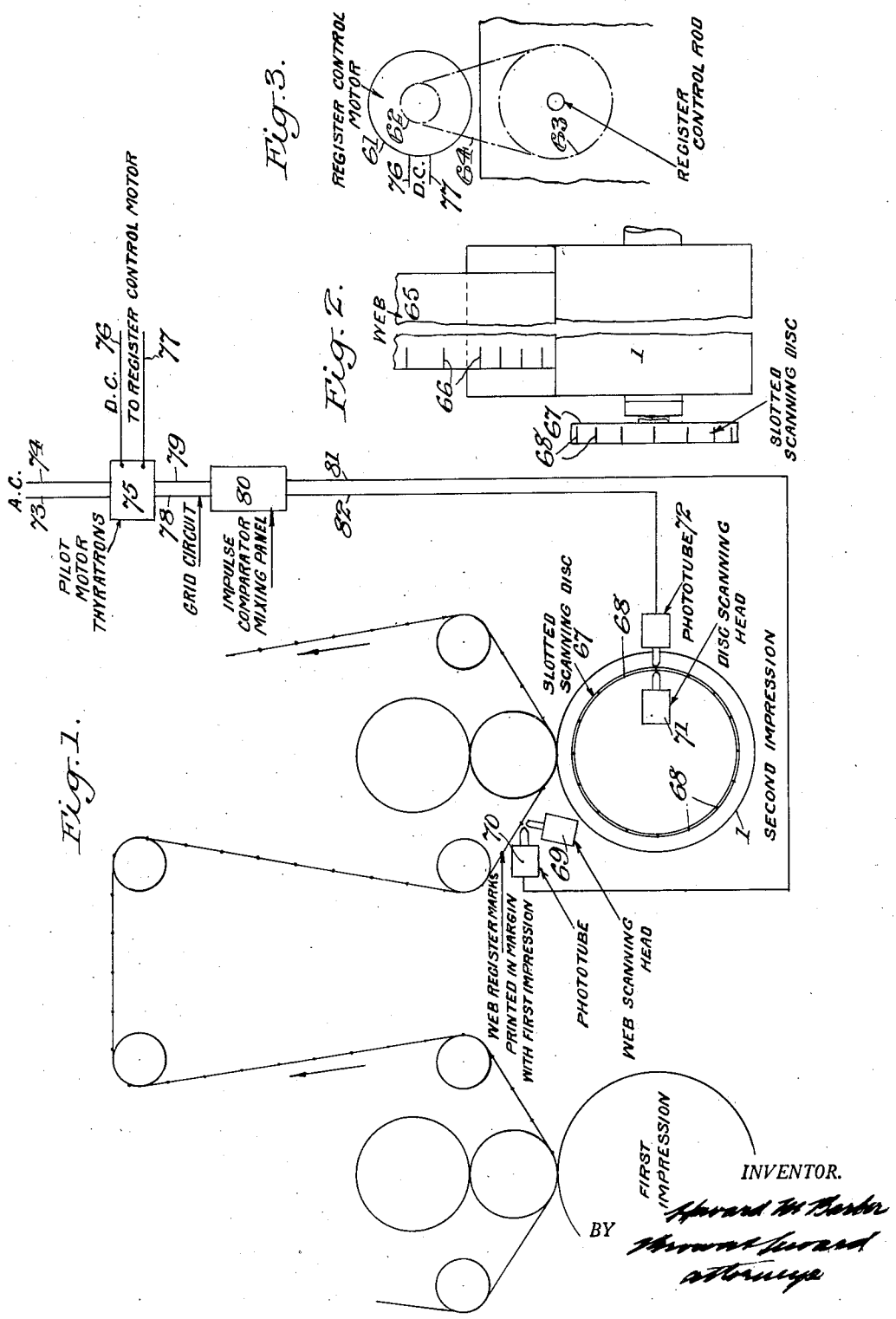
Aug. 31, 1948. H. M. BARBER 2,448,292

GEARED ADJUSTMENT MEANS

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Fig. 4.

