ART TO ZOO

News for Schools from the Smithsonian Institution, Office of Elementary and Secondary Education, Washington, D.C. 20560

April 1991

What Makes Time Tick, *or* Has The Industrial Revolution Really Made Clocks Go Faster?

National Museum of American History, Smithsonian Institution

Over the past 200 years, Americans have had to keep increasingly close track of timing in their daily lives. Timepieces like this moderately priced 1908 watch have helped them to do so.

"Everyone's always rushing these days." The pace of life sure has speeded up; you hardly have time to think now." "You didn't get this kind of pressure back in horse-and-buggy days."

You frequently hear remarks like these. Are they true? If so, in what way?

Time itself, of course, is not what has changed. It remains a mysterious dimension of our experiences and actions. Nor is the measured amount of time in each daily cycle of 24 hours any different now than when this country began.

What *has* changed, though, is the way activities are timed within these 24 hours. Two centuries ago, most Americans' time was loosely structured compared to our own—somewhat more flexibly scheduled, more slowly paced, more under each individual's personal control. But nowadays as we approach the end of the 20th century, most Americans live in a world of rigid schedules, fast tempos, and short response-times . . . a world that evolved out of the complex changes that we call the industrial revolution.

In the course of the 19th century, the United States changed from a primarily agricultural country into the world's leading industrial nation. This industrialization transformed virtually every aspect of American life. Increasingly precise scheduling and stepped-up tempos made it possible to run economic enterprises of ever-increasing size as smoothly and profitably as possible. We will be looking—in a highly simplified way—at how this came about.

Why focus on *timing* to look at industrialization? Because adapting to time-discipline is an experience that your students know first-hand. They are all under pressure—especially at school—to learn to be in the required place at the required time and to carry out activities on schedule . . . because time-discipline (like it or not) is a skill that our society has come to demand of all adults who are to function successfully.

Three Word-Pictures

Search for clues to how—and why—the pace of life has changed over the years by briefly, magically, flying through time and space to visit three moments in U.S. history: 200 years ago, 100 years ago, and now.

You will approach each stop from the sky, to first get an overall impression of how big and built-up the country is at this time. Then you will look more closely at how people travel and communicate, and how they work. The way they go about these activities will help you understand the timing of their lives.

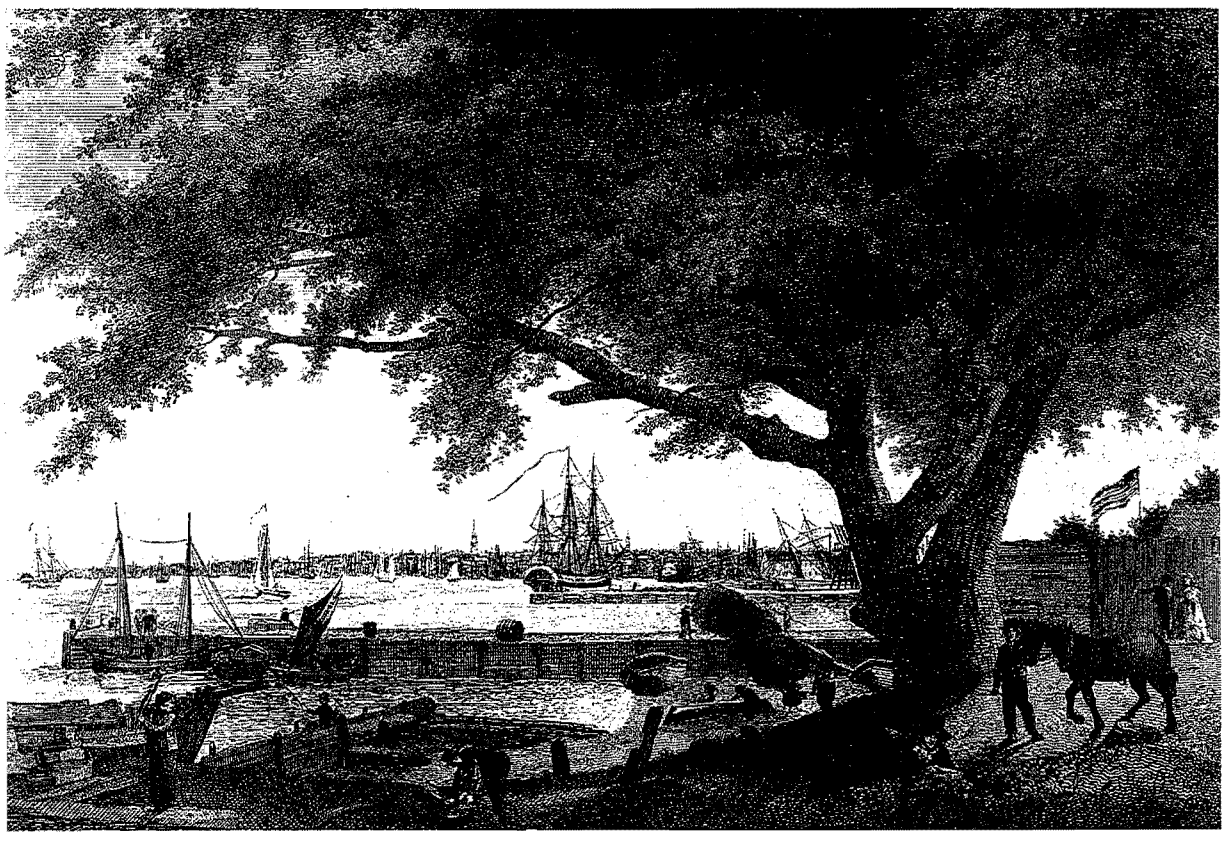
• **200 years ago.** As you fly in over the United States of 200 years ago, you see that most of the nation is still countryside—much wilderness, and some farmland. The scattered towns and very small cities are clustered within 200 miles of the Atlantic seaboard.

These towns look isolated from each other to your 20th-century eyes . . . but to the people who live there, transportation seems amazingly improved. The roads joining the towns are few in number, and mostly made of dirt or logs.

Carts loaded with farm produce jolt along them. Travelers on foot and on horseback pick their way among potholes. A stagecoach sways south—one of those now making a regular run. The trip from Boston to Richmond takes just under a week.

If you wanted to travel far into the interior, to the lands opening up west of the Appalachians, you would probably go by horseback. In a little over a month, if you were lucky, you might reach the Mississippi.

Horses hauling carts, oxen pulling plows, people carrying messages; rivers turning the waterwheels of mills, and sweeping rafts downstream; wind filling the sails of ocean-going ships. . . . Everywhere you look in the 1790s, it is animals and people, water and wind that are supplying the energy that gets work done.



Picture by William Birch, Library of Congress

The outskirts of Philadelphia, the largest city in the United States in the 1790s. Animals and people, wind and water are supplying all the energy. No wonder the overall feel is slow-paced.

But animals get tired, people need to eat, water freezes, wind dies down. Nature sets the pace of life, and natural limits keep this pace mostly slow and unsteady.

Besides, at the end of the 18th century, very few free Americans work for a boss . . . so most workers can set their own schedules. In practice, of course, this freedom is limited by the demands of earning a living.

For farmers, these are set by nature and are quite strict. A farmer has to time tasks in ways that keep animals, people, and crops healthy: milk the cows at sun-up, feed the chickens regularly so they continue to lay well, make sure there is plenty of firewood when the blizzard hits, get in the harvest before it is ruined by rain. . . .

Nature's clues about when to do what are clock enough for most country folk in 1790s America: when the rooster crows, you get up; when the sun is at its zenith, you eat your mid-day meal; when dusk falls, you bring the animals into the barn. Time is given by nature, and nature is given by God.

Town life is somewhat more manmade. Urban events like markets, law courts, and church services require groups of people to show up at approximately the same time. The scheduling of such events in the 1790s is less precise than in the 1990s, but attendees still need to know at what hour to arrive—even when it is impossible to see the sun's position in the sky.

In town, many more people than in the country own a watch or clock. But timepieces are still individually crafted and quite costly, so it is mostly the well-to-do—like merchants, shopkeepers, and professionals—who own them.

Other town-dwellers depend on the sun and on church bells or tower clocks that mark the hour. This much knowledge of the time is precise enough for most people's needs.

Take a craftsperson, for example. So long as he produces dependably enough to earn a living, he can open up shop when he decides, and can take a break—or even a day off—if he feels like doing so.

