2^a suitably supported on the press frame and having an arm 2^b engaging a cam 2^c on a shaft 2^e journaled in part of the press frame adjacent the switch, and said cam may be operated by suitable means, so as to raise and lower the switch 2 at proper times to direct successive sheets alternately onto the tapes B and tapes C. As indicated in Figure 5 the shaft 2^e may be driven by gears 2^x from a pinion R^x on the shaft of the guide R^3.

The tapes B run over rotary guides b, b', which are mounted on shafts journaled in suitable bearings in or supported on a frame 3 which bridges the space between the adjacent ends of the press frame and the bronzer frame, and provides a convenient support for the intermediate operative members.

The tapes C also run over rollers c and c' which may be mounted in suitable bearings attached to the supporting frame 3. This frame 3 may be of any suitable construction and one end thereof is preferably pivoted to part of the frame of the bronzer, in line with the axis of the roller b'; and the other end of this frame may have arms 3^a by which it is supported upon the lugs 3^b on the press frame, when the bars are in operative position. This construction would permit the frame 3 and the parts mounted thereon to be swung up out of the way, if it is desired to do so.

The tapes A run over the guides b' and over a rotary guide mounted in suitable bearings on the frame of the bronzer, and adjacent the cylinder W.

The several sets of tapes A, B, C are caused to travel at a speed slightly faster than the peripheral speed of the bronzing cylinder W, and may be conveniently driven by suitable means, from the printing or bronzing machine.

As shown the tapes C and B are driven at approximately the same speed as the tapes A by means of pinions bx and cx on the guides b and c respectively, which pinions mesh with an intermediate gear 2^z which is driven by a pinion d^x on guide d' so that the tapes A, C, B have approximately the same linear travel and are operated in the proper directions to advance the sheets on the printing mechanism towards the bronzer.

The tapes A may be driven in a direction to carry the sheets toward cylinder W by any suitable means. As indicated in Fig. 1^a a gear ax on guide a meshes with an intermediate gear az driven by a gear wx on the cylinder W of the bronzing machine. Any other suitable form of gearing might of course be used to operate the tapes A at a speed preferably slightly faster than the peripheral speed of the cylinder W.

Adjacent the discharge ends of the sets of tapes C and B are mounted suitable sheet stops hereinafter described by which sheets S carried by these tapes can be arrested or retarded, until it is time to have the same progress toward and onto the tapes A. These sheet stops may be of any suitable construction and operated by any suitable means.

Cooperating with the set of tapes B near their sheet stops is a sheet retarding device adapted to slow down the sheets before they reach the sheet stops. A similar retarding device is provided for the tapes C and a like sheet retarding device is provided for the tapes A adjacent the cylinder W. These sheet retarding devices may be of any suitable construction.

As shown above the path of the tapes C and near the discharge end thereof is arranged a rock shaft 4 which may be mounted in supports 3^e attached to the frame 3 (see Figs. 1^a and 5). This shaft carries fingers 4^a which swing longitudinally of the tapes C, and in one position will depend below the tapes to arrest or retard a sheet thereon; and in another position will release the sheet. The shaft 4 may be rocked in proper time and at proper speed to cause the fingers 4^a to properly retard the sheet by any suitable means. As shown shaft 4 has an arm 4^b connected by a rod 4^c to the upper end of a lever 4^d which is pivoted to the frame of the printing press adjacent the shaft 2^e and carries a roller which engages a cam 4^f on the shaft 2^e; which cam is adapted to rock the shaft 4 at the proper time.

A similar set of sheet retarding devices is arranged below the tapes B; and comprises a shaft 5 journaled in bearings 3^d on the frame 3 and carrying fingers 5^a which in one position project above the upper run of the tapes B (see Figs. 1^a and 5) in position to engage or retard the sheet brought forward on said tapes, and can be swung to pass below the tapes so as to release the sheet. The shaft 5 may be rocked at the proper time by any suitable means; as shown a crank arm 5^b is connected by a rod 5^c to a

lever 5^d which is pivoted on the arm adjacent the shaft 2^e and preferably carries a roller engaging a cam 5^f on the shaft 3 (see Figs. 5 and 6). At a point beyond the sheet retarding devices 4^a, 5^a, sheet stopping and sheet detecting means are provided whereby the sheets are prevented from passing from the tapes C or B ahead of time onto tapes A.