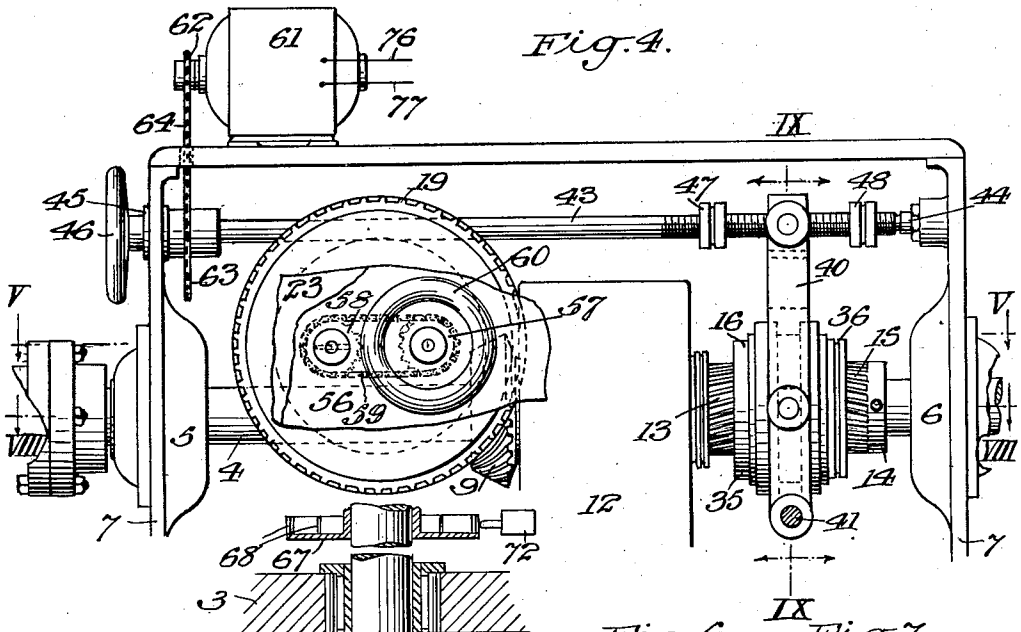


Fig. 6.

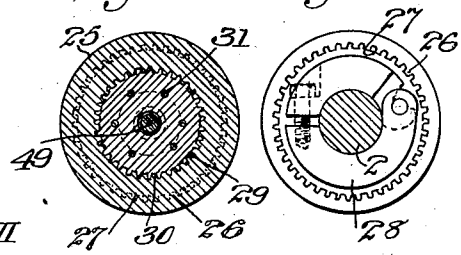


Fig. 7.

Fig. 5.

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Fig. 8.

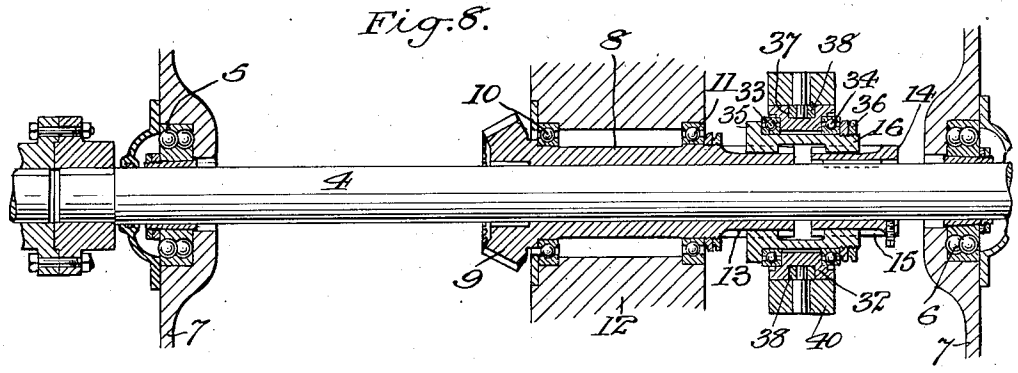


Fig. 9.

