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DELIVERY MECHANISM FOR PRINTING MACHINES

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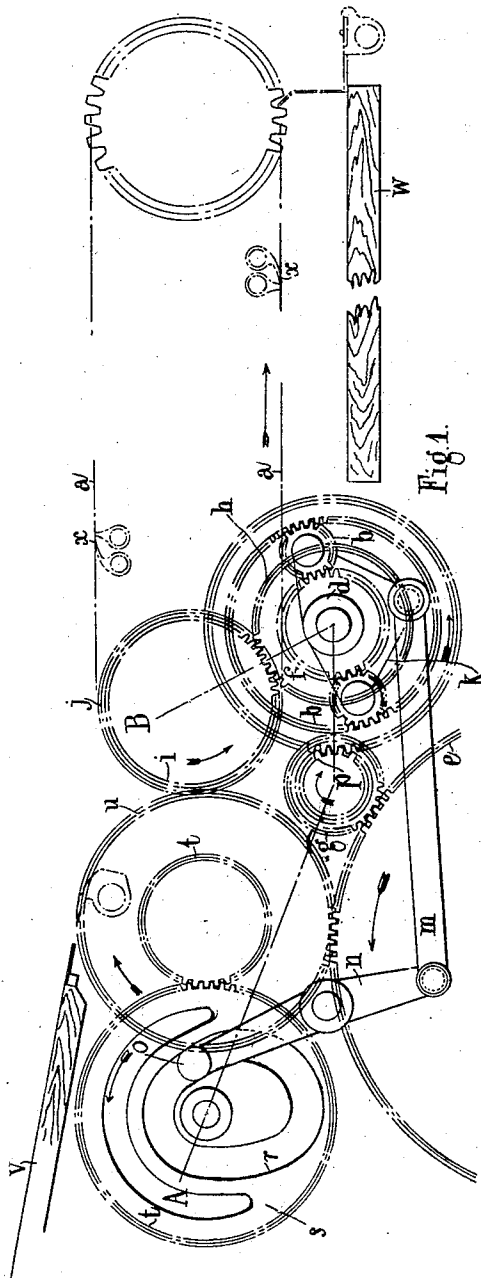


Fig. 1.

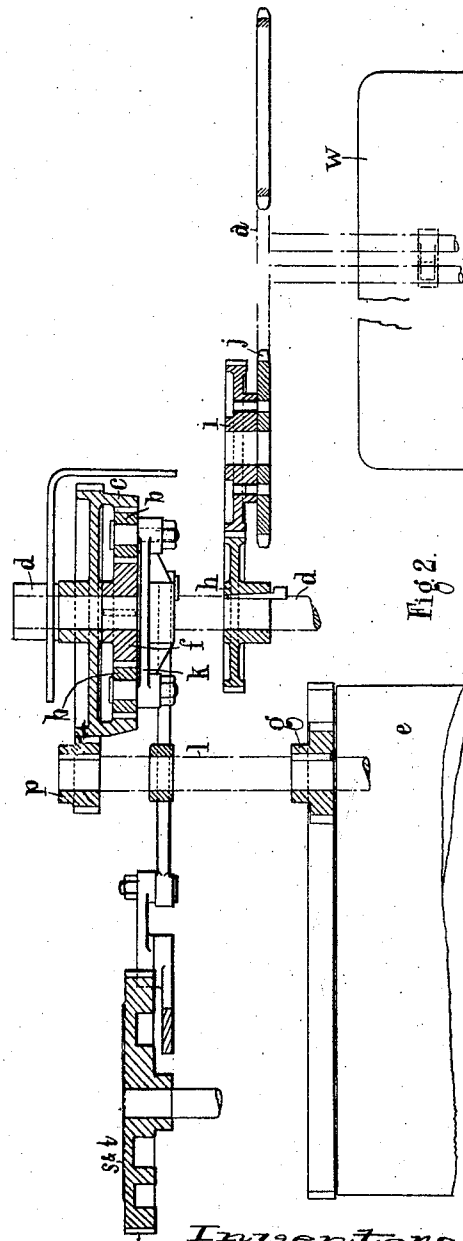


Fig. 2.

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UNITED STATES PATENT OFFICE.

THOMAS FRANK ELSWORTH, FRED WESLEY WRIGHT, AND PERCY HARKER, OF LEEDS, ENGLAND, ASSIGNORS OF ONE-FOURTH TO GEORGE MANN AND COMPANY, LIMITED, OF LEEDS, YORK, ENGLAND.

DELIVERY MECHANISM FOR PRINTING MACHINES.

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To all whom it may concern:

Be it known that we, THOMAS FRANK ELSWORTH, FRED WESLEY WRIGHT, and PERCY HARKER, all subjects of the King of Great Britain and Ireland, and all residing at Larchfield Works, Hunslet, Leeds, in the county of York, England, have invented certain new and useful Improvements in and Relating to Delivery Mechanisms for Printing Machines, of which the following is a specification.

This invention relates to variable-speed sheet delivery mechanisms for printing machines of the kind wherein the printed sheets are delivered through the medium of continuously or intermittently travelling take-off chains or the like fitted with two or more sets of grippers each of which in turn receives a printed sheet from the grippers of the continuously rotating printing cylinder or other part of the machine for deposit on a delivery board.