The way manufacturing is carried out makes this flexibility possible. Although factories are already

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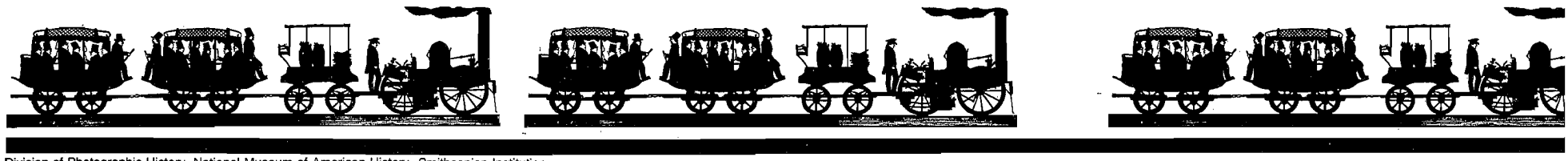
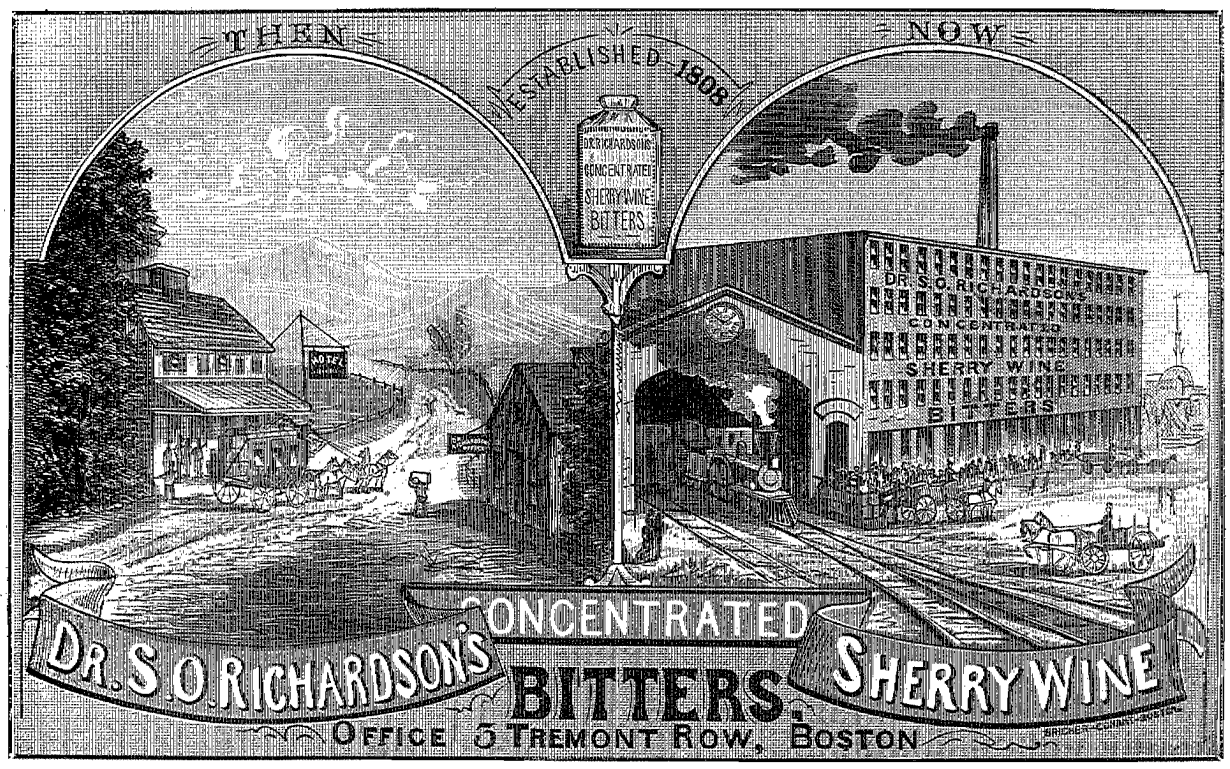


Division of Photographic History, National Museum of American History, Smithsonian Institution



Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution

This late-19th-century advertisement for a patent medicine made from sherry contrasts the world you saw on your first stop with the world you saw on your second. Notice in the first the small town, the rural setting, the stagecoach, the modest local business . . . and in the second, the factory emitting coal smoke, the railroad lines ready to haul the factory's output to faraway places, the clock above the train.

common in England by this time, in the United States most manufactured products are still made by hand, by individuals—sometimes within a family, for their own use; or as a business, for sale to customers in the local community. One skilled craftsperson often carries out all the steps involved in the manufacture of his product. He has learned the skills he needs through an apprenticeship of many years . . . and his skill shows up in the quality of his product.

If you look through the open doorway of that shop there, along this cobbled street, you will see a shoemaker inspecting a pair of boots he has just finished making. He turns them over, looks inside. Then he smiles as he polishes the leather with a soft cloth.

• **100 years ago.** Zip ahead now 100 years, to the 1890s. The United States you see below you now is three times bigger than a century before; it stretches all the way to the Pacific.

Many more towns and cities have been built, especially in the northeast quarter of the country. These include some much bigger cities than existed on your first visit.

The cities no longer seem isolated to you the way the earlier towns did. As you look down, you can see three different networks* connecting them: a rather poor network of roads, a slender but well-maintained network of telegraph wires, and a heavy network of railroad tracks.

Along this network of tracks, trains rush in all directions, whipping factory-made goods to buyers around the country . . . and carrying passengers all the way from New York to California in 3½ days!

You swoop down low to take a closer look. A locomotive whooshes past you, black coal smoke pouring out of its smokestack . . . the same coal smoke that now pours out of factory chimneys around the country: since your first stop, the United States has become the world's leading industrial nation. And it is no longer animals or people, water or wind—but *coal*—that drives the engines of its industries.

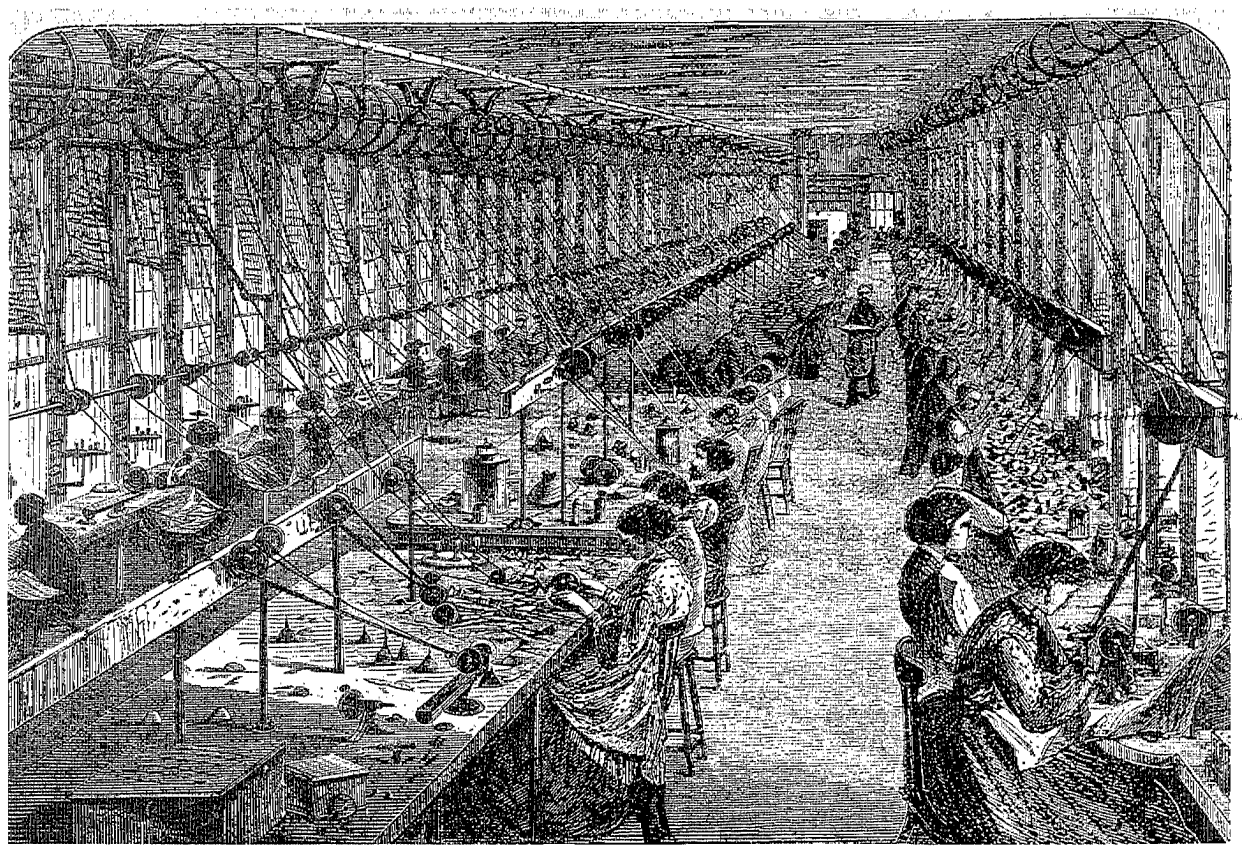
Coal can produce power enough to run machines of any size . . . as fast as you want . . . as long as you want . . . around the clock, if that will make more money. Unlike animals, coal-powered machines never get tired.