As shown (Figs. 1^a, 2, 3 and 5) above the run of the tapes C and between the retarding fingers and the tapes A are sheet stops or blades 7^a, attached to a shaft 7 extending across the frame 3 and these blades normally project down between the tapes C and in the path of the sheets. The shafts 7 are journaled in brackets 3^h on the frame 3. On the end of the shaft 7 are arms 7^b, and suitably supported by these arms is a rod 7^c which carries detector fingers 7^x that depend into the path of the sheet edges in advance of the stops 7^a. On the rod 7^c is a latch 7^d which is normally engaged with a lug 7^e on a finger 7^f pivoted to the upper end of the arm 7^b, and normally upholds the finger 7^f so that it will not be in position to be engaged by the arm 7^g of a rocking lever loosely pivoted on the shaft 7. This rocking lever has one arm 7^g adapted on one rocking motion to engage the finger 7^f if the latch 7^d is disengaged; and this rocking lever also has an arm 7^h adapted to engage and uplift the finger 7^f on the opposite rocking motion of the rocking lever if finger 7^f has been released by the latch 7^d. The rocking lever also has an arm 7^i by which it is connected to suitable operating means as hereinafter described.

The construction is such that if the sheet engages the detector fingers 7^x when the parts are in their normal position shown in Figs. 2 and 3, the sheet will cause the detectors to rock the rod 7^c and thereby disengage the latch 7^d from the lug 7^e, and permit the finger 7^f to drop into engagement with the arm 7^g of the rocking lever, and when the latter is rocked, at the proper time, it will move the finger 7^f and rock shaft 7 to remove the stops 7^a out of the way of the sheet and permit it to pass onto the tapes A.

A similar set of sheet stops and detectors are arranged above the upper run of the tapes B between the retarding devices and the tapes A; and as shown, comprises stops 8^a carried by shafts 8 having arms 8^b carrying a detector shaft 8^c provided with sheet detector fingers 8^x, and latch 8^d adapted to engage a finger 8^f on arm 8^b, and hold the finger 8^f out of engagement with the arm 8^g of a rocking lever loosely pivoted on shaft 8, said rocking lever also having an arm 8^h adapted to return the arm 8^f to normal position, and also having an arm 8^i which is connected with suitable actuating mechanism. The rocking lever on shaft 8 is also pivotally connected by a link 8^j with the arm 7^i of the rocking lever on shaft 7, so that the rocking levers on the shafts 7 and 8 may be simultaneously rocked by any suitable means. As shown the arm 8^i of the rocking lever on shaft 8 is connected by a link 8^n to a lever 8^k, which may be pivoted on the bronzer frame adjacent the reel V and may be operated by a cam 8^l on the reel shaft as indicated in Fig. 1^a.

In the construction illustrated the sheet tapes C are not quite as long as tapes B but the sheets may be directed from the discharge end of the tapes C on to the receiving end of the tapes A by a bridge or guide C', of any suitable construction, as indicated in Fig. 1^a. Means are preferably provided for retarding the sheets on tapes A so that they arrive at the taking point in exactly the proper time. As shown retarding fingers 9^a (see Fig. 1^a) are mounted on a shaft 9, which may be suitably supported on the bronzer frame, and has an arm 9^b connected by a rod 9^c to a lever 9^d, which may be pivoted on the bronzer frame and lever 9^d may be operated by a cam 9^f on the shaft of the bronzing cylinder W.

The parts are so proportioned that the fingers 9 will extend into the path of the sheet brought forward on the tapes A, as indicated in Fig. 1^a, and will retard the latter, but the fingers 9^a are swung in such time that they permit the sheet to arrive at the sheet taking position at the proper time, and fingers 9^a move out of the way in time to permit the sheet to be taken by the grippers on the cylinder W.

Operation.

The sheets are alternately delivered from tapes D to tapes B and C. As the sheet S is carried along on tapes C (or B) it is first slowed down by fingers 4^a (or 5^a) which are operated as described. Further travel of the sheet actuates the detector 7^x (or 8^x) and then it stops against the sheet stops 7^a (or 8^a). When detector 7^x (or 8^x) is moved by the sheet, it unlatches finger 7^f (or 8^f) which drops into position so that when lever 7^g (or 8^g) is moved, it lifts the sheet stop out of the path of sheet 7^a (or 8^a) which then passes onto tapes A. Just before the sheet arrives at the bronzer it engages fingers 9^a which are moved so as to permit the tapes A to deliver the sheet at the proper speed and time for the grippers on the bronzing cylinder to take it.