In order to prevent damage to the sheets by coming in contact at too high a speed with the front stops of the delivery board, it has been customary hitherto to slow down the chains at the moment of delivery, with the result that the cyclic length of the chains, i. e. their total travel during a printing cycle has been less than the cyclic peripheral travel of the printing or take-off cylinder, the sheets being thereby deposited on the delivery board in closer proximity to the machine than desirable, with a resulting loss of accessibility.

The primary object of the present invention is to overcome this difficulty while other objects are pointed out below.

Referring to the accompanying drawings, which are throughout of a diagrammatic nature:—

Figure 1 shows an end view of so much of a printing machine as is necessary to explain one form of the present invention,

Figure 2 being a corresponding view taken on the line A—B of Figure 1.

In carrying the invention into effect according to the illustrative form shown in the drawings applied by way of example to a rotary printing machine, a differential gear mechanism is arranged at a suitable point in the train of gears through which the chains *a* are normally driven. The dif-

ferential pinions *b, b* gear on the one hand with the driving member, *c*, which takes the form of an internal toothed wheel loosely mounted on the shaft *d* and driven by the blanket cylinder *e*, for example through the medium of gears *g* and *l* secured to spindle *p* and on the other hand with the driven member *f* which takes the form of an ordinary spur gear, keyed to the spindle *d* which also carries in rigid relation the spur wheel *h* serving by way of the intermeshing wheel, *i*, to transmit the desired motion to the chain wheel *j*.

A rocker *k* carrying the differential pinions *b, b* is freely mounted upon the common spindle *d* of the driving and driven members and connected by a suitable link *m* with a double lever *n* carrying a runner *o* at one end engaging with the groove *r* of a cam *s* which is rotated at a uniform speed and in definite timed relation with the machine, for example, by gearing *t t* from the spindle of the impression cylinder *u*.

The feed board is indicated at *v*, and the falling delivery board at *w*.

The cam groove is so formed that the following action takes place:—

With the runner, *o*, in engagement with a certain concentric part of the groove the rocker *k* carrying the differential pinions *b, b* has no rotation about its axis and the chains are then driven at normal speed, i. e. the peripheral speed of the impression cylinder *u*, the differential member being locked by the cam. The chain grippers *x* seize the sheet at a convenient point after the runner has engaged the concentric part of the cam groove referred to, which is of suitable length to maintain the differential member locked until the sheet to be delivered is clear, or nearly so, of the impression or take-off cylinder *u*. The runner now engages with an eccentric part of the cam groove which causes the rocker to move about its axis in a direction to increase the speed of the chains. Subsequently, the runner engages with a further portion of the cam groove which is likewise eccentric, so that the rocker is moved in the reverse direction, thereby reducing the speed of the chains below the normal.

In the class of machine referred to in the above description the sheets may be taken

from grippers on the printing or take-off cylinder or from an appropriate intermediary.

By suitable design of the cam groove and differential motion, the variations in speed of the chains may be adapted to particular requirements in accordance with the present invention, so long as at some point the speed of the chain exceeds the peripheral speed of the take-off cylinder. Thus, in each cyclic movement of the chains, during a fraction of their travel, the speed is equal to the normal, while for the remainder of the travel, the speed is partly above and partly below the normal in any desired proportion. In order to gain length of travel as compared with existing machines in which the average speed of the chain is less than the normal, the design of the speed varying mechanism described should be such that the average speed of the chains is equal to or greater than the normal but in particular cases, e. g., when fitted to old machines, the design may be readily varied to give an average speed less than the normal, so that the mechanism can be designed to give cyclic lengths of chain equal to, greater than or less than the cyclic peripheral travel of the printing or take-off cylinder.

The mechanism described may be modified in such a manner that the normal speed of the chains is obtained by the action of the runner in a part of the cam groove which is not concentric in conjunction with the differential pinions.

In general it is not desirable to employ more than two sets of grippers on the delivery chains owing to their weight and the added difficulties of adjustment and it is in such a case that the advantages of the present invention are most marked as regards increased accessibility due to additional length of travel.

The above detailed description is given by way of example to make clear the nature of the invention, but it will be obvious that the primary object aimed at, namely, the acceleration of the chains at the proper moment to gain length of travel, could be attained by a great number of different mech-

anisms, all of which we intend to include within the scope of this invention.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. A printing machine, having in combination an impression cylinder and means for continuously rotating said cylinder at a substantially uniform speed; delivery chains receiving a sheet direct and a single gear train driving said chains throughout the working cycle, said train including a variable speed gear; together with means for operating said variable speed gear at an appropriate moment to increase the speed of said chains above the uniform peripheral speed of said impression cylinder, as set forth.

2. A printing machine, having in combination an impression cylinder and means for continuously rotating said cylinder at a substantially uniform speed; delivery chains receiving a sheet direct and a single gear train driving said chains throughout the working cycle, said train including a variable speed gear; together with means for operating said variable speed gear at an appropriate moment to increase the speed of said chains above the uniform peripheral speed of said impression cylinder, and subsequently to slow down said chains to deposit a sheet, as set forth.

3. A printing machine as claimed in claim 1, in which said variable speed gear and means for operating said gear comprise a differential gear train and a timed cam, as set forth.

4. A printing machine as claimed in claim 1, in which said variable speed gear comprises a differential gear train having pinions and a rocker carrying said pinions while the means for operating said variable speed gear comprise a timed cam and a lever connected to said rocker, substantially as described.

In testimony whereof we have signed our names to this specification.

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