This new source of energy, combined with the machinery it drives, has eliminated the brakes that used to slow the pace of work.

How has this affected the lives of working people?

To find out, take a look inside a factory, a textile mill.

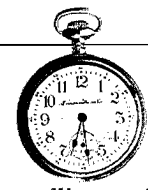
You see a huge room crowded with huge machines. Men, women, and children tend these machines. Some of the children are so small they have to stand on boxes to reach the equipment they operate.



Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution

Inside a factory after the Civil War.

Timing Goes National: Coordinating Big Systems



In the old days, as you saw on your first stop, it was individuals who produced most manufactured goods. An individual craftsperson produced in small quantities, for local customers.

But now, at the end of the 1890s, it is factories that turn out most manufactured goods. Mechanized factories can produce enormous amounts, far more cheaply and faster than any craftsperson could possibly produce them.

But because all the factory buildings and machines and coal *cost* a lot, the factory must *sell* a lot to stay in business. There are not enough buyers locally, so factories have to ship part of their output by train to buyers in other places around the country.

One result of this is that producers and buyers, suppliers and shippers all over the country have come to do business with each other and depend on each other: the American economy has become national.

Even American *time* has become organized on a national basis. Just a few years before this visit of yours, each community in the United States still had its own local time. As the economy became national, this hodge-podge of local times became increasingly inconvenient, especially for railroads. Each station a train passed through might be on a different time system from its neighbors. In 1883, with the establishment of standard time zones for the whole country, time itself was organized into a larger system.

Standard time zones made coordination easier . . . but usually, as a system becomes bigger, it becomes harder to manage. This is true of factories, of railroads, and of the entire interlocking economic system described a couple of paragraphs ago.

The shoemaker you saw back in the 1790s had no trouble keeping track of his business. He could easily hold in his own head all the information he needed: he knew what he had promised his customers, how much leather he had, how fast he (and his apprentice, if he had one) could work, whether any of his tools needed fixing. . . .

But 100 years later, the owner of a large factory could not possibly just depend on his own memory to keep up with all his factory's employees, departments, suppliers, buyers, and shippers.

As systems get big, keeping track of—and controlling—what is happening everywhere in the system becomes a major part of the system's work: getting up-to-date feedback, comparing what is going on in one place with what is going on in another, communicating this information to wherever it is needed, storing it in clear records for future use . . . all this processing of information becomes essential to making sure that the right thing is being done *at the right time*.

By the 1890s, more and more people—managers, clerks, telegraphers, telephone operators—are working at jobs that involve the processing of information. And more and more inventions—the telegraph, the telephone, the typewriter, carbon paper, the calculating machine—that help gather, communicate, process, and store information are coming into common use.

All this effort is costly, but essential. Even small mistakes in timing can be disastrous: if a vital supply does not arrive when it should, a factory's production can be forced to a complete stop; if the timing of two trains running along the same track is off by even a few seconds, the trains may crash.

*A fourth network—of long-distance telephone lines—is rapidly developing. But until the *late* 1890s, it is still confined mostly to the Northeast.

The room is full of dust and noise. Wheels rattle, metal parts clatter. You watch one child carry out his task: when the yarn breaks, he has to go in past moving machinery to fix it. If he moves too slowly, he could easily get hurt.

Suddenly a whistle blows. The machines stop; how quiet it becomes. The workers rush to the side of the room and pull out metal lunch buckets from under the benches there. They eat fast, talking and joking. In just a few minutes, the whistle blows again and they rush back to their machines.

Meanwhile, in the town nearby, it is also lunchtime. Office workers—men in derby hats and women in high-collared white blouses—come pouring out of the commercial buildings downtown.

No whistle announces their lunch break, but their time on the job is also rigidly scheduled. They have to get to work at a certain hour, eat at a certain hour, leave at a certain hour.

In fact, more and more Americans each year work according to schedules—and at a pace—set by someone else. They have lost control over the timing of their own work lives.

Why?

The simplest explanation is that fewer and fewer people now work for themselves. Agricultural machinery and improved farming methods have made farmers a smaller fraction of the work force. Competition from low-priced factory goods has put large numbers of craftspeople out of business.

Many of these displaced workers have gone to work for others, often in factories. Their new employers are now the ones who set work-schedules.

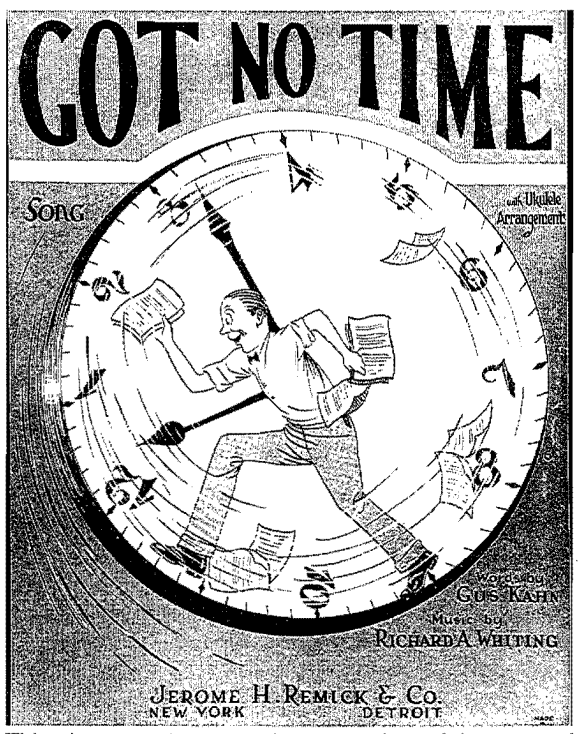
This drop in self-employment helps explain who sets work-schedules. But it does not explain why these work-schedules are more rigid and rushed than before.

To learn more about this, stop here and read the sidebar on page 2. It describes how the growth of the factory system and of a national economy made coordination and precise timing very important. When you have read it, come back here and continue your visit.

The changes you just read about underlie what you are seeing in 1890s America. You are thinking about them as you notice one of the office workers pause in his walk. Sure enough, he takes a watch out of his pocket, and carefully checks it against the ornate street clock that stands at the corner.

Now that scheduling is so important in business, Americans are increasingly time-conscious. Punctuality is an important sign of respectability. Timekeeping devices are everywhere: grandfather clocks in living rooms, alarm clocks next to beds, wall clocks in stores and restaurants, and watches in people's pockets.

Around the Civil War, mass-produced watches became available in every price range. Advertisements for watches describe watch owners as dependable and respectworthy. With advertisers' encouragement, people have come to think of watches as appropriate gifts to mark major life changes like graduations and retirements. They stand for people's identity, as well as for the importance of time in our lives.



DeVincent Collection, Archives Center, National Museum of American History, Smithsonian Institution

This sheet music cover gives one view of the pace of life of an office worker early in this century.

• **Now.** The United States you are flying over today is crowded with towns and cities, many of them huge. One half of all Americans now live in cities of over a million people. These cities sprawl outwards along the highways that connect them, one community often blending into another without real countryside in between.

Almost everywhere you look you see many more signs of people than before. Even when you are passing over wilderness areas, you catch glimpses of gum wrappers and soft drink cans. And nowadays even the most far-flung community is connected with the rest of the country by a fast and complex network of transportation and communication.

The priority for transportation these days is to get travelers and freight where they are going in as short a time as possible. On the ground, broad highways cut across long distances, looping into cloverleafs and beltways as they approach cities, so through-travelers won't be delayed by city traffic.

And when Americans leave their cars behind, they now usually take to the air to go even faster, in planes that can fly from coast to coast in just a few hours.

But what you *see* up there in the sky is going very, very slowly compared to what you can't see: all around you all the time, invisible messages are racing through wires and through the air itself at the speed of light. These messages arrive almost instantly, in the form of telephone conversations, radio advertisements, faxed reports, television broadcasts.

Communication is so rapid at the end of the 20th century that events on the other side of the world become part of Americans' present experience. This is a very different situation from 200 years ago, when a message took at least a week and a half to travel from New York to Charleston . . . so that events had turned into stories about the past by the time people a few hundred miles away learned about them.

All this instant communication gives people more and more information—but less and less time to react to the information, whether they are at a fax machine, in front of a television camera, at a computer terminal, or in a military command post. There is constant pressure to make quick decisions and to turn transactions over fast. This is particularly noticeable in work situations.

On each of your stops so far, you have looked in briefly at some people on the job . . . and have seen important connections between work and timing.

Two hundred years ago, you looked at farmers and craftspeople to get a sense of typical pace; 100 years ago, you looked at factory workers. Today, the best people to look at are probably workers in a large computerized office. . . . There is one, up on the 38th floor of that building. Take an elevator there: even up-and-down transport is mechanized and fast now.