If the bronzer and press could be driven synchronously at the same speed any ordinary set of tapes would carry the sheets from press to bronzer. But practically it is impossible to so operate the machines when they are driven by separate motors. Where my sheet transferring and timing

mechanism is used the bronzer must run faster than the press. My invention will work successfully no matter what the difference in speeds between the machines may be, but the best results are obtained when the difference is as small as the controllers on the motors allow; as the less this difference is the fewer times the bronzer will run without a sheet.

The following example will impart a clear understanding of just what may be accomplished by my invention.

Assuming for instance that a cycle of the bronzer or one revolution of the cylinder W is equal to 50 inches of linear sheet travel; and that in the time required for the bronzer to run 50 cycles the press will run but 49 cycles, and when the machines are started sheet #1 will pass onto tapes C and arrive at the sheet stops 7^a on tapes C in time to move detectors 7^x to cause pawl 7^d to release finger 7^t which drops into position to engage lever 7^s and the latter is rocked at the proper time to lift said sheet stops and permit sheet #1 to pass onto tapes A and go to the bronzer. Meanwhile sheet #2 moves onto tapes B, but is 1 inch late in reaching detectors 8^x, therefore the sheet stops 8^a do not lift with stops 7^a and sheet #2 remains on tapes B while the bronzer goes through its next second cycle without a sheet. But on the next third cycle of the bronzer, when the time comes for the sheet stops to lift, the sheet stop 8^a lifts (since a whole cycle has passed during which time sheet #2 had but to move ahead 1 inch to arrive at its sheet stop 8^a and move its detector 8^x and sheet #2 passes onto tapes A and is delivered to the bronzer. Meanwhile sheet #3 has passed onto tapes C but is two inches late in reaching detectors 7^x and therefore its stops 7^a are not raised and it will not pass onto tapes A and go to the bronzer until the following cycle. Each successive sheet (4 to 50) is one inch later than the preceding sheet in reaching its detectors (7^x or 8^x), but sheet #51 (being 50 inches late) will reach its detectors just in the same time and manner as did sheet #1, and pass onto tapes A— but sheet #52 will arrive 1 inch late as did sheet #2. In short each successive sheet up to the 50th will arrive 1 inch later than the preceding sheet but the 1st sheet (and 51st sheet) will arrive in exact time and place.

To summarize—In practice the cyclical speed of the cylinder W is preferably slightly faster than the cyclical speed of the printing cylinder P, I and therefore during each revolution of the bronzing cylinder W it makes a slight gain on the printing cylinders P, I. For example, if the bronzing cylinder gains, say one inch per revolution on the printing cylinder, it will ultimately gain a complete revolution on the printing cylinder; and, assuming that the bronzing cylinder is 50 inches in circumference for each 50 revolutions of the bronzing cylinder the printing cylinder would only make 49 revolutions. Therefore I provide the sheet stops 7^a and 8^a and the detectors 7^x and 8^x and the retarding devices so that when operated as described they will automatically take care of the leading edges of the series of sheets successively delivered from the printing cylinder and insure that 49 sheets will successively be presented to the bronzing cylinder in proper position, but on the 50th revolution the bronzing cylinder would not receive a sheet because there would be none presented thereto at the proper time, but on the next (51st) revolution of the bronzing cylinder a sheet would be properly presented thereto and a cycle of 49 sheet handling operations repeated. Thus during each cycle of 50 operations of the bronzing cylinder the sheets would be successively further removed from the bronzing cylinder until say the 50th sheet would be at such a distance from the bronzer as to permit the cylinder W to make one idle revolution before such sheet reaches it; of course these above figures are merely illustrative and not definitive.

What I claim is:

1. In mechanism of the character specified, a first means for operating upon sheets; a second means for subsequently operating upon sheets; and a sheet transferring means receiving sheets from the first means for operating upon sheets and transferring them to the second means for operating upon sheets; said transferring means including a plurality of paths for the sheets for part of the length of travel thereof.

2. In mechanism of the character specified in claim 1; two different tape paths adapted to receive successive alternate sheets during part of the length of travel thereof.

3. In mechanism as set forth in claim 1; means adapted to control the movement of the sheets in the transferring mechanism to deliver them at proper time to the second means for operating upon sheets.

4. In mechanism as set forth in claim 1; means adapted to retard the movement of the sheets in the respective paths so that they will be forwarded in proper time toward the second means for operating upon sheets.

5. In mechanism as set forth in claim 1; a sheet carrying means receiving sheets from said paths, and operating at slightly greater speed than the second means for operating on sheets; and means adapted to retard the movement of the sheets by said sheet carrying means to substantially accord with the speed of the second means for operating upon sheets.

6. In mechanism as set forth in claim 1;

each sheet path comprising endless tapes; and means for driving the tapes at greater speed than the speed of the second means for operating upon sheets.