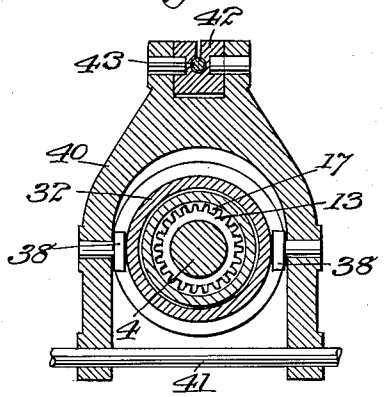


Fig. 10.

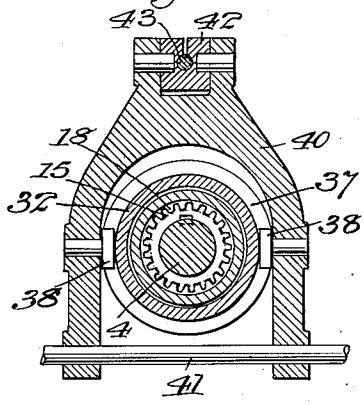


Fig. 11.

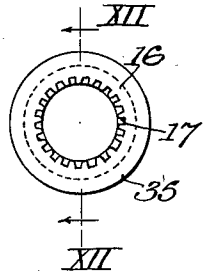


Fig. 12.

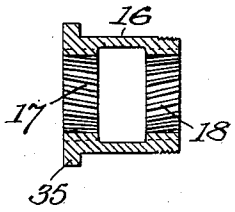
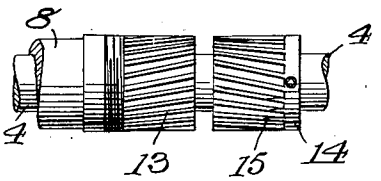


Fig. 13.



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UNITED STATES PATENT OFFICE

2,448,292

GEARED ADJUSTMENT MEANS

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Application October 22, 1943, Serial No. 507,232

6 Claims. (Cl. 74—395)

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My invention provides novel, accurate and much simplified means for independently adjusting the printing cylinders of a printing press, particularly the design cylinders of an intaglio printing press, rotatively and in an endwise direction, to bring each printing cylinder into proper color register with respect to the printing cylinder of the first printing unit of the press, said means being operable while the press is running or at rest.

My invention more particularly includes both manually and automatically operated means for bringing each printing cylinder into circumferential register with the first printing cylinder of the press and it also includes manually operated means for bringing the printing cylinder into endwise register.

The object of my invention is to provide novel means whereby the main drive shaft of the press is so connected to each of the printing cylinder shafts as to eliminate a considerable amount of gearing and the backlash thereof.

A practical embodiment of my invention including both manually and automatically operated means for adjusting the printing cylinder rotatively, and manually operated means for adjusting the printing cylinder in an endwise direction into proper color register is represented in the accompanying drawings in which:

Fig. 1 represents a diagrammatic end elevation of the first and second color printing units of a multi-color intaglio printing press showing certain of the cooperative elements of the electrically operated means for automatically bringing the printing cylinder of the second printing unit into color register with the printing cylinder of the first printing unit;

Fig. 2 represents a detail diagrammatic side view of the printing cylinder and the traveling web showing register marks on the web and the slotted scanning disc on the printing cylinder;

Fig. 3 represents a diagrammatic end view showing the register control reversible motor and its operative connection with the adjusting shaft, which is also manually operated, for adjusting the printing cylinder rotatively;

Fig. 4 represents a detail view showing in side elevation both the manually and the automatically operated means for adjusting a printing cylinder (in the present instance the printing cylinder of the second printing unit) rotatively, and in end elevation the manually operated means for adjusting the printing cylinder in an endwise direction;

Fig. 5 represents a horizontal section taken in

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the plane of the line V—V of Fig. 4, looking in the direction of the arrows;