Enter the office and you see men and women sitting in cubicles, each at a desk equipped with a telephone and a computer. These people work for the accounts department of the local phone company. When a customer calls with a question about his bill, the employee calls up the customer's account onto the computer screen, where she can also enter any changes resulting from their conversation.

Meanwhile, the computer is automatically keeping a record of when the conversation took place and how long it lasted. Think what this means. Two centuries ago, most craftspeople and farmers set their own work pace. One century ago, the employer set the work pace and supervised the workers to make sure they kept it. The office we are now looking at has gone a step further. Here it is the work tool that keeps an eye on its user: the computer keeps track of how fast the computer operator works. If she repeatedly takes time to chat on the phone, she may be penalized for not working fast enough.

Not all computer operators are tracked in this way, but it is common for computers to keep time . . . and already about one half of all jobs in this country involve using a computer.

And it isn't just people working with computers whose pace is pressured. Almost all jobs these days demand speed and scheduling. A bus driver has to arrive on time; a waiter's customers won't leave good tips if he doesn't bring their food quickly; a scientist times her experiments down to fractions of a second; a one-hour dry-cleaner won't stay in business long if his service really takes a day.

Moreover, everyone's schedule has to mesh with everyone else's. And what's more, this now has to happen off the job as well as on.

Follow one of the computer operators—a woman—as she leaves her office and rushes from precisely timed event to precisely timed event: to a dentist's appointment; to pick up her children before the daycare center closes; to her kitchen to microwave frozen dinners (for a fixed number of seconds) because this is the only way to have time for a family meal before her husband leaves for his night job. Finally (if she can finish her other chores in time) she will watch her favorite t.v. program when it comes on at 8 o'clock precisely.

Meanwhile, her children go play computer games that challenge them to carry out precisely timed actions at ever-higher speeds. Is this their entertainment . . . or their training for the pace of the future?

Lesson Plan

Step 1: Time in your life

Begin by asking your students, as homework, to each count how many timepieces there are at home, including all the clocks and watches belonging to all the people who live there.

In class the next day, write all the children's answers on the chalkboard. Have the kids figure out the total "Class Clock-and-Watch Count" by adding up all the numbers. Then ask: What other ways besides these clocks and watches do people have to find out the time? (Radio, telephone, school bells, etc.)

Why do people have so many ways to find out what time it is? Because so many things have to be done at a certain time. Ask the children for examples and write some of their answers on the chalkboard: You need to know the time so you won't be late for appointments, won't miss television shows or airplanes or doctor's appointments, so you will know when to take a cake out of the oven, or when paint is likely to be dry enough to put on a second coat. . . .

Then give the children a few minutes to try to estimate how many times in a school day they themselves check the time (by looking at a clock or watch) or are made aware of the time (by hearing a school bell, for example). Have each child write down her guess.

Then hand out peel-off labels large enough to provide writing space but small enough to fit on the children's wrists. Tell them: Now you're going to check how close you came to guessing right. Before you go to bed tonight, stick this label on your wrist, high enough up so it won't get washed off. When you wake up in the morning, it will remind you to carry out this activity . . . which is to make a mark on the label whenever you check the time or are made aware of the time. Keep on doing this all day, from the moment you wake up until you are ready to go to sleep. (Keep a pen handy.)

The day after the children have kept count this way, write all their answers on the board. Once again, have them figure out a class total (older kids could also figure out a class average).

Ask: Is this total probably higher or lower than the true figure? (Probably considerably lower, since no doubt the kids will often forget to make a mark.) How accurate did their guesses turn out to be?

Step 2: Alternative kinds of timing

This step involves a class discussion. The questions and ideas that follow are meant to suggest the line of thought that you are trying to elicit from your students . . . and are not meant to be a script or guidelines for a lecture:

You have been noticing how important exact timing is in your lives, and how often you have to pay attention to what time it is. Was this true even when you were very little?

No. . . . Your parents probably taught you to tell time when you were very small, and also trained you gradually to take more responsibility for timing things right—for being ready for outings, for example, or for finishing jobs by a certain hour. Think of how often people tell you to hurry up!

Then when you started school, your whole day became organized around a class schedule . . . and as you got to higher grades, your teachers expected you to take more and more responsibility for being where you were supposed to be when you were supposed to be there, and for getting your work done on time.

Learning to pay attention to time is an important part of growing up in our society . . . because adults have to be time-conscious to get along—have to show up on time for appointments, for example, and have to work at a certain speed on the job.

These two examples—being on time and working fast enough—illustrate two important aspects of timing: scheduling and pace. Let's take a closer look now at each of them, beginning with scheduling.

Continued on page 4.

Continued from page 3.

Write the headings *Scheduled Activities* and *Unscheduled Activities* on the chalkboard. Explain that by scheduled activities you mean activities involving fixed timing: activities that are supposed to begin at an exact time, end at an exact time, or last an exact length of time (in contrast to activities that begin and end whenever you want, and last as long as you want).

Give one or two examples of scheduled and unscheduled activities, and tell the children that in a moment they will be thinking up examples of their own. The lists that the children finally compile might include the following kinds of items:

- *Scheduled Activities:* Store hours, television programs, school day, school lunch, dentist's appointment, bedtime, space shot countdown, football quarter, recipe cooking time, airplane departure, birthday party. . . .

- *Unscheduled Activities:* Getting together informally with friends, washing car, taking dog for walk, playing board game with parents, ice cream break, telling a joke, playing with stamp collection, painting a picture, building a sand castle. . . .

Some of the examples the children come up with will probably elicit discussion, since the categories are not at all rigid. The same activity may seem to some children to belong in the first category, while to others it belongs in the second. Some families, for instance, eat their meals at exactly the same time every day, while others eat at varied times (or don't eat together at all).

Drawing the children's attention to these kinds of differences is an important part of this activity. The students' lives are scheduled in different ways and to different degrees. Encourage the children to think about these differences . . . and about what they personally prefer.

The more aware the children become of their options and preferences, the better prepared they will be to make future choices involving timing. These discussions of personal attitudes about timing will also make more real and meaningful the historical materials that the kids will be dealing with in the next step of this Lesson Plan.

When the children have had plenty of time to explore scheduling, move on to pacing, the other aspect of timing mentioned earlier.

On the chalkboard, write the headings *Speedy Activities* and *Leisurely Activities*. Explain that by speedy activities, you simply mean activities where there is pressure on the doer to be fast. Again, the categories are not rigid. Here are some examples:

- *Speedy Activities:* car races, video games, games of tag, television quiz shows, airplane travel, overnight mailing services, fast-food restaurants, speed-skating, timed exams, drive-in bank tellers, automatic teller machines, auctions. . . .

- *Leisurely Activities:* gardening, playing checkers, drawing, going to the zoo, figure skating, shopping in an open-air market, organizing a stamp collection, building a model, building sand castles, taking care of pets. . . .

Follow the same procedure you did with scheduling. Again, encourage the children to explore personal differences in attitude. Some people prefer the intensity and excitement of fast-paced activities; others like nothing better than to focus in a leisurely way on the details of whatever they are doing. Often, a person's feelings vary according to the activity: the same person may love fast-paced competitive sports and yet hate feeling hurried when she is writing.

Step 3: Three word-pictures

At most times and in most places in history, people have lived in a time structure that was looser than our own. Their appointments were more likely to be on the order of "in the morning" or "after dinner," but not usually at a specified-down-to-the-moment time.

In fact, throughout much of history, it has been impossible to do things on a very exact schedule. Why? Because throughout much of history, clocks—when they existed at all—were less accurate and far more expensive than now . . . so most people had no way to *know* the exact time.

The situation changed for a complex of reasons. Particularly important was the fact that precise scheduling and a fast pace were essential to large-scale production and to the growth of a national economy.

You are now going to take a look at this for yourselves—by reading three word-pictures that describe the United States at three different dates: 200 years ago, when it was a brand-new country; 100 years ago, around the time when your great-great-grandparents may have been about the age you are now; and today. Each word-picture focuses on how people's lives were typically scheduled at the time.

When the children have finished reading the first word-picture, have them stop, ask questions, and discuss what they have read.

Here are some of the kinds of questions you may want to raise: Did most events take place at fixed times? Did work take place at fixed times? Who set work schedules? Were people under pressure to work fast? Could they travel fast? What's an example of how long it took to travel? Could they transport goods fast? Could they communicate quickly and easily with people in other parts of the country? How often do you think *they* checked the time . . . and how?

Follow the same procedure for the two remaining word-pictures.

Finally, have the children, as homework, carry out the Pull-Out Page activity.

Step 4: When time-keeping stops

As a last step, have each of the children write a science fiction story or play, illustrated if they wish, on the following subject:

An Anti-Timekeeping Ray from outer space suddenly destroys all the time-keeping devices in the world. All the clocks and watches stop working. Metronomes won't tick. When you dial the telephone time number, you hear a voice repeating "I don't know . . . I don't know. . . ."