7. In mechanism as set forth in claim 1; sheet stops adapted to arrest and control the movement of the sheets in the transfering mechanism, substantially as described.

8. In mechanism as set forth in claim 1; sheet stops adapted to arrest and control the movement of the sheets in the transferring mechanism, and sheet detectors to control the stops, substantially as described.

9. In mechanism as set forth in claim 1; means adapted to retard the movement of the sheets in the respective paths and sheet stops to arrest the movement of the sheets in said paths, substantially as described.

10. In mechanim as set forth in claim 1; each sheet path comprising endless tapes; and sheet stops in each path to arrest and control the movement of the sheets in the transferring mechanism, substantially as described.

10. In mechanism as set forth in claim 1; each sheet path comprising endless tapes; sheet stops in each path to arrest and control the movement of the sheets in the transferring mechanism, and sheet detectors to control the stops, substantially as described.

12. In mechanism as set forth in claim 1; each sheet path comprising endless tapes; means adapted to retard the movement of the sheets in the respective paths and sheet stops to arrest the movements of the sheets in each path, substantially as described.

13. In mechanism as set forth in claim 1; each sheet path comprising endless tapes; means adapted to retard the movement of the sheets in the respective paths, sheet stops to arrest the movements of the sheets in each path and sheet detectors to control the stops, substantially as described.

14. In mechanism of the character specified, a first means for operating upon sheets; a second means for operating upon sheets; a sheet transferring means receiving sheets from the first means for operating upon sheets; two sheet carriers receiving sheets alternately from the said sheet carrying means; and sheet transferring means receiving sheets alternately from said carriers.

15. In mechanism as set forth in claim 14; means adapted to retard the movement of the sheets by said third carrying means to substantially accord with the speed of the second means for operating upon sheets.

16. In mechanism as set forth in claim 14; sheet stops adapted to arrest and control the movement of the sheets in the sheet carriers, substantially as described.

17. In mechanism as set forth in claim 14; sheet stops adapted to arrest and control the movement of the sheets in the sheet carriers, and sheet detectors to control the stops, substantially as described.

18. In mechanism as set forth in claim 14; means adapted to retard the movement of the sheets on the respective carriers and sheet stops to arrest the movement of the sheets by said carriers, substantially as described.

19. In mechanism as set forth in claim 14; each sheet carrier comprising endless tapes; and sheet stops for each carrier to arrest and control the movement of the sheets thereby substantially as described.

20. In mechanism as set forth in claim 14; each sheet carrier comprising endless tapes; sheet stops for each carrier to arrest and control the movement of the sheets by the carrier, and sheet detectors to control the stops, substantially as described.

21. In mechanism as set forth in claim 14; each sheet carrier comprising endless tapes; means adapted to retard the movement of the sheets by the respective carriers and sheet stops to arrest the movements of the sheets by each carrier, substantially as described.

22. In mechanism as set forth in claim 14; each sheet carrier comprising endless tapes; means adapted to retard the movement of the sheets by the respective carriers; sheet stops to arrest the movements of the sheets by each carrier and sheet detectors to control the stops, substantially as described.

23. In mechanism as set forth in claim 14; and means adapted to retard the movement of the sheets upon the last transferring means to substantially accord with the speed of said second means for operating upon sheets.

24. In mechanism of the character specified, a first means for operating upon sheets; a second means for operating upon sheets; a set of tapes receiving sheets from the first means for operating upon sheets and travelling faster than said first operating means; two parallel sets of tapes receiving sheets alternately from the said first set of tapes; and a third set of tapes receiving sheets alternately from said parallel sets of tapes; and means for driving the parallel sets of tapes and the third set of tapes faster than the second means for operating upon sheets, substantially as described.

25. In mechanism as set forth in claim 24, means adapted to retard the movement of the sheets by the last set of tapes to substantially accord with the speed of the second means for operating upon sheets.

26. In mechanism as set forth in claim 24; sheet stops adapted to arrest and control the movement of the sheets by the parallel sets of tapes, substantially as described.

27. In mechanism as set forth in claim

24; sheet stops adapted to arrest and control the movement of the sheets by the parallel sets of tapes; and sheet detectors to control the stops, substantially as described.

28. In mechanism as set forth in claim 24; means adapted to retard the movement of the sheets by the parallel sets of tapes; and sheet stops to arrest the movement of the sheets by said tapes, substantially as described.

In testimony that I claim the foregoing as my own, I affix my signature.

FRANK R. BELLUCHE.