Fig. 6 represents a detail section taken in the plane of the line VI—VI of Fig. 5, looking in the direction of the arrows;

Fig. 7 represents a detail section taken in the plane of the line VII—VII of Fig. 5, looking in the direction of the arrows;

Fig. 8 represents a horizontal section taken in the plane of the line VIII—VIII of Fig. 4, looking in the direction of the arrows;

Fig. 9 represents a detail section taken in the plane of the line IX—IX of Fig. 4, looking toward the left;

Fig. 10 represents a similar section looking toward the right;

Fig. 11 represents an end view of the adjusting collar;

Fig. 12 represents a section taken in the plane of the line XII—XII of Fig. 11, looking in the direction of the arrows; and

Fig. 13 represents a detail side view of the main press drive shaft showing the right and left hand gears forming parts of the means for rotatively adjusting the printing cylinder with respect to the drive shaft.

The printing cylinder 1 is provided with a shaft 2 which is mounted for rotary and endwise movement in side members of the main printing press frame 3, one side member only being shown in the accompanying drawings.

The horizontally disposed main drive shaft 4 of the press is disposed lengthwise thereof and it is mounted in suitable bearings 5, 6 in the end members of the auxiliary press frame 7.

The hub 8 of a hypoid pinion 9 surrounds the main press drive shaft 4 and it is rotatively mounted independently of the drive shaft in suitable bearings 10, 11 in the member 12 projecting from the adjacent side of the press frame 3. This hypoid pinion 9 is driven from the main drive shaft 4 of the press as follows: the outer end of the hub 8 is spirally threaded externally as shown at 13 at a predetermined angle, in the present instance about ten degrees, in one direction. A collar 14 keyed to the main drive shaft 4 adjacent to the hub 8 of the hypoid pinion 9 is spirally threaded externally as shown at 15 at the same angle in the opposite direction.

An endwise movable sleeve 16 surrounds portions of the hub 8 and shaft collar 14 and it is spirally threaded internally in opposite directions as shown at 17 and 18 with the same angularity as the spirally threaded portions 13 and 15 with

which they mesh and serve to lock the drive shaft 4 to the said hub 8 of the hypoid pinion 9.

The shaft 2 of the cylinder 1 is at right angles to and is driven by the main drive shaft 4 as follows: the hypoid pinion 9 meshes with a hypoid gear 19 fast on a hollow cross shaft 20 mounted in suitable bearings 21 and 22 in members 23 and 24 of the auxiliary frame 7, which hollow cross shaft is in axial alinement with the printing cylinder shaft 2. This shaft 20 is provided with a head 25 which is slidably locked to the coupling 28 on the printing cylinder shaft 2, in the present instance by the internal and external straight toothed gears 26, 27.

This head 25 is shown as locked to the hollow shaft 20 by the internal and external gears 29, 30, the external gear 30 being fastened by screws 31 to the said shaft 20.

The manually operated means for adjusting the printing cylinder 1 rotatively, whether the press is running or at rest, to bring the form cylinder into circumferential color register is shown as comprising the following elements: a ring 32 is mounted in suitable bearings 33, 34 on the endwise movable sleeve 16 between a flange 35 and one or more nuts 36 threaded on the sleeve. This ring 32 has a circumferential groove 37 for receiving the studs or rollers 38 carried by the branches 39 of a sleeve shifting yoke 40 which is pivoted at its lower end on the bar 41 carried by suitable members of the auxiliary press frame 7. The upper end of the yoke 40 is pivoted to a traveling nut 42 mounted on the threaded portion of a shaft 43 rotatably mounted at its ends in suitable bearings 44, 45 in members of the auxiliary frame 7. This shaft 43 is provided outside of the said auxiliary frame with a suitable hand wheel 46 for rotating the shaft in either direction, to move the nut thereon. Adjusting stops 47, 48 are threaded on the shaft 43 in position to limit the throw of the nut and thereby the yoke 40.