Nothing else in the world has been damaged. All other things and people are fine.

Continue telling the story from here. What are some of the things that people notice first after the Ray strikes? What happens next? How do they react? How do they try to cope with the changes?

You *may* want to include an interview with someone 30 years after the Anti-Timekeeping Ray destruction. How do they view this event now? Looking back, do they think the effects were all bad . . . or were there good results too? If so, what?

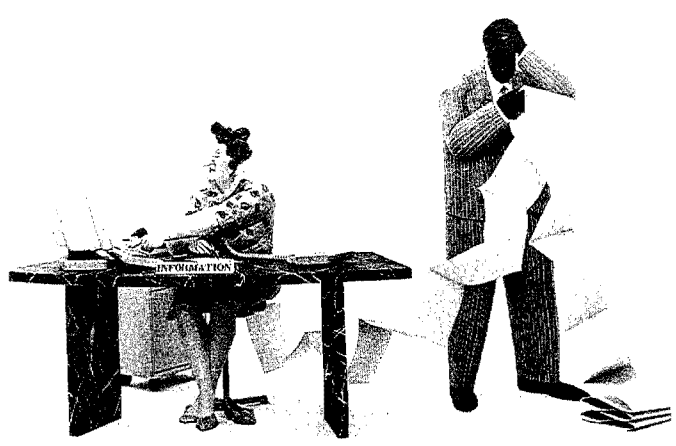
Real Things!

The Smithsonian's National Museum of American History, in Washington, D.C., is full of objects related to the changes you have been reading about:

- Highlights from the museum's large collection of timepieces are on display in the **Hall of Timekeeping and Light Machinery.**

If you can't come in person to view them, you may enjoy the pictures and descriptions of them in *American Clocks*, by Otto Mayr and Carlene Stephens. This 52-page book, published in 1990, may be ordered by writing: Publications Division, Room MBB66, NMAH, Smithsonian Institution, Washington, DC 20560. A check for $8.95, payable to "Smithsonian Institution," should accompany your order.

- See more . . . learn more . . . about the speeding-up of our ability to process and communicate information . . . at the largest interactive exhibition ever mounted at the Smithsonian—**Information Age: People, Information & Technology.** The exhibition places this evolution in a social context, showing how information technologies have changed our lives.



- The exhibition **Engines of Change: The American Industrial Revolution, 1790–1860** traces many of the developments discussed in this issue.

A 300-page book by the same title as the show, written by Brooke Hindle and Steven Lubar and published in 1986, is available from the Smithsonian Press.

Resource Guide for Teachers

This 90-page guide describes over 300 resources available from the Smithsonian. More than half of these resources are free or are available for a nominal fee.

You'll find posters, recordings, newsletters, bibliographies, books and booklets, kits, and video programs to use in your classroom. Send a check for $4.95 to Smithsonian Institution/OESE, Department 0561, Washington, D.C. 20073-0561.

ART TO ZOO
is a publication of the
Office of Elementary and Secondary Education
Smithsonian Institution, Washington, D.C. 20560
Write to this address if you want your school to be placed, free of charge, on the ART TO ZOO mailing list.

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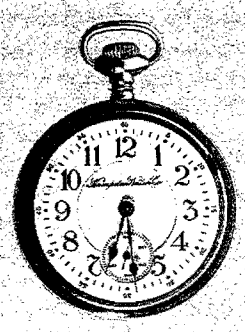
Special thanks to the following people at the Smithsonian for their help in preparing this issue of ART TO ZOO:

National Air and Space Museum: Mark Avino, Paul Ceruzzi, and Ronald E. G. Davies.

National Museum of American History: Michelle Delaney, Bernard Finn, Lynne Harlan, Peter Liebhold, Steven Lubar, Robert Selim, Elizabeth Sharpe, Carlene Stephens, Kay Youngflesh, and the staff of the Archives Center.

Office of Elementary and Secondary Education: María del Rosario Basterra, Teresa Mora and Michelle Smith.



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Books for children

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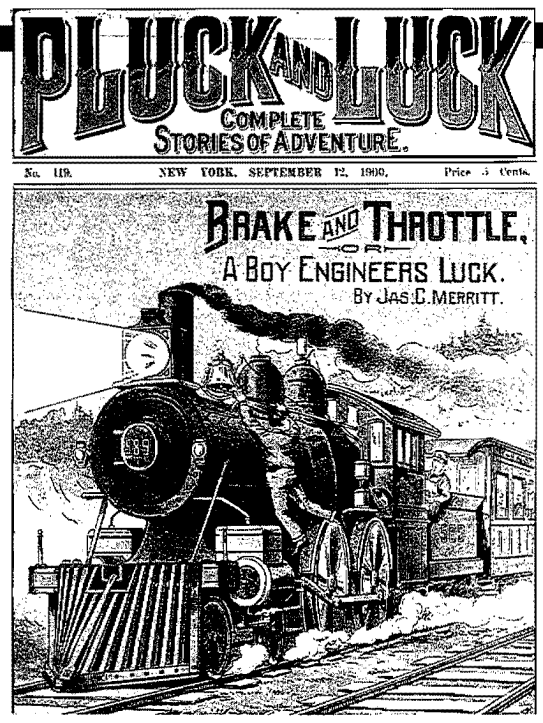
Time Machines

All the pictures on this page show inventions that have affected the timing of people's lives. The caption under each picture tells you what it is.

Imagine now that each of these inventions can talk . . . and describes itself. Their statements appear at the right of this page.

Your job is to figure out which invention made which statement and to draw a line connecting them. . . . Then find or draw pictures of two other Time Machines, of your own choosing. How would *they* describe themselves?