The manually operated means for adjusting the printing cylinder in an endwise direction, while the press is running or at rest, to bring the printing cylinder into proper lateral register, is shown as comprising the following elements: a shaft 49 extends axially through the hollow shaft 20 from the coupling 28 which is clamped on the printing cylinder shaft 2, to a yoke 50 in which the shaft 49 is rotatably mounted by suitable bearings 51. Nuts 52, 53 threaded on the opposite ends of the shaft 49 serve to hold the shaft locked to the coupling 28 and yoke 50.

Two screw shafts 54, 55 are rotatably mounted in a member 56 of the auxiliary press frame 7 and they are threaded into the yoke 50 upon opposite sides of the shaft 49. These screw shafts are connected to turn together, as, for instance, by sprockets 57, 58 and their sprocket chain 59. One of these screw shafts, in the present instance the screw shaft 54 is provided with a hand wheel 60 for manually operating the yoke 51 to move the shaft 49 and thereby the printing cylinder 1 endwise in either direction.

In Figs. 1, 2 and 3 there is illustrated in diagram a typical photoelectric means for automatically adjusting the printing cylinder rotatively to correct circumferential misregister of the printing cylinder with the traveling web. In these diagrams the reversing pilot motor 61 is operatively connected to the adjusting shaft 43 through the sprocket 62 on the motor shaft, the sprocket 63 on the adjusting shaft and their connecting sprocket chain 64.

The traveling web 65 is provided along the of its margins with a series of spaced register marks 66 and the printing cylinder 1 is provided with a scanning disc 67 whose peripheral flange has an annular series of slots 68. The web register marks 66 and the scanning disc slots 68 are equally spaced and are equal in number for each revolution of the printing cylinder.

The scanning head 69 and the phototube 70 of the web scanning unit are controlled by the register marks 66 on the traveling web, and the scanning head 71 and the phototube 72 of the printing cylinder scanning unit are controlled by the slot 68 of the scanning disc 67.

The scanning head 69 and the phototube 70 of the web scanning unit are controlled by the register marks 66 on the traveling web, and the scanning head 71 and the phototube 72 of the printing cylinder scanning unit are controlled by the slots 68 in the scanning disc 67.

The main circuit wires 73, 74 lead to the pilot motor thyratrons represented conventionally at 75. The circuit wires 76, 77 connect the pilot motor thyratrons 75 with the pilot reversing motor 61 and the grid circuit wires 78, 79 connect the pilot motor thyratrons 75 with the impulse comparator mixing panel represented conventionally at 80. The circuit wires 81 and 82 connect their respective phototubes 70 and 72 with the impulse comparator mixing panel 80.

The operation of the automatic web register control is as follows: detection of misregister is accomplished by comparing photoelectrically the instantaneous positions of the initial impression on the web with the mechanical position of the printing cylinders of the successive printing units. This is accomplished by matching regularly spaced voltage pulses or signals from the two scanning units, i. e., the web scanning unit and the printing cylinder scanning unit, the web scanning unit being actuated by the register marks 66 printed simultaneously on the web with the first impression, and the cylinder scanning unit being actuated by the equally spaced slots 68 in the cylinder scanning disc 67.

Correction for misregister is accomplished through each reversing pilot motor 61 which actuates its adjusting shaft 43 in either direction. The direction of correction as well as the rate of correction is determined by the timed relation of the two signals received at the mixing panel 80, where they are compared and a resultant signal is relayed to the thyratrons 75 that energize the said pilot motor.

It will be understood that should the web signal come ahead of the printing cylinder signal the pilot motor is rotated to advance the angular position of the cylinder. Conversely if the web signal is later than the printing cylinder signal the pilot motor will move the cylinder a proper amount in the opposite direction. Should the signals happen simultaneously this would indicate a correct position for longitudinal register of the web and no corrective movement takes place.

From the above description it will be seen that by using hypoid gears for operatively connecting the press drive shaft with the impression cylinder shaft these two shafts which are located at right angles to each other in different horizontal planes may be located very close to each other and thereby eliminate a considerable amount of gearing and backlash consequent thereto.