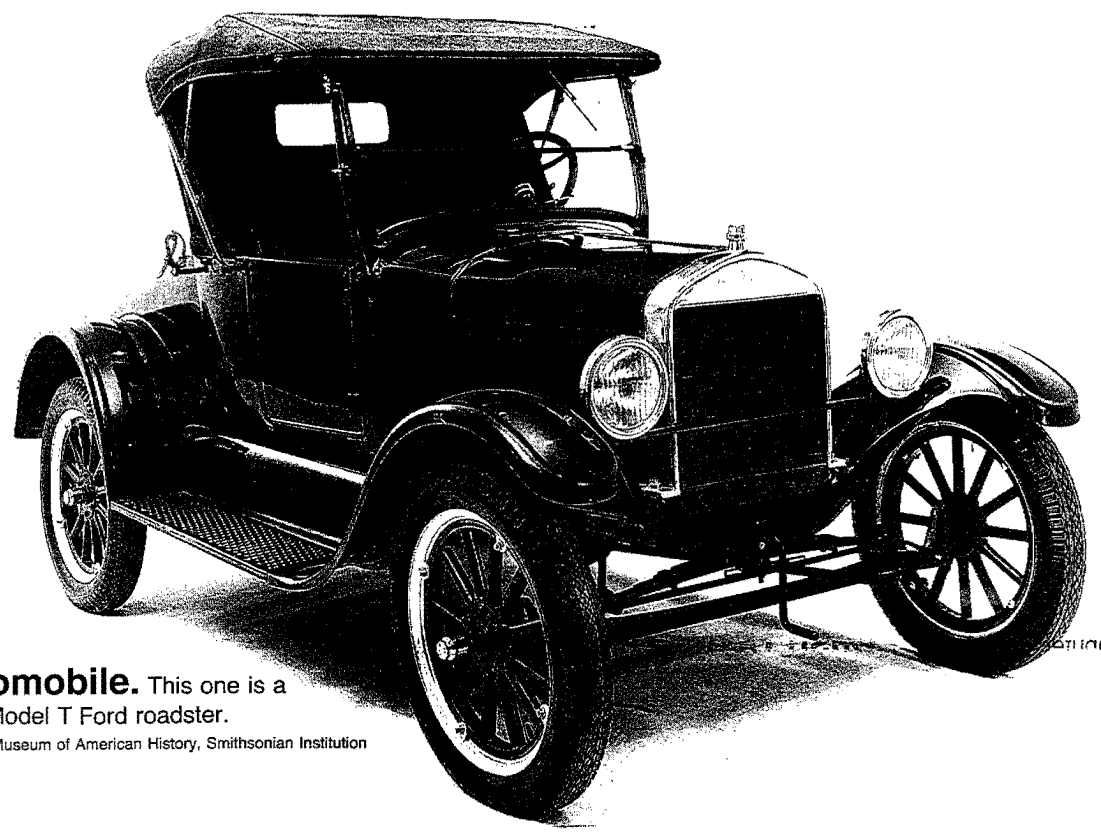


Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution

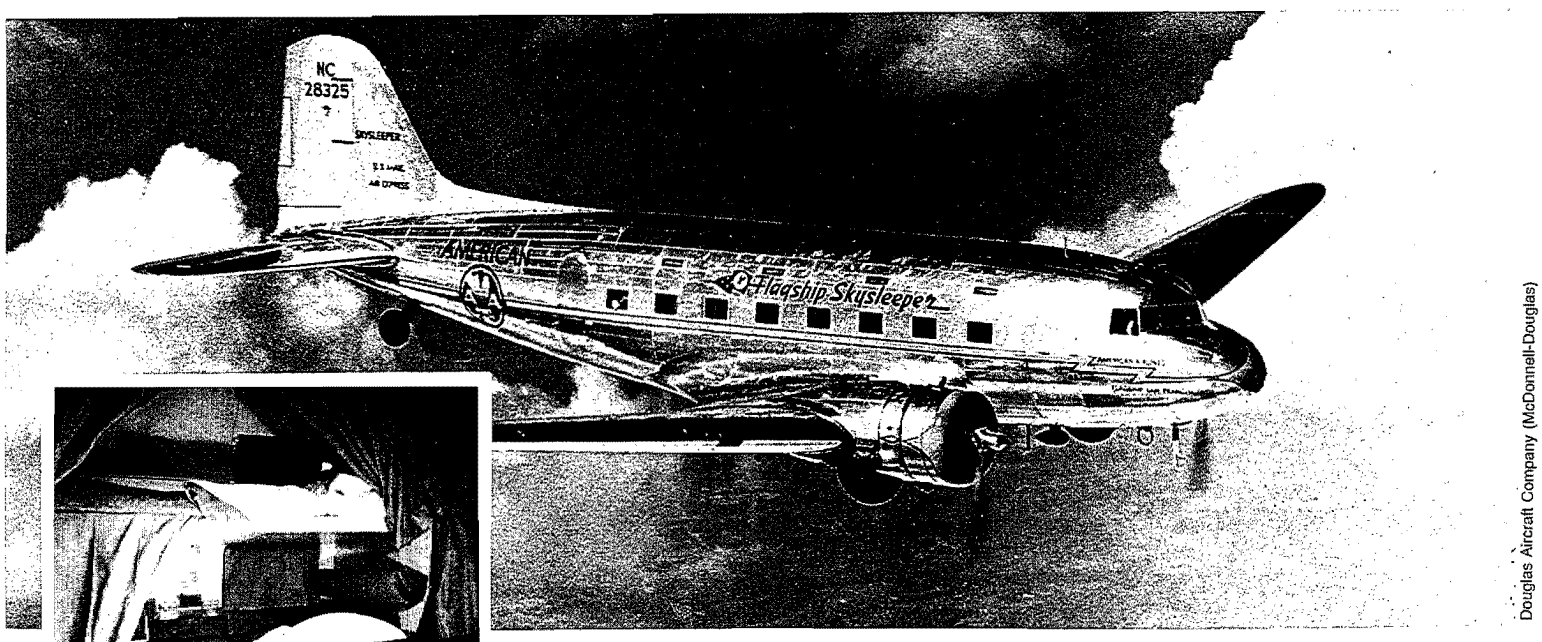
Train. "There he hung for his life, the train sweeping along at frightful velocity . . ." say the words under this picture, which was the cover of a 1900 boy's magazine.

National Museum of American History, Smithsonian Institution

Typewriter. Office worker with her shorthand pad and typewriter, ready to turn out written words quickly.



Automobile. This one is a 1926 Model T Ford roadster.
National Museum of American History, Smithsonian Institution



Douglas Aircraft Company (McDonnell-Douglas)

Airplane. Douglas DST (Douglas Sleeper Transport), developed to provide comfort as well as speed on the long trip across the country. During the day, passengers sat in seats, as they do on most passenger planes. But at night, as the inset shows, these seats could be converted into bunk-type beds. This airplane went into service in 1936.

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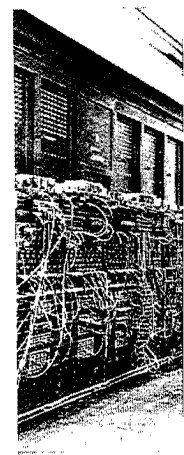

Computer
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Telegraph
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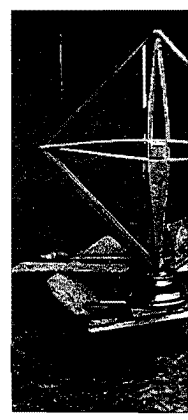
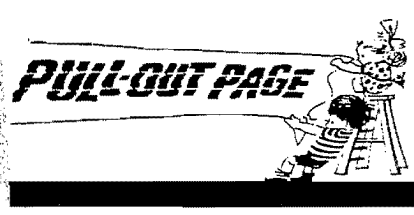
The inset show



Radio. Yes,
early one.



19 G 1909

NING AGAINST TIME

ican Demand for Prompt During the Busy Hour

Americans look . *mediate* service. during the day same time and d fast. People est delay.
of the *tremen-* the telephone d in the *means.*
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have at instant command a separate line for each customer everywhere, at the rush hour.

Frequently one man talking over a long distance Bell line has the exclusive use of $300,000 worth of equipment.

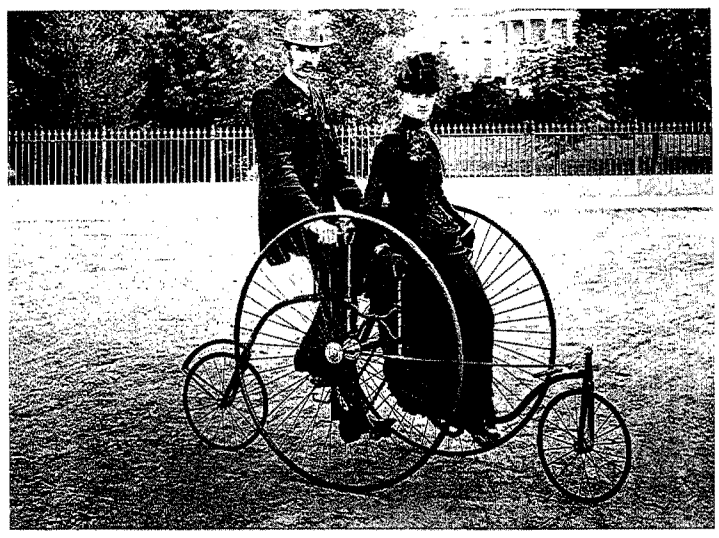
No one else can use it while he is using it.

Talking from New York to St. Louis his voice travels over one million pounds of copper wire.

This is his own private, one-passenger, talk road while he is using it.

e. Illustrations from a 1909 adver- phasized the role of telephones in munication possible.

Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution



National Museum of American History, Smithsonian Institution

Bicycle. Actually, this 1880s vehicle is not technically a *bi*cycle, because it has four wheels instead of two. Yet its whole construction makes it a very close relative. The building in the background is the White House.

No. 1 Style,
Showing Dishes in Place.

They Remain Stationary, and are Perfectly Safe.

Your Hands do not touch the Water, thus Avoiding Scalding, Par-Boiling, and Chapping them.

EVERY MACHINE GUARANTEED.

Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution

Dishwasher. 1892 advertisement for a Stevens Dish Washing Machine.

National Museum of American History, Smithsonian Institution

. All the equipment you see in this a single computer—the ENIAC, the fully electronic calculating machine, se in 1946. Today, a computer with ssing power could fit into a person's

Photo by Laurie Minor, Smithsonian Institution

Cash Register. This ornate model was made by the National Cash Register Company in 1919.

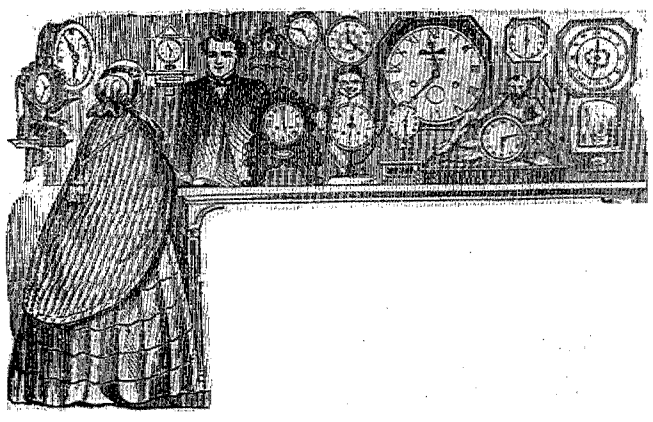
Soldiers putting up wire for a field telegraph. During the egraph was used to coordinate supply and troop movements.

Division of Electricity and Modern Physics, National Museum of American History, Smithsonian Institution

a Beardslee telegraph machine.

Library of Congress

his device really is a radio, a very



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Clock. Woman buying a clock in the second half of the 19th century.

What Am I?

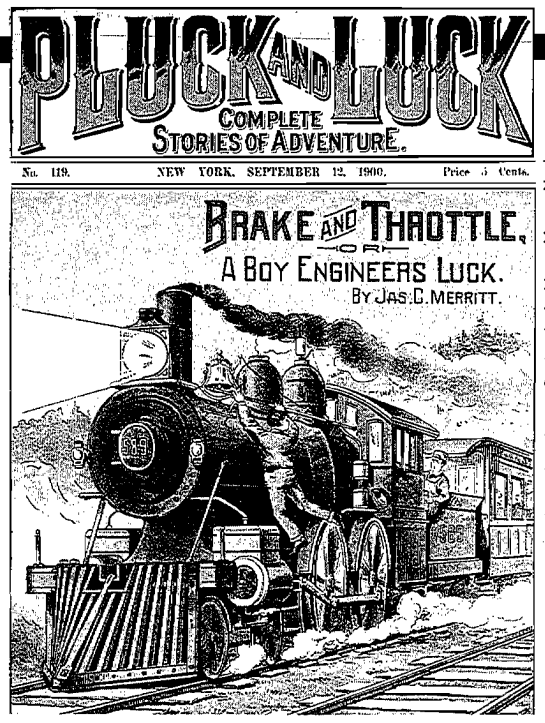
- I made it possible for people in different parts of the country to hear the same news, music, and plays at the same time . . . bringing Americans into a shared present moment.
- Once they began to mass produce me cheaply, I made it possible for everyone to check the time whenever they wanted . . . and to be on time.
- I gave individuals a way to travel quickly wherever they wanted, around a city or over long distances, even on the spur of the moment. I became so important that I transformed the country.
- I made one kitchen task faster.
- Thanks to me, people and freight could travel long distances much faster than before . . . and factories could sell what they made to buyers all over the country.
- I kept faster, more dependable track of cash exchanges than had been possible before.
- I began helping people process information faster . . . and my descendants are continuing to do the same job . . . and many others. They can process a lot more information than I could, a lot faster . . . and they sure are smaller!
- Once I became common, one person could talk directly with another—both hearing each other's voice—even if they were hundreds of miles apart. At first I was used in business, but I soon moved into people's homes too.
- I've been around commercially since just after World War I, carrying people long distances in fantastically short times. I'm now the most common way to travel when people don't drive.
- I speeded up written communication.
- I'm an unusual-looking member of my family . . . but all kinds of us became popular in the late 1800s. We gave our users a wonderful sense of freedom of movement and speed, and our popularity led to a demand for better roads.
- I was the first device that could carry messages instantly over long distances, though these messages had to be put into a code. Though the picture shows me doing something else, I'm particularly famous for making it possible to coordinate the movements of trains in large railroad systems.

Maquinas de Tiempo

Todas las figuras en esta página muestran inventos que han afectado la regulación del tiempo en la vida de la gente. La leyenda debajo de cada figura te dice lo que ésta es.

Imagina ahora que cada uno de estos inventos puede hablar y se describe a sí mismo. Sus descripciones aparecen al lado derecho de esta página.

Tu trabajo es descifrar cuál invento originó cuál descripción y dibujar una línea de conección entre los dos. . . . Luego busca ó dibuja figuras de otras dos máquinas de tiempo que te gusten. ¿Cómo se *describirían* ellas mismas?



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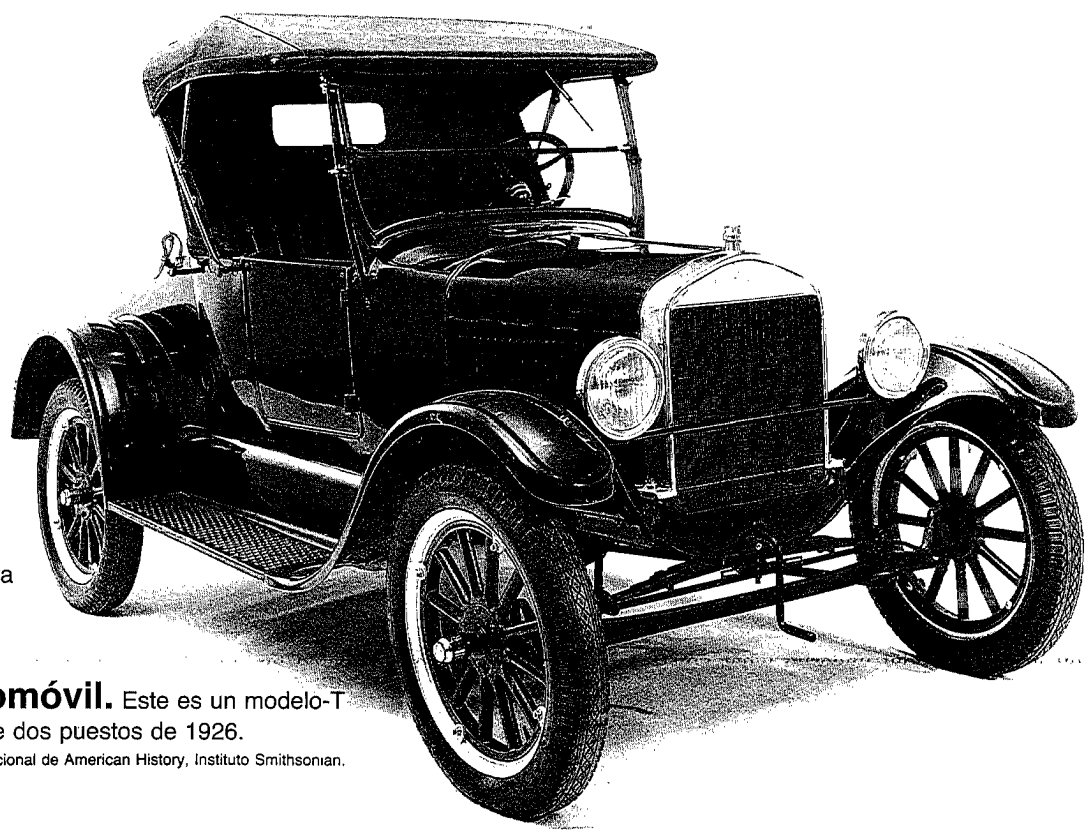
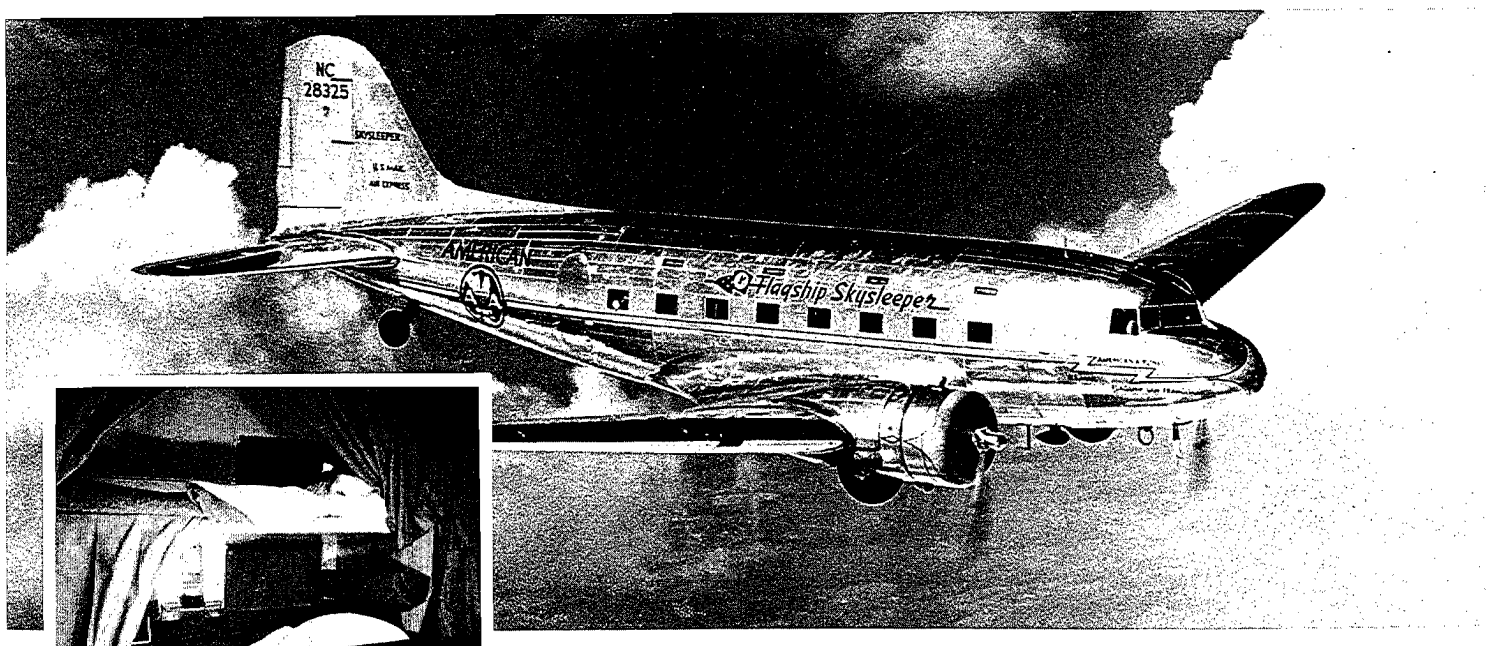
Tren. "Se colgó allí para salvar su vida, el tren desplazándose a una velocidad espantosa" dice la leyenda de esta figura, la cual fue la cubierta de una revista para niños en 1900.