It will also be seen that very simple and effective manually and automatically operated means may be employed for obtaining the circumferen-

tial register of the printing cylinder and that simple and effective manually operated means may also be employed for obtaining the endwise or lateral register of the printing cylinder.

It is evident that various changes may be resorted to in the construction, form and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the particular embodiment herein shown and described, but what I claim is:

1. In combination, a rotary cylinder, its shaft, an auxiliary drive shaft axially aligned therewith and slidably locked thereto, a main drive shaft located adjacent and at right angles to the auxiliary drive shaft, two intermeshing hypoid gears, one on said main drive shaft and the other on said auxiliary drive shaft, and automatically operated means for rotatively adjusting the drive shaft hypoid gear and thereby the auxiliary drive shaft hypoid gear with respect to the main drive shaft, to rotatively adjust the said cylinder.

2. In combination, a rotary cylinder, its shaft, an auxiliary drive shaft axially aligned therewith and slidably locked thereto, a main drive shaft located adjacent and at right angles to the auxiliary drive shaft, two intermeshing hypoid gears, one on said main drive shaft and the other on said auxiliary drive shaft, and both manually and automatically operated means for rotatively adjusting the drive shaft hypoid gear and thereby the auxiliary drive shaft hypoid gear with respect to the main drive shaft, to rotatively adjust the said cylinder.

3. In combination, a rotary cylinder, its shaft, an auxiliary drive shaft axially aligned therewith and slidably locked thereto, a main drive shaft located adjacent and at right angles to the auxiliary drive shaft, a hub loosely mounted on the main drive shaft, two intermeshing hypoid gears, one on the said auxiliary drive shaft and the other on said hub, and means for rotatively adjusting the hub hypoid gear and thereby the auxiliary shaft hypoid gear with respect to the main drive shaft, to rotatively adjust the said cylinder, said means including oppositely inclined external spirally threaded portions on the hub and the main drive shaft respectively, a shiftable sleeve having oppositely inclined internal spirally threaded portions meshing with their respective spirally threaded portions on the hub, a sleeve shaft yoke, and a screw-threaded shaft engaging said yoke.

4. In combination, a rotary cylinder, its shaft, an auxiliary drive shaft axially aligned therewith and slidably locked thereto, a main drive shaft located adjacent and at right angles to the auxiliary drive shaft, a hub loosely mounted on the main drive shaft, a collar fixed to the main drive shaft adjacent the hub, two intermeshing hypoid gears, one on said auxiliary drive shaft and the other on said hub, and means for rotatively adjusting the hub hypoid gear and thereby the auxiliary drive shaft hypoid gear with respect to the main drive shaft, to rotatively adjust the said cylinder, said means including oppositely inclined external spirally threaded portions on the hub and collar respectively and a shiftable sleeve having oppositely inclined internal spirally threaded portions meshing with their respective spirally threaded portions on the hub and collar.

5. In combination, a rotary cylinder, its shaft, a hollow auxiliary drive shaft axially alined therewith and slidably locked thereto, a horizontally disposed main drive shaft, two intermeshing gears, one on said main drive shaft and the other on said auxiliary drive shaft, and means for adjusting the rotary cylinder endwise to obtain its lateral register, said means including an endwise movable shaft extending axially from the rotary cylinder shaft through the said hollow auxiliary shaft, and a manually operated adjusting screw for moving said endwise movable shaft.

6. In combination, a rotary cylinder, its shaft, a hollow auxiliary drive shaft axially alined therewith and slidably locked thereto, a horizontally disposed main drive shaft located adjacent and at right angles to the auxiliary shaft, two intermeshing hypoid gears, one on said main drive shaft and the other on said auxiliary drive shaft, and means for adjusting the rotary cylinder endwise to obtain its lateral register, said means including an endwise movable shaft extending axially from the rotary cylinder shaft through the said hollow auxiliary drive shaft and a manually operated adjusting screw for moving said endwise movable shaft.

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