Museo Nacional de American History, Instituto Smithsonian.

Máquina de escribir. Oficinista con su libreta de taquigrafía y máquina de escribir, lista para producir palabras escritas rápidamente.



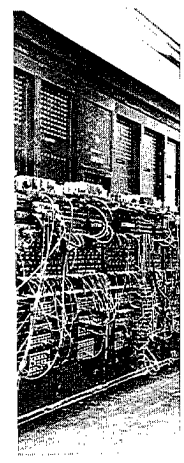
Automóvil. Este es un modelo-T Ford de dos puestos de 1926.
Museo Nacional de American History, Instituto Smithsonian.



Compañía de aviación Douglas (Mc-Donell-Douglas).

Avión. El Douglas DST (Douglas Sleeper Transport) fue desarrollado para proveer comodidad así como velocidad en los viajes largos a través del país. Durante el día los pasajeros se sentaban en asientos, como lo hacen en la mayoría de los aviones de pasajeros. Pero en la noche, tal como se muestra en el recuadro, estos asientos podían ser convertidos en camas tipo litera. Este avión entró en servicio en 1936.

Teléfono.
rio de 1900 que
la rapidez de las



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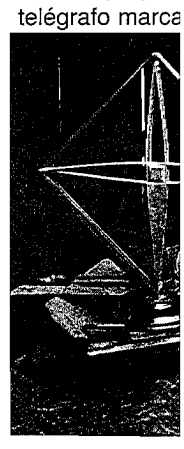

Radio. Sí, e
dio, uno de los

Del Arte al Zoologico Abril 1991
Noticias para las escuelas del Instituto Smithsonian Traducción de Teresa L. Mora

19 6 1909

NING AGAINST TIME

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Americans look ... *mediate* service. ... during the day ... same time and ... fast. People ... est delay. ... of the *transmi-* ... the telephone ... in the *means.* ... ompanies have ... have at instant command a separate line for each customer everywhere, at the rush hour.

Frequently one man talking over a long distance Bell line has the exclusive use of $500,000 worth of equipment.

No one else can use it while he is using it.

Talking from New York to St. Louis his voice travels over one million pounds of copper wire.

This is his own private, one-passenger, talk road while he is using it.

llustraciones de un anuncio publicita- enfatizaba el papel los teléfonos en comunicaciones.

Colección Warshaw de Business Americana, Centro de Archivos, Museo Nacional de American History, Instituto Smithsonian.

Museo Nacional de American History, Instituto Smithsonian.

Bicicleta. En realidad, este vehículo de 1880 no es técnicamente una *bi*cicleta, puesto que tiene cuatro ruedas en vez de dos. Aunque su construcción lo hace un pariente muy cercano. El edificio en el fondo es la Casa Blanca.

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EVERY MACHINE GUARANTEED.

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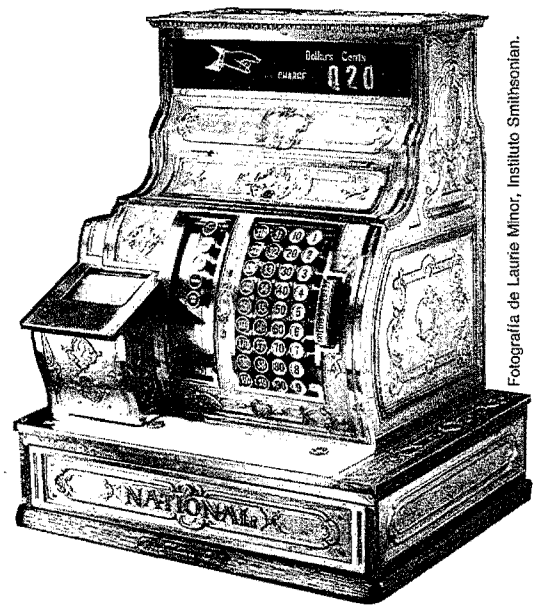
Lavaplatos. Anuncio de 1892 de una máquina de lavar platos Stevens.

Museo Nacional de American History, Instituto Smithsonian.

dor. Todo el equipo que ve en esta te de un solo computador; el ENIAC, una calculadora, totalmente electró- ltiple, que entró en uso en 1946. ador con el mismo poder de proce- entrar en la mano de una persona.



Fotografía de Laurie Minor, Instituto Smithsonian.

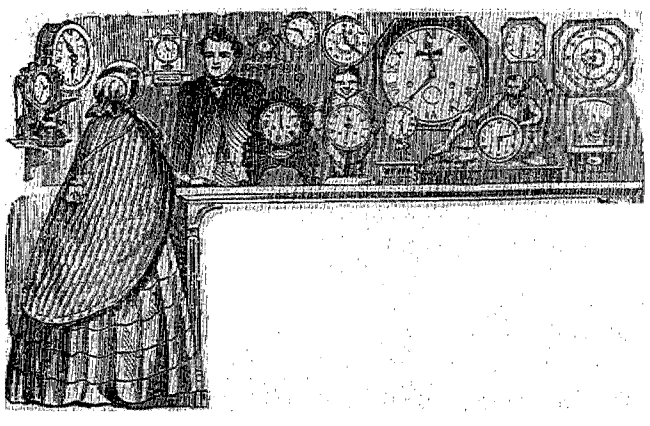
Caja registradora. Este modelo decorado fue hecho por la Compañía Nacional de Cajas Registradoras en 1919.

División de electricidad y física moderna, Museo Nacional de American History, Instituto Smithsonian.

. Soldados colocan alambres para un telégrafo de campo. ra Civil, el telégrafo fue usado para coordinar los movimientos suministros. En el recuadro se muestra una máquina de Beardslee.

Library of Congress.

ste dispositivo es en realidad un ra- primeros.



Colección Warshaw de Business Americana, Centro de Archivos, Museo Nacional de American History, Instituto Smithsonian.

Reloj. Mujer comprando un reloj en la segunda mitad del siglo XIX.

¿Qué Soy Yo?

- Hice posible que gente en diferentes partes del país pudiesen oir las mismas noticias, música y obras de teatro al mismo tiempo, haciendo posible que los norteamericanos compartieran el mismo momento.
- Una vez que empezaron a producirme en masa a bajo costo, hice posible que cada persona pudiera constatar la hora cada vez que quería y ser puntual.
- Le dí a los individuos una manera de viajar rápidamente adonde quisieran, alrededor de una ciudad o largas distancias, incluso en el momento en que ellos lo deseaban. Me hice tan importante que transformé el país.
- Hice una de las tareas de la cocina mas rápida.
- Gracias a mi, la gente y la carga pudieron viajar largas distancias más rápidamente que antes y las fábricas pudieron vender a los compradores lo que hacían en todo el país.
- Mantuve un registro mas rápido y mas eficiente del intercambio de dinero efectivo de lo que había sido posible anteriormente.
- Empecé ayudando a la gente a procesar información más rápido y mis descendientes continúan haciendo el mismo trabajo y muchos otros. Pueden procesar mas información que la que yo pude, mucho más rápidamente y seguramente son ¡más pequeños!
- Una vez que me hice común, una persona podía hablar directamente con otra, ambas oyendo sus voces aun cuando estuvieran separadas cientos de millas. Al principio fuí solo usado en los negocios, pero pronto me mudé también a los hogares.
- He estado comercialmente en uso justo desde la Primera Guerra Mundial, transportando a la gente en largas distancias en tiempos fantásticamente cortos. Soy ahora la forma mas común para viajar cuando la gente no conduce.
- Aceleré la comunicación escrita.
- Soy un miembro poco común de mi familia, pero modelos de todo tipo nos hicieron populares a finales de 1880. Le dimos a nuestros usuarios un sentido maravilloso de libertad de movimiento y velocidad, y nuestra popularidad condujo a la demanda de mejores vías.
- Fui el primer equipo que pudo llevar mensajes instantáneamente a través de largas distancias, aunque estos mensajes tenían que estar en un código. Aunque la figura me muestra haciendo otra cosa, soy particularmente famoso por hacer posible los movimientos de los trenes en los sistemas ferroviarios grandes.